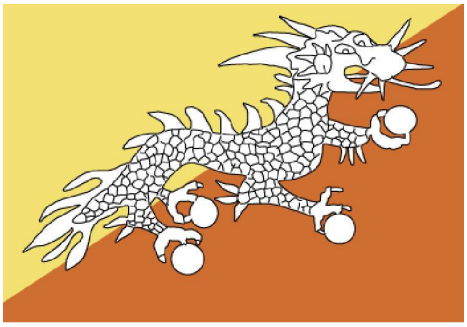
Executive Summary



In keeping with the policy of the Royal Government of Bhutan for enlarging the role of the private sector in the economic development of Bhutan, the Department of Industry, Ministry of Economic Affairs, commissioned this Investment Opportunity Study for the entire country. This required mapping the resources of the entire country for the purpose of identifying investment opportunities, and preparing project profiles for 10 prioritized projects with details on investment, technology, market, global competitiveness, environmental issues and profitability. The study also involved developing an action plan for implementation of the recommendations and generating a list of projects for further detailed studies.

This study commenced in February 2006 and the field work was completed in July 2006. The draft report submitted thereafter underwent a number of revisions and modifications primarily to synchronize field data with published information. In general the report is therefore based on 2005 data unless indicated otherwise. The report was finalized in December 2007 after successive reviews, incorporation of various comments and observations from the concerned Ministries and Departments. During the field study, our experts surveyed all the districts of Bhutan to collect at first hand, all possible information on resources, recording the data in a structured questionnaire. Our teams also met the Dzongdags, Planning and other senior officials of the Dzongkhags, for their inputs. After completing the data collection at the Dzongkhag level, the team returned to Thimphu to collect the resources data at the national level, interviewing officials at most of the Ministries, Departments and related Institutions. Our desk research teams researched the official websites of the Royal Government of Bhutan, as well as the reports published by international financial institutions such as the World Bank and the Asian Development Bank.

The data was then collated. Where resource data revealed small volumes of commercial insignificance, it was screened out at the Dzongkhag level itself. Discrepancies in data from different sources were identified and some data rejected for lack of authenticity. The meaningful data was compiled into a detailed inventory Dzongkhag-wise, under the different heads of resources, which had been defined in the beginning of the study and approved in the Inception Report. Analysis of the inventory of resources identified exploitable surplus or shortfalls, which presented opportunities for investment. Weaknesses were also identified in the investment environment at the Dzongkhag level. This enabled a 'SWOT Analysis' for each Dzongkhag.

From a review of the resources at the Dzongkhag level, several investment ideas emerged and these preliminary ideas have been listed for each Dzongkhag, as 'Investment Opportunity Ideas'.

Analysis of the data at the national level is covered in 'Investment Opportunity Study Volume I', which presents an overview at the national level, of all the contributory factors that determine the health of the economy of Bhutan and the drivers for its growth.

The investment opportunity ideas at the Dzongkhag level were reviewed and concretized into 'Projects for Further Detailed Studies', to point out the need for detailed professional evaluation of suggested projects on the basis of their relevance to Bhutan and the major markets in its proximity.

Recommendations on project implementation at the National and Dzongkhag levels have been made by our experts, based upon their evaluation of the country's investment environment and potential.

The Study highlighted the clear difference between the opportunities and business environment in the border areas and those in the interior areas. This calls for different approaches to development in the respective areas.

In the southern region, with the availability of a large pool of inexpensive labor from across the border and better access to raw materials and markets for final products, it is more feasible to develop industries that make intensive use of labor and raw materials. In the northern and interior areas, where labour and transport costs (both inward for raw materials and outward for finished products) are appreciably higher, the cost of producing for any, but the local market is prohibitive.
A more feasible development strategy for the north would be to focus on niche industries and on services to support labor-intensive industry in the south. Industrial development on the border will create demand for support services for management, accounting, maintenance, information technology services, and the like. Service jobs typically demand higher skill levels than most manufacturing jobs but also provide higher value addition per worker and, thus, higher wages. However, developing a service sector that provides avenues for well-paid employment will require significant investment in the education and training of human resources.

New investments in the south can take full advantage of Bhutan's inexpensive power to develop heavier industries, but there is a note of caution now on the availability of power. Bhutan's total installed capacity has reached 1488 MW after the commissioning of the Tala Hydropower Project. This figure can shoot up to 1612 MW during the monsoons. However, it drops to 283 MW during the winter months. To have 100% reliable power supply in the kingdom throughout the year, the power consumption is confined to firm power of 283 MW, unless new generating capacity is added, which is unlikely in the immediate future.

The interior areas also have the potential to develop niche industries that do not require large inputs of raw materials (particularly from outside of Bhutan) and do not produce heavy finished products that incur high transport costs in export. Niche industries should build as much as possible on the country's agro-processing base such as maize, potatoes, medicinal herbs, spice oleoresins etc. For niche industries to succeed, quality production will be critical. Thus, if Bhutan is to find its own place in the sun of niche markets, it is imperative that it establishes quality standards and encourages farm productivity improvement training for consistent production. Bhutan could build on one of its significant advantages, by initiating certification for organic status for the agricultural produce of some of its Dzongkhags.

Non-traditional niche industries include those based on handicrafts or non-wood resources like fragrances, aromatic and incense. Information technology provides another avenue for investment, along with other industries not heavily dependent on transport or low-cost labor. In both central and southern Bhutan, the development of industries based on locally available surplus resources should be encouraged – this includes agro-processing, tourism, non-wood forest produce based industries.

The ten prioritized projects are selected on the basis of the commercially exploitable surplus in resources, to give products, which have good national and international markets. Maize is one of the major surplus crops of Bhutan and offers immense scope for breakfast cereals for the ever-expanding markets in neighbouring India. Thus, the breakfast cereals project has been selected as one of the key investment projects. In Bhutan, horticulture is an important economic activity and the climatic conditions are favorable for seasonable vegetables, which can be sold in the premium category as "out of season" vegetables provided international quality cleaning, grading and packaging is adopted for increasing the shelf life as well as in saving wastage. Thus, the project for fruit and vegetable cleaning, grading and packaging will be one of the important investment projects at national level, catering to local and international markets.

Potato is another major produce with a surplus and Bhutanese potatoes being excellent in quality, we suggest a project for producing potato chips and flakes for the international market.

Minerals are an important resource for Bhutan. Dolomite is one such mineral, which qualifies as a commercially exploitable resource for production of magnesium carbonate and calcium carbonate. These are in high demand in the neighbouring markets. The proposed project does not have any significant adverse impact on the environment.

Horticulture products like chili, cardamom, and ginger are available in surplus quantities and have potential for high value addition by conversion into oleoresins; thus, one of the projects suggested is for manufacture of spices oleoresin for which a large export market exists.

The animation industry is growing at a very fast rate world wide and Bhutan's English speaking and creative young population is well suited to capitalizing on it. There is a good scope for developing the IT infrastructure for this project. The proximity to India is another advantage. BPO projects also benefit from the fact that business process work is being increasingly outsourced to new destinations. Bhutan can take advantage of this situation and develop into a good ITES hub.

Fast moving consumable products, which are presently imported from India or neighboring countries, offer interesting investment options in a cluster based environment. Most of these products are manufactured in tiny to small-scale industries, but are marketed by transnational companies or big corporations.

The advertising or branding is one of the key issues. In Bhutan, cluster based projects have a good future, as many entrepreneurs will be available for setting up such units, which can cater to local markets and neighboring countries as well. Thus, the FMCG cluster project has been suggested as a unique project based on the cluster concept. Another important project is construction cluster as infrastructure development is booming in Bhutan.

Another important resource in Bhutan is livestock. Livestock products like milk, which is in surplus in many of the Dzongkhags, can change the local economy and bring prosperity at Gewog level with processing and value addition. Thus, integrated dairy project is considered.

The following table lists ten prioritized projects and suggested locations:

Project No.	Projects	Locations
G1	Breakfast Cereals (Maize)	Mongar , Trashigang , Samtse, Dagana, Samdrup Jongkhar , Sarpang and Zhemgang
G2	Fruits/Vegetables Cleaning, Grading and Packaging unit.	Thimphu, Phuentsholing, Gelephu, Samdrup Jongkhar
G3	Savory Potato Products	Thimphu, Trashigang, Wangdue Phodrang and Chhukha
G4	Manufacturing of Magnesium Carbonate and Calcium Carbonate	Gelephu
G5	Spice Oleoresin (Chili, Cardamom, Ginger)	Samdrup Jongkhar
G6	Digital Animation Studio	Thimphu
G7	Fast Moving Consumer Goods (FMCG) Cluster Park	Gelephu
G8	Business Process Outsourcing Units	Thimphu, Paro and Phuentsholing
G9	Construction Material Cluster	Mongar, Thimphu (Jemina Industrial Area), Bumthang and Samdrup Jongkhar
G10	Integrated Dairy	Paro, Chhukha, Haa, Tsirang, Wangdue Phodrang, Dagana and Sarpang

Table1: Ten Prioritized Projects and Suggested Locations

The output of this Investment Opportunity Study is being reported in two volumes, as follows:

Volume I: Country Inventory of Resources, List of Projects for Further Detailed Study and Project Profiles of Prioritized Projects

- Consolidated national investment opportunity report with a list of projects in manufacturing, services and trade and policy recommendations at the district as well as national level.

- A list of recommended projects for further feasibility studies and ten prioritized project profiles.

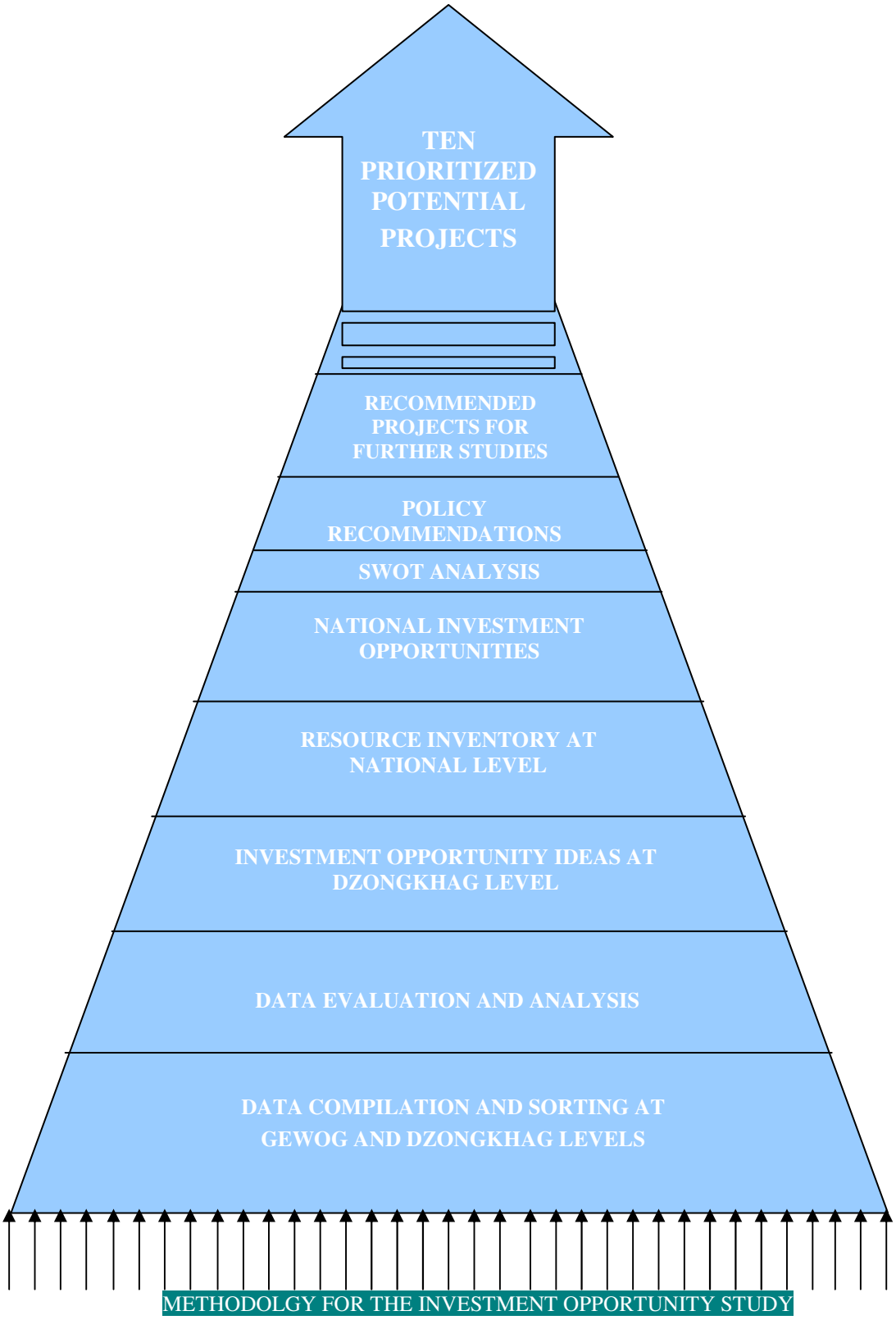
Volume II: Inventory of Resources Dzongkhag - wise and Investment Opportunities

- Inventory of resources, skills, infrastructure, comparative advantages and a list of potential business ideas in manufacturing, services and trade for each Dzongkhag.

Valuable cooperation and guidance were received by our team from the Department of Industry, Ministry of Economic Affairs. The analysis and constructive comments received from Director General and his team of officers, Mr. Loknath Chapagai, Joint Director and the other Project Development Officers, have helped mould this report in its present form; their contribution is gratefully recorded.

We also acknowledge the contribution of a great many individuals, departments and institutions in completing this project, which we trust will be an important milestone in the economic development of Bhutan in the years to come.

The methodology followed in the collection of data and its flow through various screening levels, to analysis and utilization in terms of project ideas, is represented in the block diagram below:



A Country Profile and Economy

The Kingdom of Bhutan is a land-locked country, situated in the eastern Himalayas and is one of the ecological wonders of the world. The terrain is among the most rugged and mountainous in the world. The country is bordered in the north by the Tibetan region of China and Indian states, in the South, West and East. Bhutan is situated between 26° 45' N and 28° 10' N latitude and between 88° 45' E and 92° 10' E longitude with the altitude ranging from 150m to 7,550m. It has a total area of 38,397 Sq km, and a 1075 km border (with India 605 km and with China 470 km).

The climate is extremely varied, ranging from sub-tropical in the lower southern foothills to temperate in the central belt, to the permanent ice and tundra conditions in the north. Water resources are abundant in Bhutan and provide many possibilities for hydropower generation. As local requirements are still quite modest, the major share of the energy produced is exported, representing a large part of Bhutan's total export revenue.

Figure A.1 Secretariat Building-Bhutan

Administratively, it is divided into twenty Dzongkhags, which can be grouped in three regions namely western (Thimphu, Paro, Haa, Samtse, Chhukha, Punakha, Gasa), central (Wangdue Phodrang, Dagana, Tsirang, Zhemgang, Trongsa, Bumthang) and eastern (Lhuentse, Mongar, Pemagatshel, Samdrup Jongkhar, Trashigang and Trashi Yangtse). There is a total of 205 Gewogs and the population of the country is 634,982 as per the 2005 census.

The local currency is Ngultrum (Nu) = 100 Cheltrum. The Ngultrum is pegged at parity to the Indian Rupee.

The flora and fauna of Bhutan are diverse; 72% of the country is covered by forests of fir, mixed conifers, temperate, chir pine and broad leaf species. The declared nature parks and reserves cover 26% of the country's land area. Much of the flora has remained undisturbed and Bhutan most likely has the richest flora in the Himalayan region.

The population density is 16 inhabitants per sq. km. Dzongkha is the official language; however, English is widely spoken and understood. The other languages spoken are Sharchopkha (East) and Nepali (South). The national literacy rate is 59.5% female 48.7% and male 69.1% (people aged 6 years and above). It has a road network of 4,393 km (2005) and at present Paro International Airport is the only airport, which is 1.5 hours driving time from Thimphu. Kolkata (India) is the most commonly used port for international trade with outside world.

Bhutan's hydropower potential and its attraction for tourists are key resources. Model education, social and environment programs are under way with the support of multilateral development organizations. Economic programs take into account the government's desire to protect the country's environment and cultural traditions.

Bhutan's development philosophy is based on the concept of Gross National Happiness (GNH) that takes into account the intangible components of culture, spirituality, environment and good governance along with sustainable socio economic development when determining policies. The concept is main-streamed in the design of development policies and programs. It is in consonance with the Buddhist philosophy that the ultimate goal of every human being is to attain happiness.

Source:
[1] Statistical Yearbook of Bhutan -2005, National Statistical Bureau, Bhutan.

A.1 Structure of the Economy

The economy of Bhutan is predominantly rural. The land area suitable for agriculture production is limited, because of the steep terrain and high altitude. Most rural households own livestock, which is left for grazing in pastures and some forest areas. The majority, about 69%, of the population derive their living from agriculture and other traditional activities in the rural sector.

Bhutanese economy registered steady and remarkable growth at and average of 6-7% per annum over the past 20 years. In 2005, GDP expanded by 5%, reaching approximately US$1,321 per capita. Much of the growth is due to the coming on stream of additional hydroelectric capacity (for domestic use as well as for export to India), and the rapidly growing services sector. Inflation has remained within single digits over most of the past decade, due in part to currency parity with the Indian rupee, and a trade ratio of nearly 60% of GDP with India.

The important economic performance indicators as on March 2006 are given in table A.1

S. No.	Performance Indicators	March 2006
1	GDP (Million Nu.)	33,104
2	Per capita GDP in US$	1,320.90
3	Average GDP growth (%)	7.50
4	Share of Agriculture to GDP	25
5	Saving as % of GDP	32.80
6	Investment as % of GDP	61
7	Export of goods and services as % to GDP	28.20
8	Import of goods and services as % to GDP	41.50
9	Inflation Rate (%) (1st Quarter 2006)	3.13
10	Foreign exchange reserves (Million US $) –2005	511.70
11	Exchange Rate Nu. / US $	45.30
12	Population (PHBC-2005)	6,34,982
13	Population Growth Rate	1.30
14	Rural Population	69 %
15	Urban Population	30.90%
16	Male: Female Ratio	111 Males per 100 Females
17	Unemployment Rate	3.10%
18	Population below Poverty Line	31.70%
19	National Poverty Line	740.36 Nu. per month
20	Health Coverage	90%
21	Literacy Rate March 2006	59.50%

Table A.1 Performance Indicators-Bhutan (March -2006)

A.2 Revenue Sources (Sector-wise)

The key economic performance in terms of revenue by the sectors comprising of electricity, trading, services, primary, manufacturing, and finance is shown in the table A.2. In the financial year 2005-2006, the trade sector was the highest revenue earner at Nu.2276 million, followed by electricity with Nu.2214 million, services with Nu.1431 million, finance with Nu.509 million, manufacturing with Nu.268 million and the primary sector with Nu.137 million.

(Nu. in million)

Sector	FY 2003-2004	% of Total Revenue	FY 2004-2005	% of Total Revenue	FY 2005-2006	% of Total Revenue
Electricity	1935	37.80	1953	31.90	2214	32.39
Trade	1234	24.10	1899	31.00	2276	33.30
Service	893	17.40	1394	22.80	1431	20.94
Primary	152	3.00	132	2.20	137	2.04
Manufacturing	282	5.50	264	4.30	268	3.92
Finance	205	4.00	361	5.90	509	7.45
	4700		**6004**		**6835**	

Table A. 2 Revenue Sources (Sector-wise)

A.2.1 Top Ten Revenue Agencies[1]

The top ten revenue agencies have been identified based on their contribution to the national revenue. Their contribution to the national exchequer and rank during the FY 2004-05 and FY2005-2006 is given below.

(Nu. in million)

S. No.	Source of Revenue	Financial year 2004-05	Rank	Financial year 2005-06	Rank
1	Chhukha Hydro Power Corporation Limited	1924.29	1	2092.68	1
2	Royal Monetary Authority of Bhutan	181.80	3	315.11	2
3	Department of Tourism	239.67	2	314.44	3
4	Department of Lottery	110.67	5	143.45	4
5	Penden Cement Authority Limited	131.07	4	131.70	5
6	Bhutan Telecom Corp. Ltd.	98.56	7	129.48	6
7	Basochu Hydro Power Corporation Ltd.	28.27	10	121.58	7
8	Road Safety & Transport Authority	91.12	8	102.08	8
9	Bank of Bhutan Limited	110.02	6	76.91	9
10	Dept. of Forestry Services	52.95	9	47.17	10
	Total	**6120.41**		**6974.43**	

Table A.3 Top Ten Revenue Agencies

A.3 Revenue Performance by Region [1]

Review of revenue performance region-wise, for the FY 2004-05, based on the collections by the five Regional Revenue and Customs Offices (RRCO), located at Phuentsholing, Thimphu, Samtse, Samdrup Jongkhar and Gelephu, shows predominance of Phuentsholing region.

There are marked differences in the composition of growth and decline of revenue from different regions. Phuentsholing region still retains its position as the number one revenue-generating region in the country because it is one of the gateways of Bhutan, where not only majority of the trade takes place, but also the country's biggest hydro-power projects are located in this region. It contributes Nu.3514.191 million or 57.4% to the total national revenue followed by Thimphu region, where the majority of business units are located, contributing Nu.2026.096 million or 33.1 % to the total national revenue. Next is the Samtse region contributing Nu.252.011 million or 4.1%, Samdrup Jongkhar Nu.216.075 million or 3.5% and Gelephu Nu.112.036 million or 1.8% to the total national revenue.

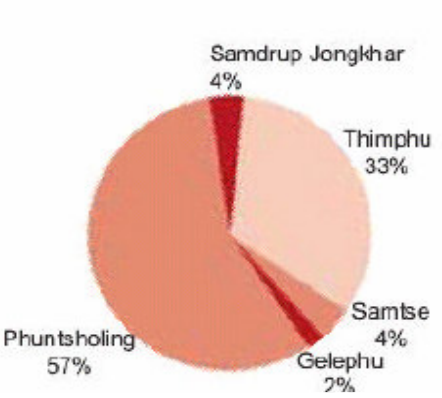


Fig: A.2 Revenue Performance by Regional Offices

Source:
[1]Performance Indicator Report-2006, Department of Revenue and Customs, Ministry of Finance, Bhutan

B Inventory of Country Resources

The objective of the study is to identify various opportunities for investment in Bhutan and the starting point is the mapping of the country's resources. Data on resources collected at the Dzongkhag level has been screened for determining whether investment opportunities arise thereon, for inclusion at the national level. The following filters have been used:

1. The amount or volume of the resource available for exploitation
2. The logistics of collection of the resource
3. The demand for the products arising from the resource

The Inventory of Country Resources has been classified into the following sectors:

- Agriculture and Livestock
- Horticulture
- Wood
- Non-wood Forest Produce
- Tourism
- Minerals
- Services

Each sector carries the following description:

- The current scenario
- The inventory of resources
- Analysis of the availability
- Resource availability for further exploitation

This resource availability is analyzed for the investment opportunities that they generate. The results of the preliminary analysis are elaborated in the 'National Investment Opportunities' section and project ideas identified based on the analysis f resources are listed in the section 'Projects for Further Detailed Studies'. From this outline, a final selection of ten projects is derived.

These projects are listed under the section on 'Ten Potential Projects at National Level', and each project profile contains the following information:

- Introduction
- Markets and Global Competition
- Proposed Business Structure
- Project Location and Size
- Infrastructure Requirements
- Technology/Manufacturing Process
- Product Quality Standards
- Consumption of Raw Materials and Services
- Project Cost and Profitability
- Financial Ratios
- Environmental Issues

1 Infrastructure

1.1 Roads[1]

Road transport is the dominant mode of transportation for passengers and freight within the country and to the neighboring states of India. The country's vehicle fleet has increased significantly from about 13,600 at the end of 1997 to over 33,000 at the end of 2006. Despite this, Bhutan has the lowest rate of traffic-related fatalities in South Asia, around 8 per 10,000 vehicles a year. Bhutan has a total road network of 4,393 kms, with Phuentsholing as the main point of trade with India. Key road sector statistics are as illustrated below:

Particulars	Units	As of 2006
Length of Roads	km.	4,393
Main Roads	km.	3,750
Paved Roads	%	56
Access to All-Season-Roads (% of Rural Population)	%	47
Road Density – Land	km./1,000 sq. km.	114

Table: 1.1 Transport Sector Key Statistics[1]

National Highways in Bhutan

The following are the national highways in Bhutan:

1. Phuentsholing - Thimphu Highway
2. Trashigang - Semtokha Highway
3. Sarpang - Gelephu - Trongsa Highway
4. Wangdue - Tsirang Highway
5. Sarpang - Tsirang Highway
6. Missina - Punakha Highway
7. Samdrup Jongkhar - Trashigang Highway
8. Chuzom - Drugyeldzong Highway
9. Jumja - Raidak Highway
10. Kharbandi-Singhi Highway
11. Chuzom - Haa Highway
12. Bondey - Haa Highway

New Roads under Construction[2]

1. Nangar-Ura realignment
2. Lhuentse-Dungkhar Road (37 km.)
3. Gomphu-Pangbang Highway (54 km.)
4. Samtse-Phuntsholing Highway (78 km.)
5. Yadi-Shershong Road (17.2 km.)

Source:
[1]World Bank Report -2006 and Road Safety & Transport Authority, MoIC, Bhutan.
[2]Department of Roads, Ministry of Works & Human Settlement, Bhutan.

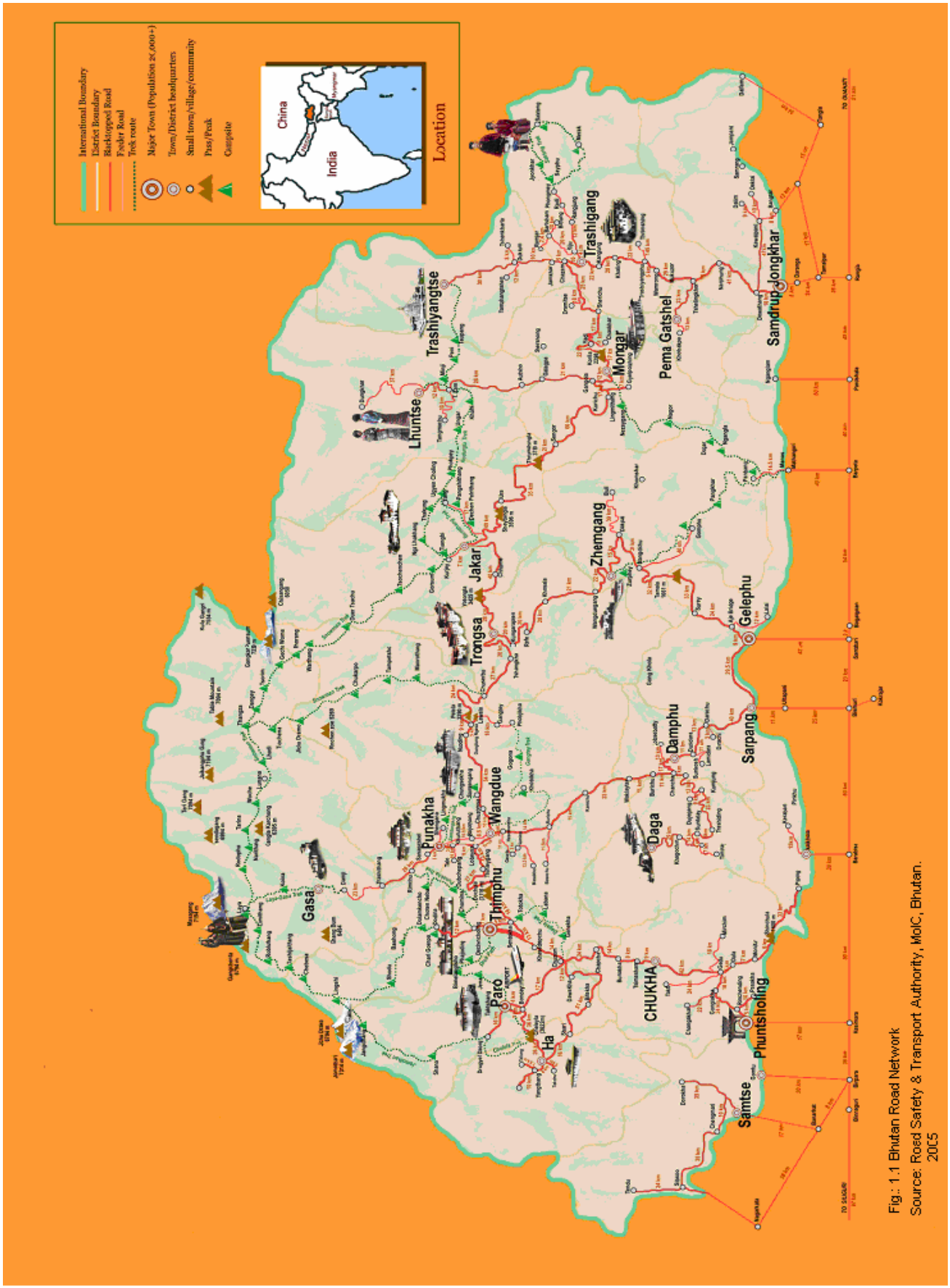


Fig.: 1.1 Bhutan Road Network
Source: Road Safety & Transport Authority, MoIC, Bhutan. 20C5

1.2 Education[1]

Bhutan has made great strides toward building a primary and secondary system of public education. Priority has been given to basic education by the Royal Government, which has enabled primary school enrolment to increase at the rate of 8 % in recent years.

The country has 245 community schools, 88 primary schools, 112 lower secondary schools, 26 higher secondary schools, 16 private schools, 7 graduate colleges and 9 training institutes. The education and training system has a current enrolment of about 1,90,000 students and teaching staff of 6,094 as per data (2006) from the Department of Education.

The development of the nation's education and training system has been remarkable, but there are limited options for pursuing higher or professional courses after completion of school. This poses a bigger challenge. Towards mitigating this, the Government has determined the 9th five year plan objectives of the education sector as follows:

- Invest in areas where employment generation can be maximized.
- Develop human and industrial capacity.
- Enhance private sector development.

The Royal Government, also, has formulated a long-term human resource development plan in the Bhutan Vision 2020 document.

1.2.1 Employment Scenario[2]

According to the Labour Force Survey 2005, 44% of the population was employed in agriculture. The service sector was the other main employer, followed by the public sector (see table below).

S. No.	Population Occupied in Different Sectors: 2005	%
1	Agriculture	44
2	Construction	12
3	Government	7
4	Retail, wholesale	3
5	Transport, communications	3
6	Education	3
7	Manufacturing	2
8	Electricity, gas, water	2
9	Hotels, restaurants	2
10	Finance, insurance	1
11	Health	1
12	Mining	1
13	Others	19
	Total	**100**

Table: 1.2.1 Employment Scenario -2005

In 1961, at the beginning of the First Five-Year Plan, Bhutan started to employ foreign workers from India and Nepal to meet labour shortages. Many Indian workers comprising both skilled and unskilled workers, technicians and shopkeepers continue to work in Bhutan. Most of them are engaged on a daily wage basis or for specific projects.

Although labour shortages continue to exist (for manual labour, as well as for managerial and specialist technicians), unemployment has become a concern - particularly the unemployment of youth. Bhutan was estimated to produce around 50,000 university graduates and school leavers by the end of 9th plan , forcing the government to seriously examine ways of boosting job-creating activities. Changing the attitude towards manual and vocational labour ('dignity of labour' campaign) and strengthening entrepreneurship (including programmes aimed at school leavers) are among Government's initiatives to meet the challenge of youth unemployment.

The Royal University of Bhutan offers graduate and postgraduate certificate courses in education and management. It will gradually expand its courses. The Royal Institute of Management has, to date, focused mainly on training of government officials.

Source:
[1]General Statistics 2006-Year Book, Department of School Education, Ministry of Education, Thimphu.
[2]Department of Employment, Ministry of Labour & Human Resources - Bhutan.

1.2.2 Supply Projections

Different educational institutes within the country produce around 4000 students who enter the labour market every year. The annual student output would increase to almost 14,000 by 2010.Although the Government has upgraded some schools and built vocational training institutes, and new higher secondary private schools have come up, the average number of job seekers remains more or less the same since higher education options are not being taken up. The Labour Force Survey 2002 indicates that by 2010, 91,000 young people will be seeking jobs.

S. No.	Source of Labour	Projections
1	Class VIII-XII	27,200
2	Graduates (including teachers from NIEs)	4,700
3	Vocational Training Institutes	17,300
	Total	**49,200**

Table: 1.2.2 Supply Projection of Graduates and School Dropouts in Ninth Plan

School leavers (including dropouts from classes VI to XI) will number 76,000, while only 15,000 will seek university education. In 2020, there would be 267,000 students seeking jobs. By the end of Ninth FYP (2002-2007), more than 50,000 youths will be looking for employment. The bulk of these, estimated at 27,200 will be those who have studied anywhere between Class VIII and Class XII. From the vocational institutes, another 17,300 will join the hunt albeit with better prospects since, they would have acquired certain skills. The remaining would be graduates from Sherubtse College and National Institute of Education in Paro and Samtse, as well as those who are graduating from the educational institutes in India and abroad.

1.3 Health[1]

Bhutan's health-care development accelerated in the early 1960's with the establishment of the Department of Public Health and the opening of new hospitals and dispensaries throughout the country. By 1998, health care was provided through some twenty-eight general hospitals (including five leprosy hospitals, three army hospitals, and one mobile hospital), forty-six dispensaries, sixty-seven basic health units, four indigenous-medicine dispensaries and fifteen malaria eradication centers. The major hospitals were in Thimphu, Gelephu and Trashigang. By 2006, out of the 29 existing hospitals, 3 were designated as the regional referral hospitals to provide full secondary services and limited specialist services.

The expansion works for the Jigme Dorji Wangchuck National Referral Hospital and Mongar Eastern Regional Referral Hospital are being continued. Construction of the health headquarters building as well as Trashigang and Trongsa hospitals are going at a fast pace.

At the end of the 9FYP, the health services is going to reach a larger part of the population with people living in remoter areas having increased access to Public Health Centers, and people in general having better access to secondary and tertiary care. Utilisation of health services would have increased in general, and in particular, in population groups that for various reasons other than distance currently tend to underutilise the services. By the end of 9FYP, the integrated public health programmes will further reduce the incidences of diseases among the children under five. The rigorous population planning activities would bring the growth rate to a manageable level.

The traditional medicine system is well established and integrated with the modern health system. There is one indigenous hospital in the capital and indigenous services have been expanded to 18 Dzongkhags, where premises are shared with the dzongkhag hospitals or Grade I BHUs. However, there is still a need for more staff. With the establishment of the pharmaceutical and research units, the production and supply of traditional medicines have been increased which has helped to meet the demand.

Along with the infrastructure expansion, the human resource development had also taken a big turn with the employment of better skilled and trained health workers through which the quality and efficiency of the delivery of health care services are enhanced. The ratio of the doctors per ten thousand population is 1.7, which is however, still very low. Further, the B.Sc. Nursing course was introduced at the RIHS in collaboration with the La Trobe University (LTU) School of Nursing, Melbourne, Australia. This programme was developed to strengthen services, through which quality of the services would be improved. There is still a lack of human resources especially at the more specialized levels as the training time for such cadres for various reasons has proved to be longer than expected.

Source:
[1]Department of Medical Services, Thimphu - Ministry of Health, Bhutan.

1.4 Energy[1]

Hydroelectric power has long been a very important aspect of Bhutan's economic development as a low-cost energy source supporting more capital-intensive industries such as, mining, cement, ferrosilicon and calcium carbide production. Bhutan's steep mountains, deep gorges and fast-flowing rivers create abundant hydroelectric potential, which the government began to develop in the early 1960s. In 1981, Bhutan generated 22 million kilowatt hours of energy from hydroelectric power plants.

The major expansion of hydroelectric facilities started in 1975 on the Wang Chhu between Thimphu and Phuentsholing, known as the Chhukha Hydro Power Corporation Ltd. (CHPCL), which helped to boost the nation's fledgling industrial development. The 336-megawatt Chhukha project came on line in 1986 and was synchronized with the Indian grid that same year, and additional capacity became available in 1988. Sixty percent of the Nu.2.44 billion Chhukha project was financed by India and budgeted outside the normal development plan process. It was planned that Bhutan would sell all unused power at low cost, to West Bengal. At the same cost, Bhutan also hoped to re-import some of that power through the Indian power grid into all the southern districts.

The Chhukha project was important not only because it supplied electric power to the western and southern districts, but also because it provided a major source of income to the government.

Besides the Chhukha project, the government installations include seven mini-hydroelectric plants, each averaging 7,350 kilowatts capacity; twelve micro-hydroelectric plants, each averaging 340 kilowatts capacity and eight diesel-powered generating stations, each averaging 6,000 kilowatts capacity.

A smaller enterprise, such as, the 1.5 megawatt Gyetsa Mini-Hydel that was inaugurated in 1989, brought badly needed power to Bumthang. A 60-megawatt plant at Kurichu in eastern Bhutan was included in the sixth five-year plan (1987-92). Further growth in power generation is described below:

1.4.1 Major Hydro Power Plants

Following are the major hydroelectric projects. Although these projects are primarily aimed for export, yet only the surplus power generated is exported after meeting the domestic demand.

1. **Tala Hydroelectric Project**
   This project was completed in 2006. It has an installed capacity of 1,020 MW and an annual generation of 4,865 million units. The project is financed by the Government of India with a financing mix of bilateral assistance and soft loan. This project is the largest high-head (860m) power plant being constructed in the region.

2. **Kurichu Hydroelectric Project**
   This project was completed in 2002 with an installed capacity of 60 MW and an annual generation of 400 million units. It is supplying power to six dzongkhags in eastern Bhutan and two dzongkhags in south-central Bhutan. The surplus power is being exported to India through the 132 kV Gelephu-Salakati line. The project was financed by a combination of bilateral assistance and soft loan from the Government of India.

3. **Basochu Upper Stage Hydropower Project**
   This project has an installed capacity of 22.2 MW with an annual generation of 105 million units. The project was completed in December 2001. This project has helped augment the generation and supply in western Bhutan as well as improve the reliability of power supply in the region. The project was financed by the Austrian Government under a financing mix of bilateral assistance and soft loan.

4. **Basochu Lower Stage (Rurichu) Hydropower Project**
   A turnkey project agreement was signed on September 13, 2001 between the Royal Government of Bhutan and Austrian Hydro Consortium Basochu (AHCB) for the lower stage of the Basochu project. This second stage has an installed capacity of 40 MW with an annual energy generation of 186 million units.

Source:
[1]Department of Energy, Bhutan.

1.4.1.1 Power generation and supply (2006) :

- Total electricity generation (million units) 2520.2
- Hydro electricity generated by CHPCL (million units) 1831.3
- Export of electricity from CHPCL (million units) 1475.1
- Hydro electricity generated by Kurichu (million units) 366.2
- Export of electricity from Kurichu (million units) 302.1
- Total export of electricity to India (%) 71%
- Number of villages electrified as of June 2005 1210
- Number of towns electrified as of June 2005 46
- Number of electricity consumers (house hold) as of July 6,2006 57,509

The major hydro power plants, their installed capacity, summer peak and winter peak generating capacities are given in following table:

S. No.	Name of Plant	Installed Capacity	Summer peak (MW)	Winter peak (MW)
1	Kurichu Hydro Power Plant	60	68	15
2	Chhukha Hydro Power Plant	336	360	84
3	Basochu Hydro Power Plant	62.2	74	10
4	Tala Hydro Power Plant	1020	1110	170

Table 1.4.1 Existing Major Hydro Power Plants in Bhutan (As of 2006)
(Source: Bhutan Power Corporation Ltd. and Department of Energy, Ministry of Economic Affairs, Bhutan.)

Power Statistics: The following figures give the total potential and targeted achievement in 8th plan, 9th plan and year 2020. (Source BPCL web)

- Potential 30,000 MW
- 8th Plan 1,490 MW
- 9th Plan 2,510 MW
- 2020 (Target) 6,002 MW

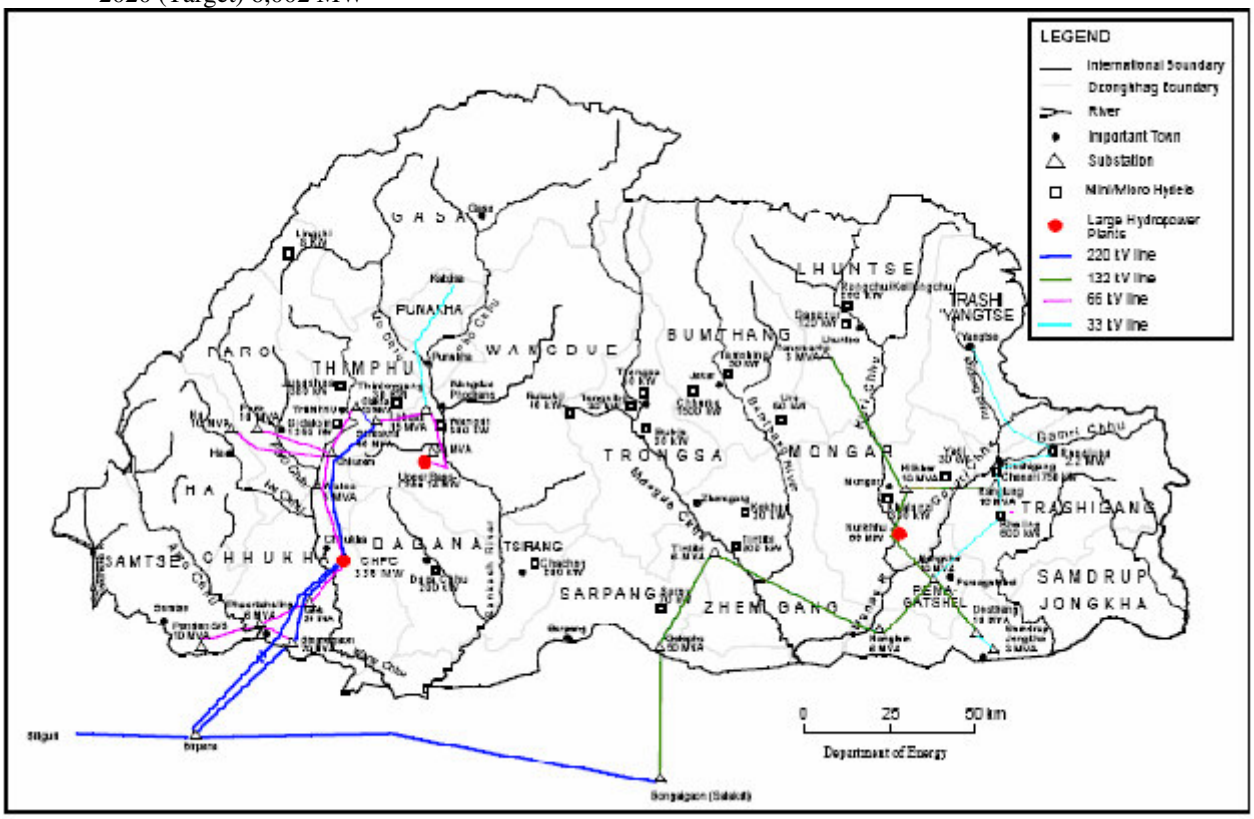


Figure 1.2 Power Infrastructure in the beginning of Ninth Five Year Plan

1.4.2 Electricity Generation - Micro Hydels

The following table gives the electricity generation potential of existing micro hydels:

S. No.	Hydro Stations	No.	Installed Capacity	Generating Capacity
1	Lhuentse	2	0.06	0.12
2	Rukubji (W/Phodrang)	1	0.04	0.04
3	Tangsibi (Trongsa)	1	0.03	0.03
4	Trongsa	1	0.05	0.05
5	Bubja (Trongsa)	1	0.03	0.03
6	Tamshing (Bjakar)	1	0.03	0.03
7	Ura (Bjakar)	1	0.05	0.05
8	Yadi (Mongar)	1	0.03	0.03
9	Kekhar (Zhemgang)	1	0.02	0.02
10	Surey (Sarpang)	1	0.07	0.07
11	Damphu (Tsirang)	2	0.10	0.20
12	Tingtibi (Zhemgang)	2	0.10	0.20
13	Dagana	2	0.10	0.20
14	Lingzhi (Thimphu)	1	0.008	0.008
15	Rongchu (Lhuentse)	2	0.10	0.20
	Total	**20**	**0.818**	**0.59**

Table 1.4.2 Electricity Generating- Micro Hydels.

(Source: National Statistical Bureau -2006)

1.4.3 Planned Hydropower Plants

The Government has planned following hydropower projects for increasing the generation capacity in the coming years:

S. No.	Name of Project	Proposed installed capacity	Expected operation
1	Punatsangchu - I	1095 MW	2012/2014
2	Mangdechu	672 MW	2015
3	Punatsangchu - II	992 MW	2015
4	Dagachu CDM	114 MW	2012

Table1.4.3 Planned Hydro Power Projects in Bhutan

(Source: Bhutan Power Corporation Ltd.)

1.4.4 Electricity Prices for Industrial Customers in Selected South Asian Countries

The prices have been shown after conversion in Nu. for the comparative study.

S. No.	Country	Nu. Per unit
1	**India**	
1.1	Assam	5.25
1.2	Bihar	5.45
1.3	Delhi	4.68
1.4	Gujarat	5.32
1.5	Maharashtra	5.52
1.6	Uttar Pradesh	4.85
1.7	West Bengal	5.80
2	**Bhutan**	**1.40/ 1.45**
3	**Bangladesh**	5.85
4	**Nepal**	4.80
5	**Pakistan**	6.50
6	**Sri Lanka**	4.80

Table 1.4.4 Electricity Prices for Industrial Customers in Selected South Asian Countries *(price per kilowatt-hour)

(Source: Annual Report on the State Electricity Boards for other countries, World Bank.)

As can be seen from the table above, cheap and reliable electricity is among Bhutan's biggest competitive advantages over other countries in South Asia. Indeed, several firms including Bhutan Carbide and Chemicals and Bhutan Ferro Alloys, were established in Bhutan because of this advantage. Electricity prices in Bhutan are half of those of its closest competitor in South Asia and only one fifth of the prices in other important locations in the region.

1.4.5 Other Sources of Energy: It included biogas, which was used in some districts for lighting and cooking and was primarily generated from cow dung. This is not seeing much use currently. Solar energy was used for a variety of purposes, including heating dwellings and greenhouses and lighting hospitals. The full potential for solar energy is yet to be realized in distant locations away from the main power grids. The mountains are funnels for powerful winds, providing another viable renewable energy source. High-technology windmills were installed in Wangdue Phodrang in 1987 to produce electricity to run irrigation pumps.

1.5 Water Supply & Sanitation

Bhutan has achieved great success in enhancing access to safe drinking water and sanitation. More than 85% of the country's population has access to safe drinking water and about 90% has access to basic sanitation facilities.

1	Rural water supply schemes (Nos.) -2006	3,852
2	Rural population access to piped water (%)-2006	78.2%
3	Rural population access to latrine (%)-2006	89%

1.6 Industrial land[1]

The main thrust of investment in Ninth Plan in the manufacturing sector is to create industrial estates around the country. The industrial estates can provide services that may include storage facilities and common facility workshops. Without the creation of industrial estates, infrastructure development cost for individual entrepreneurs can be cost inhibitive. Moreover, clustering industries in a tract of land can offer advantage in management of pollution and waste. The Government has approved five industrial estates at Pasakha in Chhukha, Jigmeling in Sarpang, Raptenling in Samdrup Jongkhar, Bongdyma in Mongar and Tingtibi in Zhemgang Dzongkhags to enable industrialization.

Common workshop facilities, especially in towns are at present located in a manner that poses environmental hazards. The location of automobile workshops in Thimphu is a clear example. Such common utilities/facilities need to be located together in designated service centers. Proposals include developing the Automobile Servicing Centre in Thimphu, Service Centre in Gelephu and Service Centre in Samdrup Jongkhar.

1.6.1 CHHUKHA DZONGKHAG

a. **Phuentsholing Industrial Estate:** It has an area of 46.44 acres including one acre near Doti khola. The estate has 29 numbers of industrial sheds and developed industrial plots. The estate is well facilitated with road network, water supply, power and transmission lines, drainage systems, telecommunication facilities and estate management office.

b. **Pasakha Industrial Estate:** It is located 16 km east of Phuentsholing and has an area of 267 acres. All the facilities like road network, water- supply, power and transmission lines, drainage systems, telecommunication facilities and estate management office are being developed currently. River protection works have been a major infrastructure required for the estate. Out of the 38 industrial plots available, half have already been allotted and the rest are being processed for allotment.

Source:
[1] (1) Project Development and Services Division, Department of Industry, MoEA, Bhutan.
(2)Industrial Infrastructure Development Division. Department of Industry, MoEA, Bhutan

1.6.2 SAMDRUP JONGKHAR DZONGKHAG

a. **Samdrup Jongkhar Service Centre:** It is located 1 km away from Samdrup Jongkhar town. It has an area of 3.2 acres. The area, being located within the municipality area, has water, power and telecommunication facilities.

b. **Raptenling Industrial Estate:** A 226-acre total area has been surveyed for the estate by MoEA, but the area is yet to be cleared by the Department of Forestry Services. It is located 6.5 km east of Samdrup Jongkhar town, and is connected by a rough road.

1.6.3 THIMPHU DZONGKHAG

a. **Changzamtog Service Center:** Developed in 1996, it has a total area of 2.31 acres with facilities like, road and drainage, water supply, power and telecommunication. It has 37 industrial sheds, 10 of which are used as the Government offices and the remaining are rented to service industries.

b. **Jemina Industrial Estate:** It was completed in 2003. It has a total area of 31 acres and is located 25 km from Thimphu. The existing infrastructure facilities within the estate are road and drainage, water supply, power supply, estate office and street lighting. Four industries have been established and one is under construction.

1.6.4 SAMTSE DZONGKHAG

a. **Damdhum Industrial Estate:** The total area of the estate is 565 acres situated at 2 km from Samtse Town. It has the closest location to the Indian markets and the feasibility study of the same has been completed.

1.6.5 SARPANG DZONGKHAG

a. **Gelephu Service Center:** It is located close to Gelephu Town. The Center has 198.33 acres of land with temporary facilities of road, water and power supplies. At present there are six industries.

b. **Jigmeling Industrial Estate:** Located on Gelephu -Sarpang highway, the industrial estate would have an area of 1,200 acres. It has plain land, good wide road, ample water availability and is near to Indian market. The feasibility study of the estate has already been completed.

1.6.6 ZHEMGANG DZONGKHAG

a. **Tingtibi Industrial Area:** An area of 29.07 acres has been identified for the purpose at Tingtibi but no development work has been undertaken.

1.6.7 MONGAR DZONGKHAG

a. **Bongdeyma Industrial Estate:** An area of 63.05 acre has been surveyed, out of which 20.42 acres has been acquired from private parties and 46.91 acres is government land**.**

2 Trade & Industry

A small country of 0.64 million people, Bhutan is situated between what are potentially the two largest markets in the world: China and India. This location gives it a unique advantage.

The Royal Government of Bhutan recognizes the importance of Economic Affairs by managing a separate Ministry for it. The Ministry of Economic Affairs has five technical departments (Trade, Industry, Tourism, Energy and Geology and Mines) and four divisions (Policy & Planning, Administration and Finance, Human Resource and Intellectual Property). It is the nodal agency for investment promotion and regulation. It has six Regional Trade and Industry offices in Thimphu, Phuentsholing, Gelephu, Trongsa, Mongar and Samdrup Jongkhar.

A liberal, flexible trade treaty with India allows import and export of goods in Bhutan through Indian ports from any part of the world, without any levies by Government of India. Trade is mostly confined to retail outlets and most of the goods are from India.

Bhutan's economic modernization began in the 1960. Major reforms in the trading regime have been implemented. Micro trade has been de-licensed and licensing process has also been made simple with the issuance of Bhutan Wholesale and Retail Trade Guidelines, 2006. The Royal Government is inclined to create and maintain an enabling environment to increase private sector participation for the growth of trade and industry.

2.1 Business Environment

2.1.1 Doing Business Report[1] 2007: Bhutan Highlights

As per World Bank's "Doing Business Report - February 2007" on business environment rating, following business parameters have been accorded to Bhutan:

(The report provides a global ranking of 175 world economies on the ease of doing business and reforms. The report is co-sponsored by the World Bank and the International Finance Corporation (IFC), the private sector arm of the World Bank Group.)

Category	Global Ranking - year 2006 (Out of 175)
• Ease of doing business	138
• Starting a business	79
• Dealing with Licences	145
• Employing workers	116
• Registering property	41
• Getting credit	159
• Protecting investors	118
• Paying taxes	68
• Trading across borders	150
• Enforcing contracts	56
• Closing a business	151

Source:
[1]The Global Business Environment Ranking Report is available on the World Bank's website

General Status & Country Rankings
Bhutan ranks 138th out of 175 countries in the year 2007 on the ease of doing business. While wide-ranging reforms have been initiated in Bhutan, implementation is still far from complete. The cost of delaying reforms is high in an increasingly international competitive environment. Progress in reforming business regulations will lead to more investment, job creation and growth.

Starting a Business
Bhutan ranked 79th in the year 2006, on the ease of starting a business, ahead of only India in the South Asia region. No minimum capital requirement applies and start-up cost is one of the lowest in the region at 17% of income per capita. However, entrepreneurs have to complete 10 separate procedures taking 62 days, well above the regional average of 8 procedures and 33 days, and the OECD average of 6 procedures and 17 days.

2.1.2 Investment Climate
In September 2002, the Ministry of Finance announced tax holidays and incentives in the following categories, of which a business entity is eligible for only one:

a. Tax holiday from corporate income tax (CIT) and business income tax (BIT) for newly established business entities (established between 1 January 2003 and 30 June 2007) in manufacturing industries including those in the interior regions, information technology training and vocational training institutes, hotels, schools and auto-mechanical workshops in the interior regions.

b. Re-investment allowance for incorporated companies: 20 per cent of total re-investment, from 1 January 2003 to 30 June 2007.

In addition, other incentives include the following:

c. Sales tax and customs duty are not collected on plant, machinery and raw materials.

d. The tax-deductible salary limits will not apply to incorporated companies.

Bhutan is also implementing the Bureau of Indian Standards (BIS) Certification Scheme. This Scheme aims at helping Bhutanese products find better opportunities to enter Indian markets.

2.1.3 Taxation
The Department of Revenue and Customs at the Ministry of Finance is responsible for structuring and implementing the tax system. There are three categories of tax:

- **Direct tax** (urban tax and rural tax): including corporate income tax and business income tax (30 per cent of net profit), property transfer (5 per cent), land and house tax, cattle tax.
- **Indirect tax:** including Bhutan sales tax, customs duty and excise tax.
- **Other taxes:** including export tax on goods of primary form like timber, tax on motor vehicles, and royalties on forestry products, mines, minerals and tourism industries.

2.1. 4 Capital Market
The Royal Securities Exchange of Bhutan (RSEB) was formally established in 1993 in an attempt to boost private sector development and to assist in creating a capital market. RSEB began with the participation of only four companies - Bhutan Board Products Ltd. (BBPL), Bhutan Carbide and Chemicals Ltd. (BCCL), Penden Cement Authority Ltd. (PCAL) and Royal Insurance Corporation of Bhutan (RICB) - with a market capitalization of Nu 493 million. As of 2002, fifteen companies were listed with the RSEB with a market capitalization of around Nu 3,156 million. However, the market remains relatively weak and inactive, reflecting the low level of economic activity, extent of monetization and private sector development in the country.

2.1. 5 Protection of Property Rights
Bhutan is a member of the World Intellectual Property Organization (WIPO) Convention and a signatory to the Paris Convention, the Madrid Agreement, and the Protocol to the Madrid Agreement.

The rights to the national protection of intellectual property are stipulated in the Industrial Property Act of the Kingdom of Bhutan, 2001, and the Copyright Act of the Kingdom of Bhutan, 2001. The Intellectual Property Division is responsible for implementing intellectual property policies.

Under the Copyright Act, original works under protection include literary, dramatic, musical and artistic works, audiovisual works, computer programmes, databases, sound recordings, performances of artistic and programmes of broadcasting organizations. Authors are not required to register their original works for protection. Intellectual property protection starts from the date of the first publication of the works, or after the life of the creator, and lasts for an average of 50 years.

The Industrial Property Act requires that trademarks, including service marks, should be registered with the Registry of Industrial Property in the Ministry of Economic Affairs for protection. The duration of protection is 10 years from the date of the filing of application, and can be renewed indefinitely. Industrial designs, in order to be registered with the Registry of Industrial Property, must be new and not contrary to public order or morality. The protection of industrial designs is five years starting from the date of filing, and can be renewed for two successive terms of five years each.

2.1.6 FDI Business

For starting a business, Government issues a provisional FDI registration certificate stating the conditions that must be fulfilled by the investors. This certificate facilitates investors in acquiring other necessary permits and licences. In addition, all commercial and industrial activities operating in the country are required to obtain an operating license from the Ministry of Economic Affairs.

All foreign investments must register with the Registrar of Companies and follow the regulations as stipulated in the Companies Act, 2000.

2.1.7 Dealing with Licences

Licensing is time-consuming and bureaucratic, placing Bhutan at 145th position worldwide, ahead of only India in the South Asia region. Fulfilling the licensing and permit requirements to build a warehouse takes 26 procedures and 204 days. Bhutan fares poorly when compared with other South Asian countries.

2.1.8 Trading across Borders

Bhutan ranks 150th on the ease of trading across borders, far from the top performers in the region. It takes 39 days and 10 documents to fulfill all procedures to export goods from Bhutan. Importing is no easier, requiring 42 days and 14 documents. Although trade administration is an obstacle, Bhutan is otherwise relatively open. Bhutan has a free trading regime with India, which is its main trading partner and accounts for over 90% of exports and imports. Average tariffs are about 24% and there are 7 tariff bands. Bhutan does not have any taxes on exports. The South Asia Free Trade Agreement (SAFTA) became operational in January 2006 and Bhutan is also in the process of negotiating accession to the World Trade Organization and BIMSTEC. Five railway routes have been identified from India to Bhutan, and with the establishment of a dry port and direct transshipment possibilities through India, future trade policy with the rest of the world will become more meaningful.

2.1.9 Enforcing Contracts

Bhutan ranks 56th on the ease of enforcing contracts. It takes on an average 275 days to resolve disputes through the courts. Bhutan's ranking on contract enforcement improved since last year because of a drop in costs. While court fees are negligible in Bhutan, lawyer's charges were relatively high due to shortage of these professional.

In 2006, the Bhutanese authorities took reform measures to limit fees that lawyers can charge. As a result, today the total cost of enforcing contracts amounts to 20% of the value of the claim, compared with 114% of the value of the claim in 2005.

2.1.10 Closing a Business

Bhutan is recorded as "no practice" on the ease of closing a business, as there are no bankruptcy cases in the country. Although Bhutan has a bankruptcy law, it is not applied. On average, the company registry has recorded 3 business closings per year over the last 5 years, but none have been closed through bankruptcy proceedings. Instead businesses simply discontinue operations, leaving creditors with no option other than to attempt recovery through ordinary enforcement proceedings.

2.2 Trade Points

Bhutan is a landlocked country and most of its imports from third countries must transit India via Kolkata. Indian customs at Kolkata are authorized to clear goods imported to Bhutan. The recently renegotiated transit agreement between India and Bhutan allows for more streamlined transit arrangements than in the past.

Goods are also freighted via Druk Air, the sole airline that flies between Paro and Bangkok, Kathmandu, Delhi, Gaya and Kolkata.

The following are the exit/ entry points in India for the imports into and exports from Bhutan as per the India- Bhutan trade agreement:

S. No.	Exit/Entry Points in India	Exit/Entry Points in Bhutan	Route Type
1	Jaigaon	Phuentsholing	By Road
2	Chamurchi	Samtse	By Road
3	Ulta Pani	Sarpang	By Road
4	Hathisar	Gelephu	By Road
5	Darranga	Samdrup Jongkhar	By Road
6	Panitanki	Phuentsholing	By Road
7	Changrabandh	Phuentsholing	By Road
8	Haldia	Phuentsholing	By Road/Sea port
9	Raxaul	Phuentsholing	Road/Rail
10	Dhubri	Phuentsholing	River Route
11	Kolkata	Phuentsholing	By Road/Air & Sea port
12	New Delhi	Phuentsholing	By Road/Air Route

Table: 2.1 Exit/Entry Points in India-Bhutan

Fig: 2.1 Phuentsholing –Jaigaon (W.B) Road Route

2.3 International Trade[1]

Bhutan's international trade activities are relatively recent and highly concentrated in Asia, with India being by far the main trading partner due to the bilateral Free Trade Agreement and currency parity between the Ngultrum and the Indian Rupee. In recent years, on average, India has taken 94% of Bhutan's exports and supplied 84% of its imports. The Government encourages the diversification of trade to generate more convertible currency.

Agriculture and forestry products, and minerals are Bhutan's traditional export items, but these are constrained by limited arable land, environmental considerations (e.g. forest conservation), transport challenges, productivity, economies of scale, etc. Tourism and energy now supply much of Bhutan's foreign exchange (including rupees, which are not yet convertible on capital account). The government is creating an enabling environment to increase exports that generate 'hard currency'. (efforts are focusing on 'high-value low-volume' product e.g. organics, traditional health products, textile products, handmade paper products, jewellery, wood products, mineral water etc.)

Bhutan depends on imports of machinery and equipments for infrastructure development and industrial inputs. It also imports fuel, foodstuffs, clothing, and many other consumer goods. Various import restrictions exist to protect hard currency reserves. Balance of trade and other highlights are provided in tables 2.2 to 2.4 given below:

2.3.1 Balance of Trade

Year	Imports		Exports		Balance	
	(US $ million)	(Nu. million)	(US $million)	(Nu. million)	(US $ million)	(Nu. million)
2000	230	9,183	103	4,655	-100	-4,528
2001	191	8,634	106	4,797	-85	-3,837
2002	197	8,931	112	5,676	-855	-5,263
2003	249	11,286	133	6,023	-1165	-10,368
2004	411	18,639	182	8,271	-229	-5,649
2005	376	17,035	251	11386	-125	

Table: 2.2 Balance of Trade

(Source: Department of Revenue and Customs, Ministry of Finance.)

Imports from Countries	Year					Nu. in million
	2000	2001	2002	2003	2004	2005
India	7,463	6,989	7,607	10,261	10,194	12,795
Japan	305	622	327	200	598	648
Singapore	251	215	254	199	420	447
Thailand	-	290	242	149	250	276
Korea	124	-	132	132	2	248
Indonesia					1	240
Germany					4,248	200
China					205	182
Taiwan					162	176
Malaysia					80	175

Table: 2.3 Bhutan's Top Trading Partners

Exports to Countries	Year					Nu. in million
	2000	2001	2002	2003	2004	2005
India	4,377	4,700	5,154	5,926	7,762	9,970
Hong Kong					12	686
Bangladesh	165	222	223	224	411	562
Singapore					2	73
Nepal	28	41	33	14	18	45
Thailand					1	33
Japan	-	-	-	5	24	7
United Kingdom	10	6	4	-	6	5
USA	239	14	14	5	5	4
Austria	-	-	-	-	14	1

Table: 2.4 Bhutan's Top Trading Partners

Source:
[1]Department of Trade, MoEA, Bhutan.
Department of Revenue and Customs, Ministry of Finance, Bhutan.

2.4 Trading Sector

The trading sector includes retail trade, wholesale trade, foreign trade and domestic trade. Trading ranges from the marketing of agriculture produce, food commodities and manufactured goods, to luxury items such as, vehicles. Within the trading sector, there are 41 categories of business as carried out in the country. Trade is heavily concentrated in the SAARC region and is expected to grow faster, at the rate of around 4.5% annually. The notable trading enterprises are State Trading Corporation, Food Corporation of Bhutan, Tashi Commercial Corporation (TCC) and Damchen Agency.

This sector largely provides services to meet customer demands for both consumable and durable goods. The services include sourcing the goods and delivering them to the consumers at reasonable cost. This reduces pressure on government for the provision of such services, generates gainful employment and contributes to the national economy by generating export income and tax revenues.

The trading sector in the interior of the country is mostly managed and operated by license holders themselves, who lack skills in trading. Product promotion is unheard of and generally "take it or leave it" is the prevailing attitude. There is very little competition between trading enterprises. Long-term strategies for their development and diversification are rare.

2.4.1 Principal Companies/Importers

Most of the goods coming from India are routed through Phuentsholing. Principal companies from India provide goods upto Phuentsholing warehouses, a distributor makes arrangements to distribute it to the rest of the country and after this Bhutanese retailers distribute the goods through their network in the country.

The main locations of the warehouses to cover the entire country are:

(1) Phuentsholing - caters to all the other warehouses
(2) Thimphu - caters to Thimphu Dzongkhag
(3) Paro - caters to Paro and Haa Dzongkhags
(4) Wangdue Phodrang - caters to Wangdue and Punakha, Trongsa and Bumthang Dzongkhags
(5) Gelephu - caters to Tsirang, Dagana and Zhemgang Dzongkhags
(6) Samdrup Jongkhar - caters to Samdrup Jongkhar, Pemagatshel, Trashigang, Mongar, Lhuentse and Trashi Yangtse Dzongkhags.

Principal distributor's margin is 3% of the MRP (on the average) excluding other incentives. Various schemes are floated by most of the principal companies. The retailer's margin is 7% minimum (on the average) of the MRP. Principal companies can have distributorship arrangements with any number of wholesaler companies in Bhutan and competition is there among the local distributors.

Independent wholesale dealers deal in all sorts of consumer goods including biscuits and sweets, which large corporate wholesalers, do not seem to deal. The wholesalers keep a margin of 5% minimum and ensure a minimum of 9% margin for their retailers. Most of the principal companies offer a minimum of 14% on the MRP.

The relationships among producers, wholesalers and retailers play an important role in the marketing of produce. Such linkages can create mutual trust among different functionaries in the marketing system, but may also cause a dependency relationship between parties and make it difficult for newcomers to enter the marketing process. Linkages are often based on village proximity (area based) or on family relationships developed over many years.

2.4.2 Conventional Marketing Intermediaries

Conventionally, the most common intermediaries in Bhutan are given below:

- **Petty Traders and Assemblers:** They are specialized middlemen who purchase produce from farmers at the farm gate or local market, for selling to other traders, wholesalers and retailers. They may use their own transport or hire from a transporter.
- **Independent Collectors and Market Agents:** They take possession of produce from an individual or group of farmers and then sell the produce to an export market (mostly to Bangladesh), wholesaler, trader or other middle-man.
- **Wholesalers and Semi-wholesalers :** They are located in markets to feed retailers.
- **Retailers** They buy either directly from farmers or from the traders or from wholesale markets and sell the products to consumers through retail outlets.

2.4.3 Trade Licences Issued – Bhutan (as on 31-12-2005)
The following are the trade licences issued under national and expatriate category for retail and dealership:

National	**Licences**
▪ Retail Licences	11,944
▪ Dealership Licences	329
Expatriate	
▪ Retail Licences	325
▪ Dealership Licences	12
Total	**12, 610**

2.5 Industries
The industrial landscape of Bhutan is dominated by a few large-scale industries and a large number of cottage enterprises, with a small number of small-scale industries in between. An industrial license is a prerequisite for an industry and this is granted on the basis of application with project report.

With the domestic market of Bhutan comparatively limited, manufacturing industries can achieve economies of scale, only by targeting export markets. The Indian market, which until now provided a ready market for finished and semi-finished products from Bhutan, is becoming increasingly competitive due to trade liberalization.

In Bhutan, labour constraints both in terms of numbers and productivity, poor infrastructure, and lack of technical and managerial skills impede the progress of the manufacturing sector. Despite these constraints, this sector is projected to grow at an average annual rate of 4.9 percent. The opening of Foreign Direct Investment, the establishment of new industrial estates and the increased availability of power are all expected to have a positive impact on the manufacturing sector.

Most of the industries are based in Thimphu, Chhukha, Samtse, Sarpang, Paro and Samdrup Jongkhar Dzongkhags. By the end of 2006, a total of 7,738 industrial licences (including services) had been issued.

Fig: 2.2 S.D. Eastern Bhutan Ferro Silicon (P.) Ltd., Samdrup Jongkhar

▪ **Some important Manufacturing/Mining Industries in Bhutan**

S. No.	Company	Location
1.	Bhutan Polythene Company	Phuentsholing
2.	Penden Cement Authority Ltd.	Gomtu, Samtse
3.	Bhutan Board Products Ltd.	Tala
4.	Bhutan Carbide and Chemicals Ltd.	Pasakha
5.	Bhutan Ferro Alloys Ltd.	Pasakha
6.	Bhutan Fruit Products Ltd.	Samtse
7.	Bhutan Marble & Minerals Ltd.	Thimphu
8.	Bhutan Agro Industries Ltd.	Thimphu
9.	Yangzom Cement Industry Ltd.	Duarpani
10.	Wood Craft Center	Thimphu
11.	Druk Stone & Mineral Export Co. Ltd.	Kamji (Nr Phuentsholing)
12.	Druk Satair Corporation Ltd.	Pemagatshel
13.	Lhaki Cement Pvt. Ltd.	Gomtu, Samtse
14.	Army Welfare Project	Gelephu & Samtse
15.	Bhutan Dairy Ltd.	Phuentsholing
16.	Eastern Bhutan Coal Co.	Samdrup Jongkhar

S. No.	Company	Location
17.	RSA Pvt. Ltd.	Phuentsholing
18.	Druk Cement Co. Ltd.	Bhalujhora
19.	Green Wood Mfg. Corporation	Phuentsholing
20.	Bhutan Polymers Co. Ltd.	Gomtu, Samtse
21.	Choden Chemical & Industry Ltd.	Samdrup Jongkhar
22.	Bumthang Brewery Ltd.	Bumthang
23.	Lhaki Wood Industries Ltd.	Gelephu
24.	Bhutan Beverage Co. Ltd.	Pasakha
25.	Drangchu Beverage	Phuentsholing
26.	Druk Iron & Steel	Rametey (Nr.Phuentsholing)

Table 2.5 Some Important Manufacturing Industries in Bhutan

The industry sector of Bhutan is categorized into large, medium, small and cottage industries. Categories are based on initial capital investment, which by definition, consists of paid-in capital and long-term credit. Each business is registered under one of the above categories and has an industrial license, which has to be renewed annually. Official statistics refer to the number of licences rather than to the number of operational businesses and thus, do not reflect the true number of active businesses. The number of operational businesses refers to the total amount of business identification numbers in each category. Businesses with one identification number holding more than one license were accounted for as one operational business. Table 2.6 lists the industrial licences excluding contract licences based on the classification and type.

- **Industrial Licences Issued[1] excluding contracts - Bhutan**

Dzongkhag	By Classification			By Type (PAM)					By Type (SVC)	By Scale (PAM)				By Scale (SVC)				
	PAM	SVC	Total	A	F	M	O	Total		L	M	S	C	L	M	S	C	Total
Thimphu	362	2729	3091	25	125	15	197	362	2729	2	0	47	313	7	14	281	2427	2729
Paro	86	399	485	8	57	6	15	86	399	0	0	12	74	1	1	26	371	399
Haa	23	93	116	2	21	0	0	23	93	0	0	10	13	0	0	24	69	93
Samtse	47	234	281	13	8	14	12	47	234	6	5	22	14	0	0	31	203	234
Chhukha	152	1108	1260	38	38	18	58	152	1108	24	32	54	42	7	3	55	1043	1108
Punakha	6	101	107	1	4	0	1	6	101	0	0	0	6	0	0	7	94	101
Gasa	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
Wangdue Phodrang	20	190	210	2	11	5	2	20	190	1	1	5	13	1	0	21	168	190
Dagana	0	67	67	0	0	0	0	0	67	0	0	0	0	0	0	3	64	67
Tsirang	11	112	123	8	3	0	0	11	112	0	0	1	10	0	0	2	110	112
Sarpang	71	373	444	38	20	5	8	71	373	2	0	18	51	0	0	13	360	373
Zhemgang	21	77	98	3	17	1	1	22	77	0	0	0	21	0	0	0	77	77
Trongsa	8	109	117	2	6	0	0	8	109	0	0	1	7	1	0	3	105	109
Bumthang	39	197	236	11	26	2	2	41	197		0	5	34	2	1	6	188	197
Lhuentse	3	28	31	0	3	0	0	3	28	0	0	0	3	0	0	2	26	28
Mongar	29	227	256	7	19	2	2	30	227	0	0	3	26	0	0	9	218	227
Pemagatshel	21	60	81	3	7	0	0	10	60	1	3	1	16	0	0	0	60	60
Samdrup Jongkhar	49	367	416	16	18	10	10	54	367	2	2	4	41	0	0	6	361	367
Trashigang	27	230	257	3	**22**	2	2	29	230	0	0	1	26	0	0	4	226	230
Trashi	10	51	61	1	9	0	0	10	51	0	0	0	10	0	0	1	50	51
Total	**985**	**6753**	**7738**	**181**	**414**	**80**	**310**	**985**	**6753**	**38**	**43**	**184**	**720**	**19**	**19**	**494**	**6221**	**6753**

Table 2.6 Industrial Licences - 26.05.2006

Notes:
Classification
PAM = Production & Manufacturing
SVC = Services
CONT = Contact Licences

SCALE:
L = Large
M = Medium, C = Cottage

Type (Sub.:-sector)
A = Agro based
F = Forest based
M = Mineral based
O = Others

Source: [1]Industrial Licensing & Monitoring Division, MoEA, Bhutan

- **Number of Industries by Type including Contract Licences (2006)**

S. No.	Dzongkhag	Agro Based	Forest Based	Mineral Based	Services	Contract	Others	All Types
1.	Bumthang	9	19	0	153	223	8	412
2.	Chhukha	28	34	9	688	696	48	1503
3.	Dagana	0	0	0	58	272	0	330
4.	Gasa	0	0	0	1	30	0	31
5.	Haa	1	19	0	81	211	0	312
6.	Lhuentse	0	3	0	24	119	0	146
7.	Mongar	7	19	1	189	354	2	572
8.	Paro	7	49	5	329	405	13	808
9.	Pemagatshel	2	7	10	53	185	0	257
10.	Punakha	1	3	1	89	269	0	363
11.	Samdrup Jongkhar	15	19	4	307	355	12	712
12.	Samtse	14	8	12	240	250	9	533
13.	Sarpang	37	17	4	299	422	5	784
14.	Thimphu	24	117	15	2310	3653	176	6295
15.	Trashigang	2	19	0	202	455	2	680
16.	Trashi Yangtse	1	6	0	41	137	0	185
17.	Trongsa	1	6	0	80	173	0	260
18.	Tsirang	8	1	0	99	121	0	229
19.	Wangdue Phodrang	2	10	5	163	620	2	802
20.	Zhemgang	3	12	0	62	262	1	340
	Bhutan	**162**	**368**	**66**	**5468**	**9212**	**278**	**15554**

Table 2.7 Number of Industries by type including Contract Licences (2006)

(Source: Industrial Licensing & Monitoring Division, MoEA –Bhutan.)

According to estimates, which are based on the 2005 license statistics of MoEA, there were only 12,188 operational business establishments in Bhutan with more than 99% belonging to the cottage-small-medium enterprise segment, and only less than 1% were large enterprises. In services and trade, more than 99% of operational businesses were micro, small or medium enterprises. In construction and manufacturing and energy, the percentage comes down to 95.5%.

Geographical Distribution: Table 2.8 ranks the top ten Dzongkhags with respect to their business activities in manufacturing, energy, construction and services.

District	Thimphu	Chhukha	S/Jkhar	Sarpang	Mongar	Paro	Samtse	Trashi-gang	Bumth-ang	Wangd-ue
MSEs	37%	12%	6%	5%	4%	4%	4%	4%	4%	3%
All	38%	13%	6%	5%	4%	4%	4%	4%	4%	3%

Table 2.8 Operational Businesses per District in % of Total.
(Source: Own calculations based on figures from the Statistical Yearbook and ILM Division, MoEA)

It shows that most businesses are concentrated in the western part of Bhutan, namely in the districts of Thimphu, Paro and the bordering district of Wangdue Phodrang (45%). A significant number of businesses are concentrated in the districts of Chhuka, Samtse, Sarpang and Samdrup Jongkhar (29%). Finally there is good business development potential in the eastern and central districts of Trashigang, Mongar and Bumthang along the central lateral road (12%). Potential in the remaining 10 districts appears low with the exemption of Haa district, where a significant number of wood processing industries are located. Majority of manufacturing industries in cottage and small category are wood processing saw mills followed by agro-based and mineral based industries.

- **Growth of the Industry:** The overall increase in the number of industrial licences is impressive. It has grown substantially by 69.3% between 2000 and 2006.

2.6 Foreign Direct Investment Policy

FDI should take a greater role in building sustainable development of Bhutan's economy. National legislation can support better investment security for local markets, fair competition and corporate responsibility through defining equitable, secure, non-discriminatory and transparent investment practices.

It may be observed that FDI can have both positive and negative impact on the various facets of development of Bhutan. However, only the positive impact of FDI can bring about series of linked development for achieving a sustainable level of GNH.

As it integrates into the world economy, Bhutan is taking steps to encourage and facilitate private sector development. One of the strategies is to open selected priority sectors to foreign investment and to facilitate transfer of capital, technology and skills. Foreign Direct Investment Policy was approved in December 2002, which replaced the previous ad hoc system of foreign investment approval. In 2005, the Ministry operationalized the policy on approval of the Foreign Direct Investment Rules and Regulations - 2005 (in effect since 1 July 2005).

The Foreign Direct Investment Policy defines a foreign investor as "an individual…who is not a Bhutanese subject; or a company incorporated or registered in a country other than Bhutan". It defines foreign direct investment (FDI) in Bhutan as "any activity for the purpose of generating revenue in industry and includes any company in which a foreign investor owns or beneficially holds a minimum of 20% and maximum of 70% of the equity of the investment". For an FDI venture, the minimum project cost should be US $ 1 million in the manufacturing sector and US $ 0.5 million in the service sector**.** These thresholds aim to protect cottage industries and small enterprises.

The sectors open to FDI are as follows:

MANUFACTURING

- Mineral Processing
- Agriculture and Agro-processing
- Forestry and Wood-based Industries
- Livestock-based Industries
- Light Industries including Electronic Industries
- Engineering and Power Intensive Industries

SERVICES

- Tourism including Hotels
- Transport Services
- Roads and Bridges
- Education
- Business Infrastructure
- Information Technology
- Financial Services
- Housing
- Private Security Services

Bhutan has the potential to be an attractive investment destination. If FDI can reach Indian shores, it can also travel the extra mile to Bhutan, given the following advantages of Bhutan:

1. Proximity and privileged access to neighboring countries with large markets, like India and Bangladesh.
2. Best political stability in the region.
3. Almost negligible social problems, and strong social bonding and patriotic feelings.
4. Corporation like Government structure without political interference and low corruption levels. The country's political set-up is gradually moving towards participative representation of the common people in the country's assembly with decentralized development and authority structure.
5. Lowest power cost in the region, equivalent to INR 1.45 per unit
6. A disciplined English-speaking workforce, in need of work.
7. A growing international recognition in terms of tourist interest, as well as of an unspoiled land suitable for special projects requiring clean environments.
8. Unique temperate climate suitable for work and also ideal for cultivating medicinal herbs and horticulture with great market potential.

2.6.1 FDI Inflow in Bhutan

Bhutan has not been able to attract the private sector FDI inflows from India that Nepal has, despite the similar Bilateral Free Trade Agreements that India has with both countries. One of the contributory factors may be the lack of publicity of the opportunities that exist in Bhutan for Indian entrepreneurs. Greater interaction between apex organizations such as Confederation of Indian Industries of India with the Bhutan Chamber of Commerce & Industry (BCCI) and the Royal Government of Bhutan would be a step in the right direction.

2.6.2 Some Prominent FDI Ventures in Bhutan

2.6.2.1 Financial Sector

- **Bank of Bhutan (BOB)**

The first instance of Foreign Direct Investment in Bhutan was the 40% equity investment by the State Bank of India in 1968 with the 60% invested by the Royal Government of Bhutan to form the Bank of Bhutan(BOB). This spearheaded the development of the banking sector in the country. BOB, with its headquarter at Phuentsholing, has become Bhutan's largest commercial bank with 27 branches in a network covering all the Dzongkhags of the country. It has 560 employees and a profit after tax of Nu.137.480 million in 2005 with over Nu. 1,111.683 millions in paid up capital and assets. The management of the company was handed over to Bhutanese nationals in 1997 by SBI and its shareholding reduced to 20%.

- **Bhutan National Bank**

The second instance of FDI in the financial sector is that of Bhutan's second commercial bank – Bhutan National Bank (BNB). The parent Unit Trust of Bhutan was established in 1980 by the Royal Government of Bhutan under the Royal Insurance Corporation of Bhutan. In 1996, this was converted, with Royal Command, to Bhutan National Bank with technical assistance of the Asian Development Bank. Equity participation was invited in 1997 when ADB took up 21% while Citibank took up the balance 19% aggregating to an FDI investment of 40%. The special feature of the bank is the holding of 28.58 % of the equity by the public.

Within a span of 6 years, the Bank has established itself by achieving an asset size half that of the Bank of Bhutan. In 2001, Citibank withdrew its stake by offloading its share. BNB's shares with their high price-earning ratio are actively traded scrip on the bourse.

2.6.2.2 Manufacturing Sector

Bhutan Ferro Alloys Limited (BFAL) was established in December 1990 and began operations in 1994. The company started with a shareholding of RGOB (25% equity participation), Tashi Group of Companies (20 %), Marubeni Corporation of Japan (20 %), Bhutan Carbide and Chemicals Ltd. (25%) and Public (10%). Marubeni invested Nu.30 million. Utilizing Bhutan's low-cost electricity, rich water resources, and abundant deposits of quartzite, BFAL produced 21,172 tons of ferro-silicon in 2002, 14 per cent more than the initial plan. Their total shipment to India in 2002 was 20,830 tons. The total sales figure was Nu. 654 million with a pre-tax profit of Nu.130 million.

- **Beverage Industry**

In this segment, Bhutan witnessed FDI in the form of franchise providing technical and operational support. Drangchu Beverages was established in 1992 with a franchise agreement with Pepsi India Ltd. The bottling plant was set up and the operations have been carried with the complete assistance of Pepsi. Around 90% of the production is sold to Pepsi India Ltd. as part of their distribution agreement.

Bhutan Beverages Company Ltd. was established in 2002 under a franchise agreement with the Coco-Cola Company Limited, USA. The bottling plant was set up and started functioning in 2003. In this case also, 90% of the production has been tied up for shipment to Eastern India as part of a distribution agreement with Hindustan Beverages Company Pvt. Ltd. (Coco-Cola India).

2.6.2.3 Tourism

Druk Group of Hotel, only star hotel in Bhutan at Thimphu and Phuentsholing in the 1980s were established by the renowned hotel chain of India, the Welcome Group of Hotels. However, in 1990s, total management and ownership was transferred to Tashi Group.

After a gap of several years, Government approved two FDI projects in 2001, relating to hotel and resorts in Bhutan. These are as follows:

- **Bhutan Resorts Corporation Limited (BRCL)**

The joint venture is between Bhutan Tourism Corporation Ltd. (BTCL), leading tourism company of Bhutan and the famous Maha / Aman Resorts. The project is considered to be the largest FDI in the tourism sector with project cost of US $ 14 million. The project was to establish small luxury resorts in Bhutan for the "Celebrated Aman Yankees". In the first phase, resorts were established in Paro, Thimphu, and Punakha by 2003. In the second phase, resorts at Gantey Gompa, Trongsa and Bumthang will be established. Maha Aman will hold 60% equity, and Bhutan is Aman's 12th destination.

- **Bhutan Eco-Ventures Ltd.**

This is a joint venture between Bhutan International Limited and the HPL Leisure Ventures Pvt. Ltd. Singapore. The HPL Leisure Ventures is known for their Halkins and Metropolitan Collection of hotels and resorts in UK. The company has established a five star hotel, Hotel Uma, near Paro Town.

2.7 Key Intervention Issues

Developing a robust and competitive manufacturing sector requires dramatic improvements in the learning mechanisms that enable companies to improve productivity. For acquiring the latest technology, Bhutanese companies need to look beyond India. However, they have found it a lot easier and cheaper to look across the border for tried-and-true production methods supported by a ready pool of trained labour, but this route may not always be the most effective for Bhutan. With trade barriers falling under the WTO regime, Bhutan will have to adopt international best practices to compete globally. This means that Bhutanese companies have to adopt a wider vision to leapfrog Indian technologies and examine more developed third-country technologies. This may be more expensive and difficult initially, but it will help ensure competitiveness in world markets.

The most relevant and pressing needs of Bhutan include access to modern management knowledge, market knowledge, production technology, design and product development, information technology and management of quality systems.

2.7.1 Management Knowledge: Management in Bhutanese firms comprise generally of the owners themselves, who may lack technical qualification or relevant experience of modern management practices. There is a need for providing refresher and similar short-term modern management courses through agencies like the Royal Institute of Management, to such owners and their managers, to make them aware of appropriate best practices for today's competitive marketplace. They would then be better placed to absorb innovation and adopt new technologies for their units. In other developing countries, many managers develop skills and knowledge of best practices by working for foreign companies and attending technical courses abroad – this will be helpful for Bhutanese managers too.

2.7.2 Quality System and International Bench Marking Practices: Many units lack consistency in their product quality. These units would benefit from adopting the ISO 9001:2000 Quality Management System standard. The Hazard Analysis Critical Control Point (HACCP) system - a process control system for the food industry - is a certification of quality that is mandatory in many countries. Implementation of ISO 14001 (Environment Management System) will facilitate compliance with Bhutan's environment policy, and will ensure proper effluent treatment, water and air pollution checks. Emphasis on conformance to international standards and certification will ensure that healthy industrial practice is established.

2.7.3 Market Knowledge: As a result of Bhutan's past isolation and the limited opportunities that existed, companies lack an awareness of marketing and familiarity with marketing tools. Identifying and penetrating niche markets are difficult because Bhutan lacks relevant skills. However, this knowledge can be transferred through the newly established Royal University of Bhutan's partnerships with international institutions of learning and organizations such as CIDA, Danida and SDC etc.

2.7.4 Production Technology: Productivity and quality in Bhutan fall short of international standards not only because of weak management, but also because of old equipment, insufficient maintenance and poor operator skills. Companies need to look beyond regional technology and use globally competitive know-how. Exposure to more efficient machines and manufacturing technology through trade fairs is the key to technology upgradation, as well as in generating the interest of potential entrepreneurs in setting up their own mini and micro projects. Production management courses organized through the College of Science and Technology, Phuentsholing can train managers on the most effective use of existing resources and future investments.

2.7.5 Product Design and Development: Innovative products and packaging are ways to enter niche markets in the agro processing, wood and tourism sectors. The design and development of products is a highly specialized business learnt through Design Centres, Prototype Development Centres and similar organizations, which have been set up in India through foreign aid (British, Danish, German and Swiss). Such institutions may be attached to the College of Science and Technology for optimum utilization by industry and academia.

3 Services

The existing services sector in Bhutan can be broadly categorized as:

- Hospitality Sector
- Health
- Transport and Logistics
- Financial
- Information and Communication Technology
- Media and Entertainment
- Postal and Courier Services
- Personal
- Facility /Maintenance Services
- Education

3.1 Hospitality Services

The hospitality sector includes tourism, hotels, tours and travels services and handicraft businesses. This sector has grown rapidly in recent years, mainly due to increase in inflow of tourists attracted by the unique culture and pristine environment of Bhutan. The experiment on 'high value' tourism has proven to be very successful both in earning foreign exchange and preventing erosion of cultural values and environmental degradation.

The Department of Tourism has identified only about 70 hotels in the country fit for tourists. In Thimphu and Paro, there are about 500 rooms and 1,000 beds suitable for tourists. It is very difficult to get hotel rooms during the peak tourists season. During this season, tour operators even face a shortage of trained guides. Facing the accommodation crunch, many tour operators resort to housing their tourists in hotels that may be well below the standard. Accommodation becomes more of an issue in the eastern parts of the country.

Many tour operators also keep tourists in identified farmhouses. Farmhouses are furnished in advance becoming a part of the tour itinerary because many tourists enjoy and look forward to stay in real farmhouses. Some tourists spend their nights in pitched tents and this is quite popular in some festival like the Jambay Lhakhang Drup in Bumthang.

Limited menu of meals offered to tourists is another bottleneck. Tourists are served a mix of Bhutanese and continental menu without much changes. The tariff covers a package that includes all internal taxes and charges including accommodation, meals, licensed guides, internal transport, camping equipment and haulage for trekking tours.

The peak season for tourists is from March to April and September to November while the lean seasons are in the monsoon months of June to August and the winter months of December to February. With tourism gaining prominence, it is important to break the seasonality and promote tourism during the lean season. There are 213 tour operators registered with Department of Tourism.

This sector is seen as a major source of employment. Eco-tourism, culture tourism and adventure tourism would undoubtedly do exceptionally well. Though this sector is fairly old, having established 30 years ago, the sector is also riddled with numerous constraints. Besides communication (road, air and telecommunication), support services, lack of new products, limited community participation, low and uneven standards of tourist accommodations and lack of private sector investment, especially in the east, refrains the growth of the sector.

Lack of qualified and skilled human resources is the most serious impediment to the growth of the sector. Therefore, in order to make this sector grow, institutional capacity, quality of services and skills need to be built besides improving information and publicity.

Competencies required in the sector:

- Trained professionals in tourism, hotel management, administration, marketing, research & planning, finance & accounts, human resource management, etc.
- Qualified and skilled human resource in business management, administration, marketing, product design and development.
- Capability to monitor, train and provide advisory services.
- Environmental evaluation.
- Skilled personnel in front desk management, house keeping, catering, waiting, guiding etc.

3.2 Health

The Government continues to lay great emphasis in the health sector, considering its overriding role for the people. Bhutan is signatory to the Alma Ata Declaration and has chosen Primary Health Care (PHC) as the core strategy, since the PHC delivery system is deemed effective in reaching health services in a country like Bhutan, which has a rugged geographical situation and scattered population. Health and services are free of charges across the country.

The traditional medicine system is well established and integrated with the modern health system. There is one indigenous hospital at the capital and indigenous services have been expanded to 18 Dzongkhags, where premises are shared with the dzongkhag hospitals or Grade I BHUs. However, there is still a need for more staff. With the establishment of the pharmaceutical and research units, the production and supply of traditional medicines have been increased, which has helped to meet the demand.

Competencies analysis:

The following are the competencies required in the sector:

1. Enhance the Quality of Health Services

Health coverage and status have improved tremendously over the past four decades. The emphasis now is to improve the quality of services and further consolidate the infrastructure. Standardization and quality assurance focus on diagnostic and curative aspects, use of appropriate technology and infrastructure consolidation will be some of the major strategies. Development of policy/legislative framework and strengthening of health systems organization will lay the groundwork to improve the quality of services.

2. Standardization and Quality Assurance

Quality assurance programme requires the institution of standards for all aspects of health care. This would, therefore, necessitate the overall review of status in the country before any tangible quality assurance mechanism can be generated.

The development of standards for services that will be delivered by each level of care will be carried out side by side with the standardization of supplies, introduction of newer technologies and putting greater emphasis on the professional development of health personnel. The other crucial aspect of quality assurance is the development of institutional capacity both in terms of management, information, research and monitoring of selected indicators. The capacity to use HMIS and to work with quality goals and indicators will form one of the major elements of institutionalizing quality assurance in each level of care.

A major pre-requisite for understanding the need for quality assurance is to develop a dynamic and need-based human resource development and implementation. Therefore, the quality assurance system should be developed by using a public- private partnership approach.

3.3 Transport & Logistics

Road and air transport are the two major modes of transport in the country and this sector has witnessed a significant growth during the last forty years since Bhutan launched the first five-year development plan. Rapid economic development and higher purchasing power of the people have led to greater mobility and therefore, increased demand for transport services. People's expectations for efficient and quality transport services and facilities have also increased correspondingly. Role of the government has since changed over the years focusing mainly on policy and regulatory issues, setting technical and services standards, strengthening enforcement and monitoring tools, developing basic transport infrastructure and protecting the natural environment, leaving the transport business to private sector.

The following are the goods transport and logistics charges:

1. Transportation charge from Kolkata to Phuentsholing (Time – 3 to 4 days to reach Phuentsholing from Kolkata)	:	Nu. 1,240.00 per MT
2. Transportation charge from Phuentsholing to Thimphu (Time – 1 day to reach Thimphu from Phuentsholing)	:	Nu. 750.00 per MT
3. Loading charge	:	Nu. 40.00 per MT
4. Unloading charge	:	Nu. 20.00 per MT

Owing to rugged terrain the cost of transport is relatively high.

Export Consignment & Logistics Expenses

- Transportation charges Phuentsholing to Kolkata Dock Nu. 10,000.00 per truck.
- Indian Customs Fee @ Nu. 600.00 per consignment.
- Loading charges Nu. 20.00 per barrel.
- Ocean freight from Kolkata to U.K. US$ 55.00 per CuM.
- Documentation @ Nu. 300.00 per consignment.
- Dock expenses @ Nu. 300.00 per consignment.
- Unloading charges @ Nu. 75.00 per barrel.
- Clearing agents charges @ Nu. 1102.00 per consignment.
- Misc. expenses at Kolkata Nu. 1500.00 per consignment.
- Courier charges for sending documents to Bank in U.K. and Importer @ Nu.1,350.00.

(Source: State Trading Corporation of Bhutan, 2006)

This sector continues to be plagued by problems despite its very important role in accelerating socio-economic development of the country. The quality, quantity and accessibility of transport infrastructure and services are still far from adequate. Passenger transport services in remote areas are either inadequate or unreliable, mainly due to high operating cost, seasonal flow of passengers and low earnings. Similar is the case with urban transport services. While urban residents are demanding better and efficient transport facilities and services, affordability remains an important factor for rural population. Problems related to traffic congestion, road crashes and environmental pollution continue to increase. Traffic enforcement is low due to lack of trained enforcement professionals, safety equipment and limited mobility. There has been a dramatic increase in the number of motor vehicles in the country while the road network has not increased commensurately. Transportation cost and travel time are very high and the freight industry is in need of greater streamlining and development.

Competencies required in the sector:

(a) Improved accessibility and affordability of passenger transport services.
(b) Promote urban transport.
(c) Provide choice of passenger and freight transport.
(d) Develop, upgrade and maintain transport infrastructure and facilities.
(e) Promote road safety to minimize road traffic accidents.
(f) Enhance efficiency of administration and improve public service delivery system.
(g) Initiate transport research.
(h) Develop institutional capacity.
(i) Promote private sector participation.
(j) Promote efficient, reliable and responsible freight transport industry for providing services at minimum cost.
(k) Protect environment and promote the use of energy efficient and less polluting vehicles.

3.4 Financial

Financial institutions, be it banking, insurance or providing financial other services, play a catalytic role in the socio-economic development of any nation. The role played by the financial institutions can be measured by the development achieved in all sectors over the last two decades.

Financial sector in Bhutan mainly represent banking, insurance and stock. Bhutan has two commercial banks:

1. Bhutan National Bank Limited with head office at Thimphu has five branches in Thimphu, Phuentsholing, Paro, Mongar, Gelephu, and extension centers in Samdrup Jongkhar and Trashigang.

2. The Bank of Bhutan was established in 1968. The bank has head office in Phuentsholing and has the widest coverage in the country with its network of 26 branches and 3 extension counters spread over the Kingdom.

The banks offer following credit products:

Loans Products	Interest Rate (per annum)
Industrial Loan	
▪ Working Capital	13%
▪ Term Loan	12%
Housing Loan	10%
Transport Loan	
▪ Heavy Vehicles	13%
▪ Light Vehicles	
a. Commercial/ Personal	14%
b. Vehicles bought under Govt. Quota	12%
Business Loan	
▪ Overdraft	14%
▪ Term Loan	14%
Consumer Loans	
▪ Personal Loan	15%
▪ Govt. Employee Loans	12%
Loan against Shares	12%
Loan against Fixed Deposits	2% above Deposit rate

The Bhutan Development Finance Corporation (BDFCL), upon its establishment in 1988, took over the administration of rural credit from the Royal Monetary Authority. Loans were granted for improving farmlands, acquiring livestock, and meeting short-term, seasonal requirements. In 1991, the corporation was given autonomy. Now it is a non-banking financial institution to cater to the financial needs of the micro, small and medium enterprises with special focus on agricultural development.

BDFCL provides credit under following categories:

- Industrial Loans
- Agricultural Loans
- Guarantees
- Rural Credit
- Loan Product for Rural/Farmers
- Savings Product
- Mobile Banking

In the industrial sector, term loan and working capital facilities are provided. The term loan @13% p.a. is extended to following sectors namely: cottage and handicrafts, equity finance, housing, manufacturing, mining industries, personal, services, tourism, trade and transport.

Royal Insurance Corporation of Bhutan Limited was incorporated on 7th January 1975 under the Royal Charter primarily to meet the insurance needs as well as to actively participate in the economic development of the nation. It has grown from strength to strength over the years in keeping with nation's march towards the goal of economic growth, self-reliance and Gross National Happiness.

RICBL as the sole insurance company in the Kingdom has been instrumental in the development progress by providing protection against unforeseen and unpredictable circumstances. It covers life and general insurance segments. It also managed provident fund, which is now transferred to a newly established National Pension and Provident Fund).
In general insurance segment, a wide range of products are offered, such as:

- Fire Insurance
- Marine / Transit Insurance

- Miscellaneous Insurance
  - Motor Insurance
  - Cash-in-Safe Insurance
  - Cash-in-Transit Insurance
  - Burglary Insurance/Combined Fire & Burglary Insurance
  - Personal Accident Insurance / Group Personal Accident Insurance
  - Fidelity Guarantee Insurance
  - Passenger Coupon Insurance
  - Contractors All Risk Insurance (CAR)
  - Erection All Risk Insurance/Storage-cum-Erection All Risk Insurance (EAR)
  - Contractors Plant & Machinery Insurance (CPM)
  - Aviation Insurance
  - Cattle Insurance

RICBL meets not only the insurance needs of the country but also provides finances for the overall development of the nation. The Credit & Investment Department pools resources from insurance related businesses and invests through the various loan schemes namely:

- Housing Loan
- Transport Loan
- Business Loan
- Personal Loan
- Industrial Loan
- RICB Card Loan
- Preferential Financing Scheme
- Loan against Shares
- EDP Term Loans
- EDP Working Capital
- Contractors Revolving Credit cum Insurance Scheme

The rates of interest range from @12% to @15% p.a. depending on the product.

Competency analysis for the financial sector:

The main competencies required in the financial sector are:

- Professional administrators/managers.
- Professionals skilled in underwriting, system analysis, computer programming, feasibility study, project appraisal, investment analysis.
- Human Resource Management.
- Financial/Accounting.
- Legal personnel (law interpretation, advocate legal cases, framing and revision of laws and national acts, rules & regulations of the agencies).
- Technical personnel in computer operation and office management.
- Introduction of Credit Cards.
- ATM's at Suitable Locations.

3.5 Information & Communication Technology

Information technology offers considerable possibilities for increasing efficiency and transparency. Therefore, information technology is one that the country could take advantage of.

Bhutanese society can be divided according to the following tree structure, in terms of ICT…….

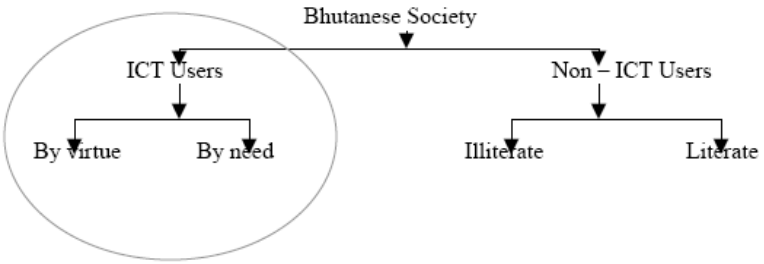


Figure 3.1 ICT Structure –Bhutan

By virtue

- Office workers who work with computers, internet and e-mail
- Domestic workers who listen to radio or watch TV at home
- General public including students who read newspapers

By need

- Internet and computer users in Internet cafés
- Businessmen and women who use personal computers
- District and local government workers subscribing to newspapers
- Viewers who watch TV to keep abreast of developments

Illiterates

- Villagers including farmers, housewives and non-school going children
- Laborers and workers in towns

Literates

- Office workers who do not have or use computers and internet
- Literate housewives who do not have TV or radio
- Students who do not use computers, read newspaper or watch TV

The four categories to which the Bhutanese society can be segregated are shown above. There is room for further segregation so that ICT activities are targeted to each of these groups rather than the public at large. Such niche targeting will be useful in the design of projects for specific groups of people. Policy has to guide the strategy to group society in this fashion so that national strategies can be devised to address each of these groups and preferably that can be coordinated with other activities.

IT must facilitate communication and exchange within the nation through development of such services as email, internet and intranet. They must also further improve the country's contact with the outside world, making it possible for the country at an appropriate time and following the introduction of appropriate standards, to cross the information super highway that will provide the country with access to the same information and data as those residing in the most technologically advanced nations.

The enormous opportunities that exist in IT and related field should be encouraged and promoted. The private entrepreneurs, institutes, schools and other interested individuals should be encouraged to participate in the promotion of this important technology.

Telecommunication is today the most important form of communication. Bhutan Telecom (BT) provides fixed line and mobile services in the country. It has seven administrative and operational areas. They are 1) Thimphu Area, 2) Trongsa Area, 3) Trashigang Area, 4) Samdrup Jongkhar Area, 5) Gelephu Area, 6) Phuentsholing area and 7) Paro Area. Each of the area covers a number of districts. These areas were identified taking note of the technical maintenance aspects of the networks.

The installed capacity of telephone exchanges under Bhutan Telecom is around 26,000. This number may be small but there has been a ten-fold increase over a period of ten years.

The total user capacity has now reached 21,500 with total exchange capacity at 26,000. Thimphu area contributes about 50% of all telephone subscription.
The capacity demand in Thimphu exchange is particularly high. The exchange capacity will further be increased with the planned installation of a new 5,000-line capacity switching exchange. The Thimphu exchange was bifurcated into two main switches i.e. Semtokha and Dechencholing by using PASOLINK. Within 2 years, these two exchanges are full.

There is a very good digital telecom backbone network in the country covering all the 20 district headquarters and major towns and commercial hubs. Telephone connections in all these locations can be used for data purposes especially for internet and e-mail. Bhutan Telecom is also implementing a number of other smaller networks to provide access to remote locations. Choice of technology is a big issue in doing so. Due to the terrain and varied climatic conditions, a system in one place may not work in another place with different conditions. There are 16 DAMA (Demand Assigned Multiple Access) stations located in remote parts of the country.

The objective of the 9th Five-year plan for the telecom sector is to provide at least 10 phones per gewog. It is estimated that a total of 6,250 rural telephone lines will be available by the end of the plan period. So far, 76 of the 205 Gewogs (or 37%) in Bhutan have access to telephone lines. The minimum number of telephone lines in each of these Gewogs is 4. Bhutan Telecom is planning to cover all the remaining Gewogs through its Rural Telecommunications Project.

With the optic fiber backbone already implemented between Thimphu and Phuentsholing, BT is exploring new usages. It can easily support the transmission of video, radio, cable TV and other similar signals. Based on its success, similar projects are planned to be undertaken to link Gelephu and the East.

There is plan to provide at least a computer to every school in Bhutan. They need not have internet facility as providing internet to some of the remote and rural schools is virtually impossible due to technical challenges and limited resources. The government has committed annually Nu. 5 million towards computerization of schools programme. More than 300 computers have been purchased during the last three years.

Most of the high schools have also started optional computer courses. Sherubtse College has a regular degree programme in computer science. It has also introduced a post-graduate degree in IT for teachers. This course is conducted in winter vacation and more than 100 teachers are already trained. This is an important strategy towards school computerization. One area that internet might be used on priority is in the resource centers. This center is an ideally located school identified within a cluster of schools where specific subject teachers can gather and discuss. Within the 9th five-year plan period, 30 such RCs will be established and interconnecting these RCs and facilitating a method of communication between them will be useful and productive.

As Bhutan has high english literacy, there are opportunities in the area of call center business. While it will be difficult for Bhutan to compete with such IT giants as India in software and application development, there are obviously promises for acquiring outsourcing businesses on ICT businesses. But this demands a robust and efficient node for private sector development.

Information technology can boost the economy in two ways as a business tool used in local enterprises /firms and as a tradable service. The information technology sector in Bhutan faces several constraints, including comparatively high connectivity charges, a lack of information technology professionals (most come from India at present), undeveloped regulatory and financial systems (online banking is not yet possible, for example) and comparatively high labor costs.

Other developing countries are targeting two main kinds of opportunities: small niche firms selling such services as software development and larger firms selling data entry or business process services. But Bhutan's information technology sector is still in its infancy and several challenges have to be overcome before it can deliver internationally competitive services. These include increasing the use of information technology in the public and private sectors, developing a pool of skilled information technology workers, introducing appropriate regulations (to support online business, for example), and building a data network.

Competencies required:

- Skills development & management (of soft skills and hard skills for ICT application).
- Programme and system analysis concept.
- Networking and hardware assembling & maintenance.
- Basic knowledge of computer in internet/communication.
- Training of Trainers.

3.6 Media & Entertainment

The mountainous difficult terrain and climatic conditions varying even within short distances have resulted in isolated communities. This necessitates the need for good communication facilities for socio-economic development. Media and communication is vital for disseminating information, like public announcements for welfare schemes, thereby facilitating the overall development objectives in the country.

The following are the media and entertainment components in Bhutan:

- Radio – Bhutan Broadcasting Service (BBS), FM stations and, international
- Television - BBS and international
- Film and music as entertainment media
- Internet
- Newspapers- Kuensel, Bhutan Times and Bhutan Observer

Though the print media in the country was introduced in late 60's and radio in the 70's, television and Internet were introduced only in 1999. The communication sector, being new, lacks skilled manpower. On the other hand, the sector is expected to cater to sparse population, meeting the public service objectives, universal access obligations that further increase the operating cost. In the Ninth Plan, the Government has given importance to infrastructure development and improving nation wide quality television and radio programmes.

Media development in Bhutan reflects the changes taking place in the Bhutanese socio-political and economic systems as well as global trends. There have been several significant milestones that mark media growth. Kuensel is distributed around the country by private agents who receive the newspaper on the public transport system. In the more remote places, it is carried by messengers and travelers. While the newspaper reaches most towns and valleys on the publication day, it can take about four days to more than a week to reach the remote parts of the country. The newspaper is the most regular and popular information system for the country's literate population.

The main problem faced by Bhutan's print media is the economics of publishing. Besides the difficulty in distribution, all the raw materials and technical expertise are imported, resulting in very high production costs. Radio is the most effective media in Bhutan and reaches by far the largest audience. BBS estimates that about 60 percent of the population listens to the radio.

With the growth of literacy, more Bhutanese tune in to international stations, mainly BBC and VOA. BBS had become a full-fledged radio station with daily broadcasts in Dzongkha, English, Nepali and Sharchhop. In a country where the rugged terrain was the main hurdle for development, BBS became the most penetrating communication service.

Bhutanese government organisations experimented with a few documentary films in the 1980s, most of them relegated to the archives. Film production began in the 1990s, spurred by the change from celluloid to the more portable video technology and "boomed" after 2000 because of digital technology. There were four films produced between 1990 and 1995, less than one a year, 13 between 1995 and 2000, more than two a year, and 32 between 2000 and 2003, an average of eight a year.

Today government support for the film industry is in the form of entertainment tax exemption, which means they do not have to pay tax from the sale of tickets while screening movies.

In the audio sector, piracy was the main concern. A lot of pirated Bhutanese audio cassettes, CDs and DVDs have recently flooded the market, especially in the Indian border town of Jaigon. Licensed audio-visual houses can also claim custom duties and sales tax exemptions while importing audio-visual equipment. The Department of Revenue and Customs have a list of audio-visual equipments eligible for exemption. However, they have to pay the annual income taxes.

Inadequate expertise, lack of movie halls, limited market, lack of production equipment (only about five film production houses had proper equipments.), lack of professionals in the field of animation and graphics and difficulty in financing are some of the concerns gripping the film industry.

With the wealthier section of the population having access to more sophisticate western and Indian films, the Bhutanese film industry is geared towards a mass urban population. Producers themselves take a film around the country to screen them, with their own projection and sound equipment.

In April 2001, 13 film makers came together to form the Motion Pictures Association of Bhutan (MPAB) and has 45 registered members today).
Their aim was to promote the quality of Bhutanese films and to protect the rights of local film-makers who were concerned about the rampant copyright breaches already taking place in the music industry. In December 2001, the Government (Dzongkha Development Commission) gave the industry a boost by funding the annual film festival and awards programme, the main interest being to promote Dzongkha. In the same year the Ministry of Communications established the film and TV review board to ensure some control of content..

A few music companies expanded into film production. All the films generally contain rigsar (modern fast) songs and music. Film songs via sale of audio cassettes; bring in a substantial earning to local films, especially the more popular ones.

Although some music producers feel that the market is already saturated, there are still people venturing into the business. The competition is expected to result in better quality productions in the long-run.

The MPAB is trying to streamline this as well as attempting to get music producers to work with the Association in keeping track of developments by registering the number of audio albums made each year.

With advertising picking up, there is interest in the private sector to start new media. Cable operators are already trying to be broadcasters and broadband providers and there is interest in the print media too.

Advertising has also been good for business and has been educative for shopkeepers. Media development in Bhutan reflects the changes taking place in the Bhutanese socio-political and economic systems as well as global trends. There have been several significant milestones that mark media growth:

1. **Increasing literacy:** As society became more educated, the information sector was a natural priority and thus, a demand for the media growth.
2. **Technology advancements:** Rapid advancement in technology raised the capability of the media in its production processes. This enhanced its sustainability.
3. **Politics:** Political reforms gave media a new and increasing role, sometimes known as "the fourth estate."
4. **Economy:** Growth in the economy drives media growth. While this is yet to take off, it will be a strong force in future.
5. **Legislation and policy:** It seeks to provide information as a right.
6. **Globalisation:** It has a direct impact on media development in Bhutan.

As with global trends, Bhutan's media has also had an impact on all spheres of Bhutanese life.

On Social impact, it looks at

- Lifestyle
- Family relations
- Values
- Sports
- Children and youth

On Cultural impact, it looks at

- Music
- Fashion
- Language
- e-culture

On Political impact, it looks at

- Media's role
- Freedom of expression
- Legislation
- Changing political values

On Economic impact, it looks at

- E-business
- Employment
- Media business
- Advertising
- Consumerism

Competencies analysis:

The main competencies required in the sector are the following:

- Administrative and management skills in the areas of management, planning, financial management and accounts, human resource management and material management.
- Professional and technical skills in the areas of RF and satellite engineering, video & sound engineering, archive management, network/Web-site administration, art and graphics designers, socio-anthropologist, legal/copyright experts, documentary video productions, photography and journalism.

3.7 Postal & Courier Services

Bhutan Post is the only public postal services in Bhutan. It has built up a nation-wide network of post offices since 1962. There are currently 107 post offices covering every corner of the country and many of them are located in some of the most inhospitable and remote places. There are about 250 employees in the organization.

Private courier services are mostly available in Thimphu, Paro, Phuentsholing and Indian bordering towns. However, in the interior parts of the country, courier services are almost non-existent. The local transport buses and taxis are used for sending the courier packets as a part of an informal network in the absence of organized courier business chain.

Growth Potential:

1. Courier services in important Dzongkhags to cover the spread of services to remotest part of the country with value-added services like goods parcel, delivery of financial services of banks and insurance company etc.
2. Collaborative arrangement with Indian/ International cargo and courier service companies.

3.8 Personal

Services like dry cleaning, beauty saloon, tailoring services, photocopier, STD-PCO and cyber café are some of the services under personal category, which have presence only in the main developed Dzongkhags. In the interior and remote parts, these services are almost non-existent.

With the increasing urbanization in all parts of the country, these services need to be spread to the interior parts where the same are not available.

3.9 Facility /Maintenance Services

The infrastructure and industrial development of any nation requires repair services for organized maintenance or facility management support services. Common facility services like electrician, plumber, electronic gadgets, home appliances (TV, geyser, refrigerators, ovens, heater, washing machines, press, sewing machines etc.) are almost non-existent. For most of the servicing jobs, the items have to be sent to neighboring Jaigaon in India via Phuentsholing.

With increasing number of vehicles and transport means, automobile repair shops and garage needs are increasing in various towns. The rest rooms with cafeteria facilities for travelers on the main highways is another area in Bhutan where lot of development potential exists.

3.10 Education

Education facilities particularly at the higher secondary level are inadequate to meet the increasing local demand. At the tertiary level, the shortage is more acute. Students who are not accommodated in public institutes pursue studies in private schools. Similarly, students at tertiary level desirous of pursuing studies in specific technical/professional fields generally seek admissions outside the country.

Complementing Government's efforts to provide educational facilities and services to the people, private investment in primary and secondary schools is steadily increasing. The sector remains open for foreign direct investment as well. The sector holds potential for private investment as the domestic demand is likely to increase at all levels. Given the clean environment, good climatic conditions and supporting policy environment, there is good scope for establishing institutes of international standards that can also attract students from the region and outside.

4 Agriculture & Livestock Sector

Bhutan is predominantly an agricultural country. Bhutanese agriculture consists of arable agriculture, horticulture, livestock and forestry. Locally referred to as the Renewable Natural Resources (RNR) sector, agriculture remains the most important sector of the national economy, with 69 percent of the population depending on some form of the agricultural production for their livelihood.

The agriculture, horticulture and livestock data at Dzongkhag level have been compiled by collecting information from agriculture and livestock officers stationed at each Dzongkhag. This information was checked with Agriculture Statistics 2005, brought out by the Department of Agriculture, Ministry of Agriculture in July 2007, and the latest of the two sources has been considered in this section for data on country resources.

On an average, 201,639 acres are under cereal crops cultivation mainly comprising of paddy, maize, wheat, barley, millet and sweet buckwheat. Paddy is cultivated in an area of 62,457 acres and continues to be the preferred staple food in Bhutan. The area under paddy cultivation has decreased due to loss of wetland to urban expansion, industries and government infrastructure developments. However, yield per unit area has increased.In the year 2005, paddy production was 67,606 MT.

Maize is a dry land crop cultivated in almost all the Dzongkhags. An area of 75,859 acres of land is under maize cultivation producing 93,968 MT of maize grain annually, mostly in the six eastern Dzongkhags where maize predominates as the staple food of the people.

Wheat and barley are generally grown on dry lands but these are also cultivated as the second crop to paddy in the irrigated lands. While a significant part of the wheat crop is generally cut as green fodder for cattle, the remaining is harvested to supplement domestic food needs. Buckwheat and millet are minor cereals thinly spread out across the country. These cereals are cultivated on 63,323 acres of land, and are all consumed in the growing areas only, leaving no surplus. As such, the consideration of these cereals has been eliminated from the data for further processing.

Oil seeds like mustards and beans are grown in small quantities to meet the home consumption and for sale in the local markets. An area of 13,956 acres of mustard was cultivated with total production of 4,382 MT in 2005.

The following table gives the annual output of important crops based on Agriculture Statistics 2005 and the next column gives the data arrived after eliminating the small volumes at gewogs level, which have no significance in terms of processing consideration at national level. *(the Maize figure has shown increase due to addition of data (2004) of Tendu gewog in Samtse Dzongkhag, which was not available in Agriculture Statistic 2005):

S. No.	Crops	Annual output (MT)	Screened Output (MT)
1	Paddy	67,606.00	67,021.70
2	Maize	93,968.00	94,088.39
3	Wheat	11,246.00	10,581.21
4	Barley	4,592.00	3,892.76
5	Mustard	4,382.00	4,260.71
6	Bean	2,094.00	1,979.61
7	Soya bean	1,634.00	1,405.03

Table 4.1 Important Crops of Bhutan -2005
(Source: Agriculture Statistics -2005, Department of Agriculture, Ministry of Agriculture, Bhutan.)

The Royal Government has established Renewable Natural Resources Centers across the country with sectoral specialization, entrusted with the important responsibilities of securing food self-sufficiency, environmental conservation, maintaining the pristine natural resources, enhancing employment and creating income-earning opportunities through sustainable utilization of the natural resources.

4.1 Agriculture Marketing

The mountainous terrain of the country presents a major obstacle for marketing of agricultural products. Travel in the rural areas is difficult, with many of the households located in far off places taking days of walking to reach. Though farm roads now connect many villages, the majority of villages still remain isolated without access to markets. The little surplus, produced in these areas, is bartered locally. However, in the hinter area of urban centers and districts, the subsistence orientation is gradually diminishing. Developmental activities and overall growth have sparked off greater monetization of the economy with a greater number of farmers marketing their crops.

Barter trade is still prevalent in many parts of the country. This form of trade takes place usually in the rural areas where access to market is limited and supply of money or cash income is low. Food grains are usually bartered for livestock products, especially in the northern part of the country where it is too cold to grow rice. However, this trend is changing with products entering the urban markets, especially during weekend markets. As a result of improved income levels of the general population and better travel conditions brought about by the developmental activities, the barter trade is gradually being replaced by the monetary system.

Many farmers are unable to participate in the market economy because they have no surplus or are cut off from markets by poor transport facilities. Lack of access to markets is the main reason that farmers are reluctant to produce crop surplus beyond what is required for their own consumption. In some regions, however, farmers have shifted to growing of cash crops.

a. Input Supplies: Seed System

The Druk Seed Corporation (DSC) functions as the main supplier of seeds and fertilizers to the farmers, through its regional branches and commission agents. The transportation cost of inputs is borne by the Ministry of Agriculture so that all the farmers have access to the inputs at a uniform price. In the rural areas where there are no seed suppliers, the extension agents facilitate the collection of orders from the farmers in terms of their demand and communicate the same to the regional branches or commission agents.

Bhutan has a serviceable formal seed system in place even though the majority of the potato growers depend on the informal system. From the analysis, one of the main shortcomings of the current system is the serious gap in communication within the seed potato system. Coordination among the key players in production and marketing are particularly problematic and this raises questions about the future performance and focus of the system.

The advancement of seed technology, particularly the tissue culture techniques, coupled with government subsidies has created opportunities for farmers to produce disease-free and true-to-type seeds in a big way. However, the adoption rate of certified seed potato and the number of farmers growing potato for seed purposes has remained very low. It could be because of inadequate technical information dissemination, limited access to supply of basic seeds and reliable seed potato market information. Availability of the technical and market information will guide the growers and traders in making sound decisions pertaining to their production and marketing decisions.

b. Weekend Markets

The local weekend markets are established to facilitate the marketing of agricultural produce and the government had directed all the districts to operate weekend markets. Due to increase in demand from the growing population, the vegetable market in Thimphu now operates almost three days a week. The weekend market offers the farmers an opportunity to sell their surplus products and generate cash income.

c. Auction Yard

The commencement of sale through auction yards has been instrumental in inducing production on a larger scale as well in producing a variety of crops. As mentioned earlier, if the farmers fail to get a satisfactory price for their produce, they sell it through the auction yards.

Auction yards have been set up in all the central regions bordering India. Mobile temporary auction yards are also set up in the main production areas during the harvest seasons. These facilities operate under Government supervision.

d. Markets

The enormous absorption capacity of Indian and Bangladesh markets particularly during off season provides Bhutan with great opportunity to venture into export oriented vegetable and other cash crop production.

During summer and autumn, vegetables are in short supply in the lowlands of India and Bangladesh, whereas most areas in Bhutan are at elevations where climatic conditions are favorable for vegetable cultivation. For sustained trade with India, trade and transportation links have to be developed and maintained.

e. Rural Credit

The Bhutan Development Finance Corporation Limited (BDFCL) extends credit facilities to the farmers. To suit the financial needs of the clients and to provide appropriate financing schemes, the BDFCL has formulated the following three loan systems for its customers:

S. No.	Loan Products	Loan Amount Ceiling (Nu.)	Interest
1	Group Guarantee Lending & Savings Scheme (GCLS)	50,000	13 % per annum
2	Small Individual Loan Scheme (SIL)	50,000	14 % per annum
3	Commercial Agriculture Loan Scheme (CAL)	50,000 and above	15 % per annum

Table 4.2 Type of credits provided by Bhutan Development Finance Corporation
(Source: Bhutan Development Finance Corporation)

Within the financial sector, BDFCL reduced its rural credit group lending rates from 13 percent to 10 percent, effective from August 1, 2004, keeping with the resolution passed during the 82nd National Assembly. In addition, BDFCL launched a new saving scheme for farmers to mark the United Nations International Year of Micro Credit 2005.

f. Market Linkage

Bhutan, being a landlocked country, has to use the nearest Indian seaport, Kolkata, 950 kms away from Phuentsholing, for overseas trade with third countries. For such export of agricultural produce, containers have to be brought from Kolkata, which is not cost effective. Airlifting is not found to be economically feasible because of the high costs involved. As such, agricultural produce movement for export is done by road only to neighbouring countries. Road transport also operates under the following constraints**:**

- Poor road conditions
- Closure of roads during monsoons due to flooding or landslides

Summer in Bhutan coincides with the monsoon season during which most parts of country remain isolated due to landslides, resulting in goods getting stranded either on the roadside or in the production areas.

4.2 Agro Processing

Bhutan's agro-processing industry faces many impediments. Raw materials are uncompetitive because of low crop yields, low productivity and high transport costs. Value-adding activities are hampered by the lack of scale, old technology, bad packaging, lack of branding and costly freight. Managements lack the skills and experience to offset these higher costs through innovation and marketing.

Government support is required to overcome these impediments to growth for a fuller realization of the potential in the following two areas:

- High-value, low-volume products (incense, mushrooms, essential oils, herbs and traditional medicines) in niche markets, based on such competitive advantages as Bhutan's biodiversity, organic production methods and the range of microclimates.
- Large-scale businesses in border areas, based on the competitive advantages of a flexible labour force, a stable political environment and competitive infrastructure and using mainly imported raw materials for processed food.

Processed food is the fastest-growing component of world agricultural and food trade, accounting for 75 percent of this sector and worth US $ 384 billion in 1996.

To exploit this potential, firms will need a timely supply of competitive, consistent and high quality raw materials; supportive policy on labour, transport and investment; innovation in products, processes, packaging and product positioning; and productivity improvements based on better management, processes and labour skills.

4.3 The Food Supply Chain

As may be seen in the diagram below, the prime producers (the farmers) are affected by several factors, of which a number may be controlled and improved through good governance – better education and training, as well as with interventions in inputs. Similar government interventions help improve processing and distribution to end consumers. The way that food is produced, processed and distributed reflects the efficiency and competitiveness of the agricultural system.

The major players in the food system are the farmers, intermediaries, retailers, consumers, and the government as shown in the supply chain diagram (Refer to Fig. 4.1). It is the small farmers who need government support in terms of improved methods of cultivation, better seeds, farm infrastructure and other inputs. Food supply is determined by the availability of cultivable land with inputs like irrigation in the case of paddy cultivation, seeds and fertilizers, farm labour, and good weather conditions. The surplus produce is transported to the urban areas and sold at the weekend market. Where there is no access to roads, transportation of goods is either on pony or backpack. Public transportation is available in some areas while in other areas, trucks are chartered to ferry relatively large surpluses.

Large-scale poultry farming for broiler and egg production is in its infancy in the country. Pilot projects have been set up in Tsirang Dzongkhag, under highly trained specialists from the Ministry of Agriculture. Present practice is of miniscule backyard enterprises. The production system is about the same for beef and pork. This natural vertical integration activity has led to minimal middleman participation in the supply chain, although in certain cases particularly in horticultural products, the actors or players are more distinct and better organized. Vertical integration is a type of business coordination, which occurs when a firm combines activities or stages of production to the sequence of marketing.

Basic characteristics of the entire system are the strong mutual linkages and interactions between the natural resources of Forest, Agricultural Land and Livestock. The natural resource base as well as the production process and the marketing mechanisms are under the influence of many external factors like the climate, economy, policy, demography, culture, technology, communication etc.

The Food Corporation of Bhutan, a state operated corporation is the main marketing agent that facilitates the selling of agricultural produce. Infrastructure facilities like warehousing, storage and auction house have been established in major trading districts.

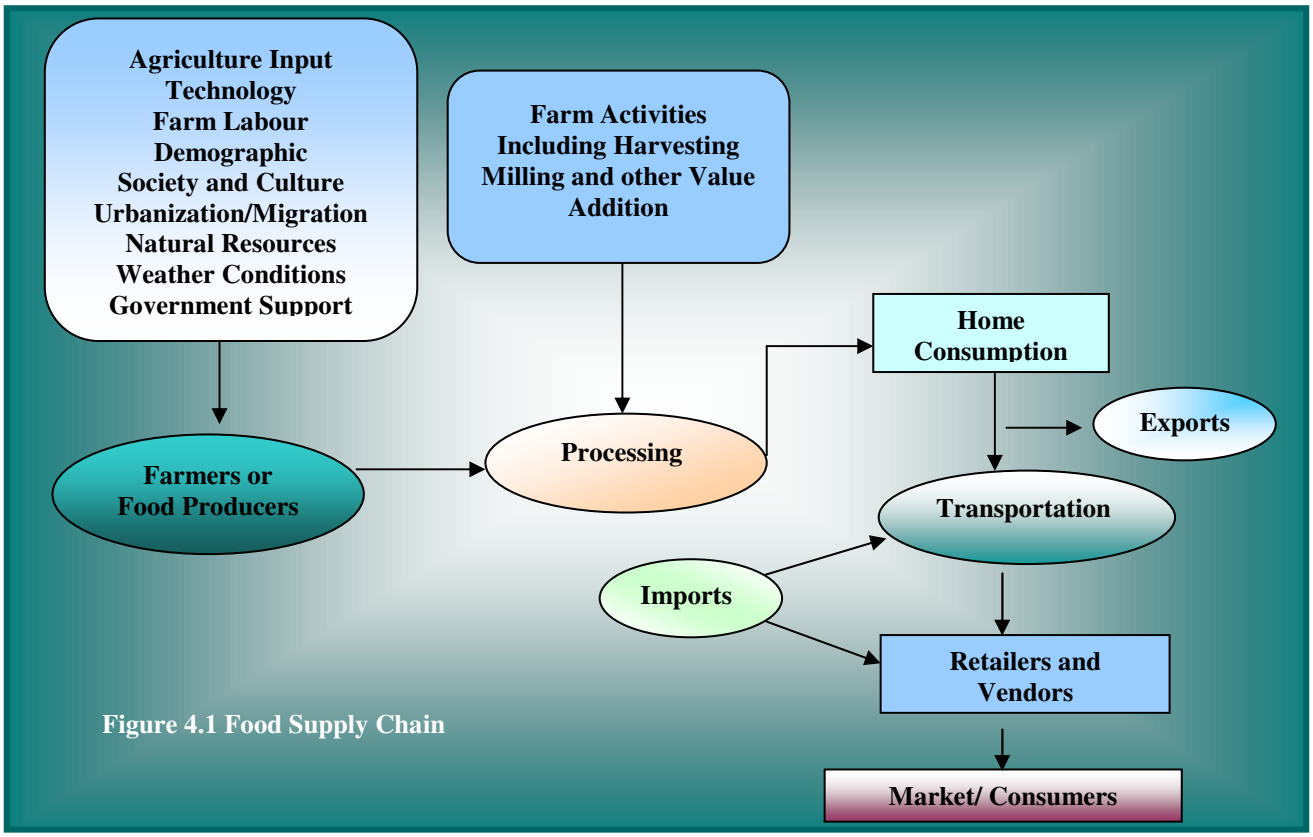


Figure 4.1 Food Supply Chain

The sale of agricultural produce particularly those of oranges, apples, potatoes, cardamoms and vegetables bring in revenue to the farmers. These, including food grains continue to be the major source of income to the farmers across the country.

At the national level, the Agricultural Marketing Services has been instituted as a new office to support and facilitate the selling and marketing of agricultural produce on behalf of the farmers. Strong emphasis is given by the Government to develop domestic and international markets for Bhutanese agricultural products.

On the domestic front, accessibility or facilitation is required in terms of connecting between districts of surplus to the ones with deficit supply. On the external market, one area would be targeting off-season production. This is possible during the summer months, when India faces short supply of fresh vegetables.

4.4 Agriculture Land Cover

The actual cultivated agricultural land area is 261,776 acres out of which 21 percent is wetland, 27 percent devoted to shifting cultivation, 8 percent orchards and one percent under the kitchen garden, while the remaining is dry land. While about 59 percent of the rural households own and cultivate wetland in the districts, 41 percent cultivate 113,000 acres of dry land.

Steep slopes, a predominant feature of the mountains of Bhutan, impose severe constraints on land available for agriculture. Crop cultivation is, therefore, concentrated in the wider valleys. Wherever feasible on the lesser slopes, fields have been created by 'terracing' to carve out land for cultivation. Farming system in different altitudes is as given below:

Agro Ecological Zone	Altitude *(m.a.s.l.)	Rainfall (mm/annum)	Farming Systems, Major Crops and Agricultural Produce
Alpine	3,600-4,600	<650	Yak herding, dairy products, barley, buckwheat, mustard and vegetable.
Cool Temperate	2,600-3,600	650-850	Yak, cattle, sheep & horses, dairy products, barley, wheat & potatoes on dryland, buckwheat & mustard under shifting cultivation.
Warm Temperate	1,800-2,600	650-850	Rice on irrigated land, double cropped with wheat and mustard, barley and potatoes on dryland, temperate fruit trees, vegetables, cattle for draft and manure, some machinery and fertilizers used.
Dry Sub-tropical	1,200-1,800	850-1,200	Maize, rice, millet, pulses, fruit trees and vegetables, wild lemon grass, cattle, pigs and poultry.
Humid Subtropical	600-1,200	1,200-2,500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.
Wet Sub-tropical	150-600	2,500-5,500	Irrigated rice rotated with mustard, wheat, pulses and vegetables, tropical fruit trees.

Table 4.3 Agriculture in agri-ecological zones of Bhutan
(Source: Ninth plan, Renewable Natural Resources Sector, Ministry of Agriculture, Bhutan.) *m.a.s.l. =meter above sea level

4.5 Crops Production Dzongkhag Wise

The crops, which have a substantial surplus after local consumption, have only been considered as a resource for this investment study, since the other crops, cultivated in small volumes, do not present an attractive investment opportunity. The following tables provide the dzongkhag wise figures of production of different agriculture produce:

1. Paddy (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	2054.12
2	Paro	5986.72
3	Samtse	9400.50
4	Chhukha	3625.17
5	Punakha	6914.88
6	Gasa	134.60
	Sub Total	**28115.99**

S. No.	Region /Dzongkhag	Production (MT)
B. Central Region		
7	Wangdue Phodrang	4628.51
8	Dagana	3145.02
9	Tsirang	3502.66
10	Sarpang	8752.58
11	Zhemgang	1154.68
12	Trongsa	1658.18
	Sub Total	**22841.63**
C. Eastern Region		
13	Lhuentse	2396.50
14	Mongar	2804.82
15	Samdrup Jongkhar	3911.19
16	Trashigang	4297.28
17	Trashi Yangtse	2654.29
	Sub Total	**16064.08**
	Grand Total	**67021.70**

Table 4.4 Paddy Production Bhutan-2005

2. Maize (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	13647.15
2	Chhukha	6093.74
3	Punakha	566.19
	Sub Total	**20307.08**
B. Central Region		
4	Wangdue Phodrang	347.06
5	Dagana	5447.68
6	Tsirang	5097.84
7	Sarpang	10696.46
8	Zhemgang	4481.01
9	Trongsa	1143.64
	Sub Total	**27213.69**
C. Eastern Region		
10	Lhuentse	4732.81
11	Mongar	10532.78
12	Pemagatshel	3343.91
13	Samdrup Jongkhar	11590.89
14	Trashigang	11162.86
15	Trashi Yangtse	5204.37
	Sub Total	**46567.62**
	Grand Total	**94088.39**

Table 4.5 Maize Production Bhutan-2005

(Source: Agriculture Statistics-2005, Department of Agriculture, Ministry of Agriculture, Bhutan.)

3. Wheat (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	359.58
2	Paro	1239.73
3	Haa	432.78
4	Samtse	809.70
5	Chhukha	1623.79
6	Punakha	570.22
7	Gasa	39.63
	Sub Total	**5075.43**
B. Central Region		
8	Wangdue Phodrang	677.26
9	Dagana	390.19
10	Tsirang	120.94
11	Sarpang	669.50
12	Zhemgang	295.79
13	Trongsa	533.78
14	Bumthang	637.57
	Sub Total	**3325.03**
C. Eastern Region		
15	Lhuentse	364.58
16	Mongar	181.77
17	Pemagatshel	169.79
18	Samdrup Jongkhar	572.94
19	Trashigang	444.43
20	Trashi Yangtse	447.24
	Sub Total	**2180.75**
	Grand Total	**10581.21**

Table 4.6 Wheat Production Bhutan-2005

4. Barley (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Paro	209.31
2	Haa	111.49
3	Punakha	166.49
	Sub Total	**487.29**
B. Central Region		
4	Wangdue Phodrang	182.56
5	Dagana	47.15
6	Zhemgang	88.94
7	Trongsa	426.54
8	Bumthang	683.75
	Sub Total	**1428.94**

S. No.	Region /Dzongkhag	Production (MT)
C. Eastern Region		
9	Mongar	935.63
10	Pemagatshel	204.89
11	Samdrup Jongkhar	308.42
12	Trashigang	430.74
13	Trashi Yangtse	96.85
	Sub Total	**1976.53**
	Grand Total	**3892.76**

Table 4.7 Barley Production Bhutan-2005

5 Mustard (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	139.36
2	Paro	126.23
3	Haa	68.83
4	Samtse	419.92
5	Chhukha	367.45
6	Punakha	183.03
	Sub Total	**1304.82**
B. Central Region		
7	Wangdue Phodrang	159.33
8	Dagana	440.82
9	Tsirang	259.93
10	Sarpang	530.73
11	Zhemgang	138.07
12	Trongsa	145.64
13	Bumthang	129.02
	Sub Total	**1803.54**
C. Eastern Region		
14	Lhuentse	72.44
15	Mongar	356.41
16	Pemagatshel	261.10
17	Samdrup Jongkhar	164.64
18	Trashigang	297.76
	Sub Total	**1152.35**
	Grand Total	**4260.71**

Table 4.8 Mustard Production Bhutan- 2005

6. Bean (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	116.36
2	Paro	125.58
3	Haa	17.74
4	Samtse	90.37
5	Chhukha	133.67
6	Punakha	158.15
	Sub Total	**641.87**
B. Central Region		
7	Wangdue Phodrang	78.21
8	Dagana	186.86
9	Tsirang	105.94
10	Sarpang	123.40
11	Zhemgang	44.13
12	Trongsa	46.25
	Sub Total	**584.79**
C. Eastern Region		
13	Lhuentse	118.36
14	Mongar	219.65
15	Pemagatshel	55.20
16	Samdrup Jongkhar	116.65
17	Trashigang	192.75
18	Trashi Yangtse	50.34
	Sub Total	**752.95**
	Grand Total	**1979.61**

Table 4.9 Bean Production Bhutan-2005

7. Soya bean (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	34.07
	Sub Total	**34.07**
B. Central Region		
2	Wangdue Phodrang	5.10
3	Tsirang	28.01
4	Zhemgang	9.14
	Sub Total	**42.25**
C. Eastern Region		
5	Lhuentse	211.81
6	Mongar	179.29
7	Pemagatshel	36.10
8	Samdrup Jongkhar	295.83
9	Trashigang	142.22
10	Trashi Yangtse	463.46
	Sub Total	**1328.71**
	Grand Total	**1405.03**

Table 4.10 Soya bean Production Bhutan-2005

Analysis of the Agricultural Resources

After compiling the data of production of the various food grains at the national level, it is adjusted for the estimated domestic consumption to arrive at the surplus. This figure is then again adjusted for estimated 'collectible' surplus that can be commercially exploited for further processing.

4.5.1 Food Grains: Annual Production and Consumption (On a population of 634,982)

Food Grain	Screened Output (MT)	Availability per Head per Day (Gms)	Adequacy for Domestic Consumption	Estimated Surplus (MT)	Estimated Surplus for Commercial Utilization (MT)
Paddy	67,021.70	223	No		
Maize	94,088.39	365	Yes	40,000	15,000
Wheat	10,581.21	19	No		
Barley	3,892.76	6	No		
Mustard	4,260.71	10	No		
Bean	1,979.61	14	No		
Soya bean	1,405.03	4	No		

Table 4.11 Food Grains: Analysis of Surplus

There are virtually no surpluses available in agriculture produce except in maize, though there is a small export of 'red rice'. This analysis is borne out by the fact that food grains are being imported into Bhutan as shown in table below:

Year	Total Import of Food Grains (MT)
1999	41,500
2000	57,000
2002	57,000
2003	62,000

Table 4.12 Total Import of Food Grains

(Source: Food Self Sufficiency status, RNR Sample Survey, PPD, MoA)

However, the review highlights the fact that the field is wide open for innovative projects in which investment could yield results in the short as well as long term. Such projects could arise from both agricultural production as well as its downstream operations, as indicated below:

4.5.2Agro Produce:

- Seed production of high yielding varieties

4.5.3 Downstream Operations

- Post harvest processing
  - Cold storage
  - Grading & packaging
  - Processing for preservation
- Flour mill
- Cereal processing (Breakfast cereals)
- Pulse milling
- Soya milk & Tofu paneer
- Bread and bakery products
- Fruit & vegetable processing
- Dehydrated vegetables
- Fruit juice and pulp
- Oils
- Ready to eat noodles
- Maize flakes
- Snack foods (Local specialties)
- Soda, soft drink and energy drinks and fats
- Spices processing (dry)
- Spices oleoresin
- Ready to eat curried vegetables
- Snack foods (Potato chips, banana chips)
- Processed & canned items (Pickles, jams, etc.)
- Dairy products (Milk, flavored milk, cheese)
- Butter, whey, ice cream, sweets
- Rice milling and bulk packaging
- Confectionery products

4.6 Livestock

About 90 percent of the rural households own livestock, which forms an integral part of the Bhutanese farming system, providing support to agriculture through draught power and the provision of manure as fertilizer. Livestock also provides increasingly greater value by generating cash incomes from butter, cheese and meat. Cattle, yak, buffalo, sheep, goats, pigs, equine and poultry are the major livestock owned and reared by farmers.

Government has been actively pursuing the objectives of:

- Enhancing livestock production and productivity
- Achieving greater self-sufficiency in livestock products
- Improving the nutritional status of the people

It is sought to achieve these objectives with the following strategies:

- Facilitating investment in livestock activities
- Promoting rural livestock enterprise development for poverty alleviation
- Promoting farmer's associations for collective self-help in indigenous development
- Promoting vertical integration through all stages of production, processing and marketing

Government is preparing a Livestock Breeding Policy and has sanctioned the setting up of Veterinary Hospitals and Laboratories in every Dzongkhag. Projects have already been identified for Dairy Development, Poultry Production (Broiler and Layer), Pig Production and Fishery Production, which are discussed hereunder.

4.6.1 Livestock Population

The existing livestock population is over 662,305. Households in the eastern and central part of Bhutan have more livestock per household than in the western, northern and southern parts of Bhutan.

The government plans to nationalize, improve and lease the pasture areas for better control on grazing and to improve the productivity of the pastures and livestock. The present norm for grazing land is about 2.5 ha per livestock unit in the alpine region, 0.4 ha per livestock unit in the temperate region and 0.2 ha per livestock unit in the sub-tropical region.

a. Yak: Totaling to about 35,000 or 5 percent of the entire livestock population, yaks are an important source for dairy products and meat, the latter known for its delicacy and taste. 2.2 percent of rural households own yaks, which occupies an ecological niche at high altitudes (3000-5000 m) where plant growth is limited by the generally cold temperatures and short growing season. The production parameters are as follows: adult live weight for males and females at 325 and 220 kg respectively; age at first calving 4.3 years. Productive life of females is 10-12 years with gestation period of 254 days at calving interval of 690 days. Yak milk constitutes 5.9-8.8 % fat, it has lactation period of 167 days and lactation yields 220 kg. The main products from yak are milk, butter, hard dry cheese, meat, hide and hair.

b. Mithun: These are the special breed of cattle. They move on an annual cycle to grazing lands between 3,000-4,500 meters. Adult live weights: males 365 kg, females 230 kg age at first calving 35.6 months. Gestation period 270 days, calving interval 425 days, lactation length 260-305 days and lactation yields 1,300-1,690 kg. The main products from mithun are milk, butter, hard dry cheese, meat, leather and hair. These animals are also used for transportation.

c. Cattle: Cattle comprise 45 percent of the total livestock population. It is an important source of draft power, dairy products, meat and farmyard manure to replenish soil fertility. Approximately 78 percent rural households on an average own cattle. Efforts are underway to improve the production potentials of the local cattle through crossbreeding. About 11 percent of the cattle are now improved breeds, of which 24 percent are males and 76 percent females. The higher ratio for females projects farmers' preference for the latter as a source of milk and other dairy products. It is proposed to introduce a cattle identification system in conjunction with Herd Book and Farm Register. The farm, NNBF at Tashiyangphu, is the only one catering to the conservation and development of indigenous cattle breed. Further, each Dzongkhag will be required in future to submit annual livestock reports.

d. Buffalo: Buffaloes are sub-tropical domesticated animals restricted to the southern belts. They serve as an important source for draft power, meat, dairy product and as a source of farmyard manure. Buffaloes comprise 0.3 percent of the livestock total and are owned by less than 1 percent of the population. About 61 percent of buffalo population is female, projecting farmers' stronger preferences for milk and other dairy products.

e. Sheep: There are four main breeds of sheep varying in their agro ecological zones and yield. The total production of wool and mutton is given in table 4.16.

f. Goats: Crossbred goats are found on government farms and in private flocks in their immediate vicinity. Sheep and goats are thinly spread out, partly due to Government policy to discourage increase in the goat population for their browsing habits(which are for vegetation). Currently, there are 52,000 sheep and goats owned by 21 percent of the households. About 42 percent are sheep and the rest are goats. While the goat population has remained stable, sheep population has been reduced by almost half over the last one decade. In Nepal, the terai type goats have been crossed with the Indian Jamunapari and Barberi breeds for providing mutton, and this could also be attempted in Bhutan.

g. Poultry Production: About 66 percent of the farm households owned 231,000 poultry birds with an average of 4 per household. Only 5 percent are improved breeds. Poultry birds are raised mainly for egg and meat purposes especially among the population in the south. Besides, duck and pigeons are also maintained by some households in the south but are statistically not significant.

h. Piggery: Pigs are widely reared by people except in Bumthang Dzongkhag (where the people have strong religious sentiments against killing). Pig rearing is also very rare in the alpine regions of Laya, Lunana, Lingshi, Soe, Naro, Merak and Sakteng where the climate is extreme and the feed limited. Pigs account for the third largest portion of livestock, with 41,400 heads bred for meat purposes only. Only 14 percent of the population is of improved breeds. Apart from government farms, no private commercial piggery exists in the country. About 38 percent of the farm households rear pigs as small backyard animals. Production on the farm suffers due to farm labour shortage, lack of arrangements for feed and religious sentiments.

The Contract Pig Breeding Programme (CPBP) in a village level is an effort put on by the Department of Livestock to reduce the increasing pressure of demand of piglets on the only three central farms of pig breeding. In Chhukha Dzongkhag, two gewogs viz: Bongo and Bjabcho were selected to conduct feasibility and its efficacy study under farmers' management. The objectives of the CPBP are:

1. To reduce the dependency of inputs on the central farms
2. To produce piglets and meet the requirement within the Dzongkhag or at least in some gewogs
3. To motivate the other farmers to venture into similar activities
4. To study its efficacy and feasibility under local management
5. To set an example for other Dzongkhags

The farmers were given materials for the construction of the pigsty free of cost along with the construction charges. They were also provided with two numbers animals (1 male and 1 female) free of cost on the condition that the same pig should be maintained until six farrowings. The participants of the programme were also asked to buy additional two numbers of piglets to sustain the programme.

The programme is understood to be proceeding well, but no data is available on actual production achieved under this programme or the extension of this programme to other gewogs. However, it may be required to import faster growing animals for improving quality and productivity of the programme. No surplus is available for commercial exploitation at present.

i. Fishery: While Bhutan is rich in cold-water streams, rivers and lakes, the fish distribution in them is poorly known, fish exploitation minimal, and aquaculture of cold-water fish species does not exist yet. Apart from indigenous fish with fisheries potential, such as asla and mahseer, the exotic brown trout is also present in some rivers where it has established self-reproducing populations. Only controlled and limited sport fishery for mahseer (Tor sp.) is allowed. It is proposed to establish a cold-water fish hatchery, both for the production of stocking material for releases in rivers and lakes, as well as for production of table-sized fish.

The Ministry of Agriculture has an Integrated Area Development Project and National Warm Water Fishery Culture Centre, at Gelephu. The record of fishery development so far has not been encouraging. A small fish-breeding farm in the western part of the country was established in the early 1970s, with the objective of breeding brown trout to be released in rivers and lakes to enhance production of fish fauna in natural water bodies. The farm remained functional for about 15 years and was closed by the government due to unforeseen reasons.

An FAO Mission in 1987, reviewed the situation and put forward a proposal for a model hatchery for the cold-water indigenous fish asla and for the exotic trout (FAO, 1987), but there has been no follow-up. A new initiative has been taken up in Samthang village in cold-water fishery. Trout breeding and breeding of indigenous fish species on a small scale specifically for stocking rivers and lakes can be carried out for conservation of biodiversity. The country has good potential for development of cold-water fishery in rivers, lakes and reservoirs. Current plans and proposal include the establishment of a trout hatchery and its culture by starting a pilot project in northern Bhutan.

j. Livestock Products[1]

The following table gives the total country production of the main products, which can be considered for organized processing.

S. No.	Livestock Product	Production
1	Milk (Lt.)	22,491,854
2	Butter (Kg.)	2,448,849
3	Cheese (Ball)	5,542,119
4	Beef (Kg.)	391,844
5	Pork (Kg.)	489,255
6	Chicken (Kg.)	167,387
7	Mutton (Kg.)	54,041
8	Egg (Nos.)	5,247,798
9	Fish (Kg.)	6,102
10	Wool (Kg.)	6,450

Table 4.13 Livestock Products Bhutan 2005

Analysis of the Livestock Resource

On reviewing the data in this sector, it is noted that there is virtually no surplus in the availability of meat, given that the majority of the population has a staple diet of non-vegetarian food. There is a move now to identify unproductive animals to cull them and replenish the resource from pedigree livestock. The domestic requirements cannot be met at present from the indigenous production and significant volumes of beef, pork, poultry and fish are imported from India. However, markets for the following products need to be explored to assess commercial potential:

- Sun dried yak meat
- Dairy milk
- Cheese
- Poultry
- Piggery
- Dried fish

Similarly, other products such as wool are produced in low volumes and suited to local utilization. Projects for processing can be considered in the handicrafts sector such as:

- Wool knitted and woven products
- Animal hair and bones (for carving)

There is a surplus availability of milk, some of which is converted to butter and cheese balls for loose sale in local markets. Further, the quality of milk sold by this unorganized sector is inconsistent, as is the price, which has large seasonal variation. For efficient utilization of this surplus national inventory, milk processing and value added products present viable alternatives.

There is a good potential for the development of integrated dairy for value-added specialty dairy products like pasteurized pouch milk, cheese, butter, cream, flavored milk, frozen fruit yogurt for local consumption and export to North Indian States and Bangladesh.

For livestock products, there is little scope for export unless scientific collection and processing facility is set up in milk surplus areas. The first objective would be to meet the domestic demand and reduce the import of livestock products from abroad. In terms of dairy, the collection and processing of milk and marketing of the products is important. As the Bhutanese dietetic preferences are changing, the products offered by Bhutanese manufacturer should try to meet these new demands. A huge portion of dairy imports consists of Amul (Indian co-operative) cheese and butter and milk powder. Efforts should be made to offer a Bhutanese alternative for these products. Thus, in the ten prioritized projects integrated dairy project has been recommended as one the projects at national level.

Source:
[1]Department of Livestock & Dzongkhags Livestock Officers, Dzongkhags Administration, Bhutan.

5 Horticulture Sector

Different types of vegetables are cultivated across the country mainly on a subsistence level, which may contribute substantially to the family's requirements, but leaves little surplus. These are chili, turnip, potato, ginger, radish, beans, broccoli, cabbage and green leaves.

On an aggregate, the total harvested area under vegetables was 38,139 acres and the total production was 99,002 MT. Potato contributed 54 percent, ginger 7 percent and chili 11 percent of the total production.

Potato is an important source of cash income and is cultivated on a large scale mainly in the western, central and eastern areas. Cultivation has been improved by the Bhutan Potato Development Program. The major potato growing Dzongkhags are Wangdue Phodrang, Trashigang, Chhukha, Bumthang, Paro and Mongar. The national average yield of potato is 3,701 kg per acre while the highest yield level reported was 6,381 MT per acre in Wangdue Phodrang Dzongkhag.

Chili, although a part of the spice group, is regarded as a vegetable like any other in Bhutan. It forms an important part of the family's diet and is also an important source of cash income for the farmers. Chili is cultivated in both wet and dry lands mainly in the mid hills from the west to east.

Radish is another important crop produced for domestic consumption. It is a dry land crop and forms an important part of the family diet. Substantial amounts of the produce are sold to institutions like schools and army establishments. Like radish, turnip is also a dry land crop produced for domestic consumption. People consume it, but bulk of the production goes as feed for cattle and pigs. Its cultivation is well adapted especially to high land areas. Both turnip and radish are high volume low value crops with limited external markets.

Numerous minor vegetables are cultivated in the country. While many are grown in kitchen gardens, others such as tomato, carrots, squash gourds and onion are being grown increasingly as cash crops in the more accessible areas. Ginger, onion, garlic and cardamom are used in the preparation of curry dishes. Bhutanese in the southern region use ginger and cardamom in tea, as this is believed to have healing effects on body.

Ginger was cultivated on 2,435 acres in the sub-tropical regions, mainly in the foothills. The total production in the year 2005 was 6,901 MT. It is an important cash crop generally sold to local and neighboring markets in India.

The following table gives the annual output of important vegetables based on Agriculture Statistics 2005 and the next column gives the data arrived after eliminating the small volumes at gewogs level, which have no significance in terms of processing consideration at national level:

S. No.	Vegetable	Annual Output (MT)	Screened Output (MT)
1	Potato	53,594.00	51,452.38
2	Radish	12,637.00	9,462.87
3	Turnip	8,470.00	7,635.23
4	Cabbage	3,346.00	2,726.98
5	Chili	10,447.00	9,125.09
6	Ginger	6,901.00	3,110.34
7	Green leaves	2,417.00	1,755.24
8	Cardamom	1,190.00	1,163.03
Total Production (MT)		99,002.00	86,431.16

Table 5.1 Major Vegetable Production- 2005, Bhutan

5.1 Development of Potato Industry in Bhutan

Potato is grown as a cash crop all over the country and particularly in high altitude areas, where farmers earlier had no other means of earning cash income. Commercial cultivation of potato initially began in Chhukha Dzongkhag in the mid 1970s. Currently, potato is grown in almost all the Dzongkhags, that covers Trashigang, Wangdue Phodrang, Chhukha, Bumthang, Paro, Mongar, Thimphu, Haa, Punakha, Tsirang, Trongsa, Sarpang, Trashi Yangtse, Pemagatshel and Samdrup Jongkhar. In terms of production, Trashigang, Wangdue Phodrang, Chhukha, Bumthang, Paro and Mongar are more significant.

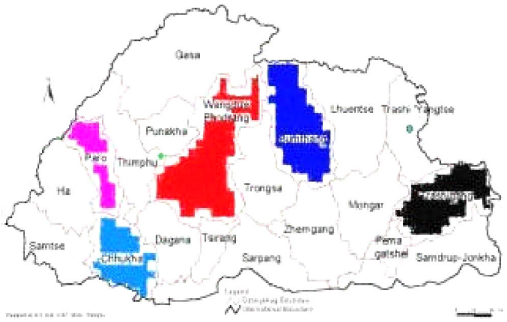


Figure 5.1: Major Potato Growing Dzongkhags in Bhutan

With access to markets in India, potato became the most important cash crop for the higher regions of Bhutan. In some Dzongkhags, it is cultivated on a kitchen garden scale while in others, it is the main cash crop. Various pests have been recorded in potato in different parts of the country. In the highlands, late blight, viruses and scab are common. At medium to low elevations, red ants and early blight are of importance, particularly in years with early spring rains, when it may assume epidemic proportions. In high altitude areas, early potato crops planted in the period January - March normally escape the disease. Low altitude potato is planted in September/October, and normally escapes the disease due to the approach of the dry winter season.

5.2 Existing Vegetable Marketing Channels in Bhutan

Before 1992, most of the vegetables were sold through the auction yards operated by the Food Corporation of Bhutan. The middlemen traveled from house to house collecting surplus products and selling it to Indian traders through the auction yards, which encouraged the farmers and led to increase in production. The farmers gradually started taking the produce to the auction yards themselves which has set a trend for most of the farmers in rural areas. While small surpluses are sold in the weekend markets all over the country, the large surpluses are sold in the auction yards. Now, due to the de-monopolization policy, the middlemen/farmers can sell either directly to traders or to buyers at auction yards.

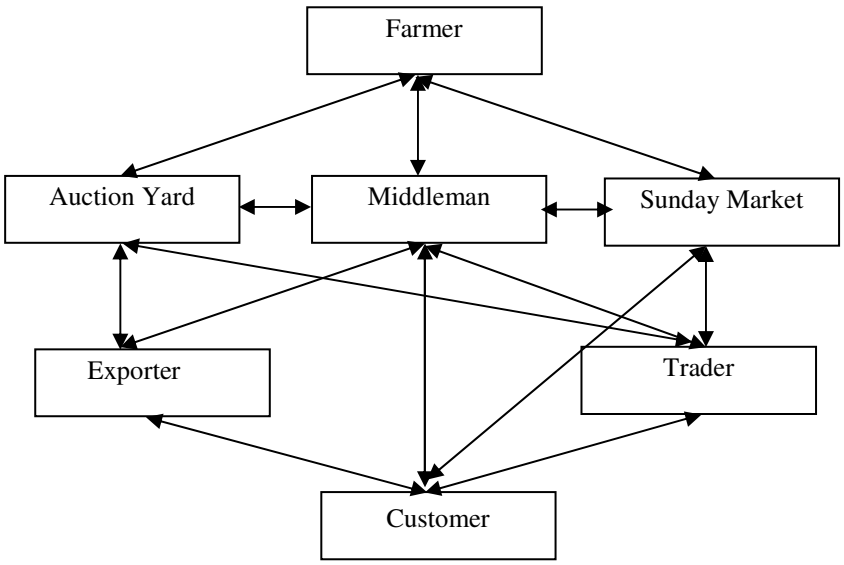


Figure 5.2 Existing Vegetable Marketing Channels in Bhutan

Bhutan has a seasonal advantage in terms of vegetable production over India. Bhutan produces the vegetables in summer while India grows them in winter. Thus, a ready market for these vegetables exist in India. Demand for Bhutanese vegetables are on the rise because of the taste, freshness and the conditions under which these are grown. Red potatoes from Bhutan are used predominantly in the manufacture of potato snacks and other potato products.

Although vegetables find ready market in India, there is little premium attached as the products are unsorted and ungraded. It is generally the middleman who makes large profits due to higher marketing margins brought about by sorting, grading and packaging.

5.3 Vegetable Production[1] Dzongkhag Wise

The main vegetables, which have a substantial surplus after local consumption, have only been considered as a resource for this investment study, since other vegetables grown in small volumes, do not present attractive investment possibilities.

1. Potato (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	1432.69
2	Paro	7582.05
3	Haa	2236.23
4	Samtse	1078.71
5	Chhukha	4996.11
6	Punakha	672.99
	Sub Total	**17998.78**
B. Central Region		
7	Wangdue Phodrang	8406.37
8	Dagana	1207.55
9	Tsirang	870.73
10	Sarpang	471.79
11	Zhemgang	297.91
12	Trongsa	544.45
13	Bumthang	4523.59
	Sub Total	**16322.39**
C. Eastern Region		
14	Lhuentse	1354.19
15	Mongar	2582.33
16	Pemagatshel	1722.83
17	Samdrup Jongkhar	598.57
18	Trashigang	8224.25
19	Trashi Yangtse	2649.04
	Sub Total	**17131.21**
	Grand Total	**5,1452.38**

Table 5.2 Potato Production Bhutan 2005

2. Radish (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	532.63
2	Haa	506.44
3	Samtse	380.97
4	Chhukha	405.80
5	Punakha	549.75
6	Gasa	19.20
	Sub Total	**2394.79**
B. Central Region		
7	Wangdue Phodrang	1194.66
8	Dagana	538.95
9	Tsirang	289.39
10	Sarpang	178.37
11	Trongsa	624.89
12	Bumthang	105.96
	Sub Total	**2932.22**
C. Eastern Region		
13	Lhuentse	522.86
14	Mongar	919.73
15	Pemagatshel	564.49

Source:
[1]Agriculture Statistics-2005 Year Book, Department of Agriculture Ministry of Agriculture, Bhutan.

S. No.	Region /Dzongkhag	Production (MT)
16	Samdrup Jongkhar	335.30
17	Trashigang	1061.95
18	Trashi Yangtse	731.53
	Sub Total	**4135.86**
Grand Total		**9,462.87**

Table 5.3 Radish Production Bhutan-2005

3 Turnip (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	883.89
2	Paro	1602.35
3	Haa	2211.79
4	Chhukha	316.72
5	Punakha	249.06
	Sub Total	**5263.81**
B. Central Region		
6	Wangdue Phodrang	2160.30
7	Trongsa	211.12
	Sub Total	**2371.42**
Grand Total		**7,635.23**

Table 5.4 Turnip Production Bhutan –2005

4 Cabbage (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Paro	1020.75
2	Chhukha	353.94
	Sub Total	**1374.69**
B. Central Region		
3	Wangdue Phodrang	207.26
4	Dagana	134.53
5	Tsirang	6.10
6	Sarpang	29.88
7	Zhemgang	52.08
	Sub Total	**429.85**
C. Eastern Region		
8	Lhuentse	142.36
9	Mongar	185.71
10	Pemagatshel	32.26
11	Samdrup Jongkhar	39.61
12	Trashigang	457.46
13	Trashi Yangtse	65.04
	Sub Total	**922.44**
Grand Total		**2,726.98**

Table 5.5 Cabbage Production Bhutan -2005

5. Chili (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	465.56
2	Paro	2041.29
3	Haa	60.47
4	Chhukha	410.11
5	Punakha	977.98
	Sub Total	**3955.41**
B. Central Region		
6	Wangdue Phodrang	760.36
7	Dagana	206.53
8	Tsirang	147.92
9	Sarpang	71.75
10	Zhemgang	119.77
11	Trongsa	196.68
	Sub Total	**1503.01**
C. Eastern Region		
12	Lhuentse	881.41
13	Mongar	722.33
14	Pemagatshel	600.74
15	Samdrup Jongkhar	189.14
16	Trashigang	708.75
17	Trashi Yangtse	564.30
	Sub Total	**3666.67**
	Grand Total	**9,125.09**

Table 5.6 Chili Production Bhutan -2005

6. Cardamom (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Haa	47.43
2	Samtse	728.24
3	Chhukha	297.61
	Sub Total	**1073.28**
B. Central Region		
4	Dagana	89.75
	Sub Total	**89.75**
	Grand Total	**1,163.03**

Table 5.7 Cardamom Production Bhutan -2005

(Source: Agriculture Statistics-2005, Department of Agriculture, Ministry of Agriculture, Bhutan.)

7. Ginger (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	1407.32
2	Chhukha	176.99
	Sub Total	**1584.31**
B. Central Region		
3	Wangdue Phodrang	62.68
4	Dagana	54.65
5	Sarpang	228.66
6	Zhemgang	24.61
	Sub Total	**370.60**
C. Eastern Region		
7	Mongar	36.39
8	Pemagatshel	106.75
9	Samdrup Jongkhar	824.79
10	Trashigang	172.04
11	Trashi Yangtse	15.46
	Sub Total	**1155.43**
	Grand Total	**3,110.34**

Table 5.8 Ginger Production Bhutan -2005

8. Green Leaves (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	43.36
2	Paro	93.91
3	Haa	16.57
4	Samtse	267.88
5	Chhukha	188.65
6	Punakha	89.57
	Sub Total	**699.94**
B. Central Region		
7	Wangdue Phodrang	85.69
8	Dagana	216.21
9	Tsirang	158.23
10	Sarpang	161.01
11	Zhemgang	102.53
12	Trongsa	47.80
	Sub Total	**771.47**
C. Eastern Region		
13	Lhuentse	146.52
14	Mongar	183.84
15	Pemagatshel	40.44
16	Trashigang	184.93
17	Trashi Yangtse	98.90
	Sub Total	**283.83**
	Grand Total	**1,755.24**

Table 5.9 Green Leaves Production Bhutan -2005

5.4 Fruits Production[1]

Apples, oranges and areca nut have had a major impact on the income generation of farmers. These crops now dominate the export market. Apples and oranges are produced mainly in the south and central regions. Other fruits like pears, plums and guava are sold in the domestic markets because of the small harvest volumes.

The following table gives the annual output of important fruits based on Agriculture Statistics 2005 and the next column gives the data arrived after eliminating the small volumes at gewogs level, which have no significance in terms of processing consideration at national level:

Fruits Production Bhutan (Production in Metric Ton)

S. No.	Fruits Name	Annual Output (MT)	Screened Output (MT)
1	Mandarin	48,367	42,655.17
2	Apple	10,421	9,862.01
3	Areca nut	6,616	4,596.89
4	Banana	2,376	1,514.45

Table 5.10 Fruits Production Bhutan-2005

Fruits Production Dzongkhag wise

1. Mandarin (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	2181.49
2	Chhukha	8154.77
3	Punakha	572.16
	Sub Total	**10908.42**
B. Central Region		
4	Wangdue Phodrang	314.79
5	Dagana	4014.43
6	Tsirang	9084.20
7	Sarpang	7996.32
8	Zhemgang	1839.19
	Sub Total	**23248.93**
C. Eastern Region		
9	Lhuentse	138.87
10	Mongar	1017.44
11	Pemagatshel	2086.82
12	Samdrup Jongkhar	4008.23
13	Trashigang	863.34
14	Trashi Yangtse	383.12
	Sub Total	**8497.82**
	Grand Total	**42,655.17**

Table 5.11 Citrus Production Bhutan –2005

2. Apple (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Thimphu	3949.74
2	Paro	4948.31
3	Haa	514.37
	Sub Total	**9412.42**
B. Central Region		
4	Wangdue Phodrang	86.20
5	Bumthang	363.39
	Sub Total	**449.59**
	Grand Total	**9,862.01**

Table 5.12 Apple Production Bhutan -2005

Source:
1Agriculture Statistics-2005 Year Book, Department of Agriculture, Ministry of Agriculture, Bhutan.

3. Areca nut (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	1020.76
2	Chhukha	1535.21
	Sub Total	**2,555.97**
B. Central Region		
3	Sarpang	1962.12
	Sub Total	**1962.12**
C. Eastern Region		
4	Samdrup Jongkhar	78.8
	Sub Total	**78.8**
	Grand Total	**4,596.89**

Table 5.13 Areca nut Production Bhutan -2005

4. Banana (Production in Metric Ton)

S. No.	Region /Dzongkhag	Production (MT)
A. Western Region		
1	Samtse	172.65
2	Chhukha	84.12
3	Punakha	69.34
	Sub Total	**326.11**
B. Central Region		
4	Wangdue Phodrang	20.97
5	Dagana	159.68
6	Tsirang	215.03
7	Sarpang	249.70
8	Zhemgang	45.45
	Sub Total	**690.83**
C. Eastern Region		
9	Lhuentse	75.61
10	Mongar	146.11
11	Pemagatshel	147.86
12	Samdrup Jongkhar	60.32
13	Trashigang	43.77
14	Trashi Yangtse	23.84
	Sub Total	**497.51**
	Grand Total	**1514.45**

Table 5.14 Banana Production Bhutan -2005

Analysis of Vegetables & Fruits Production as Investment Resource:

Data on production of fruit and vegetables indicates that the surplus does come to market but it does not fetch the price for the producer that it would if it were graded and packed properly before being put on the market. These operations of grading and packaging add value and are applicable to both the perishable vegetables and fruits and the longer lasting items such as ginger and cardamom. These operations have to be supplemented with quick freezing and cold storage facilities to ensure that the produce retains its freshness till displayed on store shelves.

The strategy to be followed is two-fold to cover produce to be sold in its original form and in a processed form. In the former, the products would require to be washed, graded and packed in their original form to send to the end customer e.g. apples. In the latter, the produce would be taken up for processing and the form changed into a longer lasting product e.g. fruit juices, potato chips or oleoresin oil. While virtually all vegetables, except radish and turnip, are suitable for grading and preservation, the ones suitable for conversion into longer lasting products are:

S. No.	Vegetable	Production (MT)	Possibility of Commercial Utilization
1	Potato	51,452	Potato chips, wafers, French fries, vermicelli
2	Chili	9,125	Suitable for extraction of oleoresin
3	Ginger	3,110	Suitable for extraction of oleoresin
4	Cardamom	1,163	Suitable for extraction of oleoresin

Table 5.15 Commercial Utilization of Vegetables

Fruit and vegetable products are therefore, taken up for detailed consideration and preliminary viability assessment for the following three projects carried out as part of ten prioritized projects:

- Fruit/Vegetable cleaning, grading and packaging unit
- Savory products from potato
- Production of oleoresins

5.5 Mushrooms

Bhutan exports the highly prized fresh mushrooms, Shitake and Masutake, to Japan and Thailand. Markets are also opening up in Malaysia and Singapore. Bhutan started exporting Masutake mushrooms to Japan, Thailand, Singapore, Malaysia and India since 1990, with the bulk of exports going to the Japanese market. This was due to greater demand from outside the country leading to exploration of more mushroom growing forest areas.

5.6 Organic Production

With the world becoming increasingly health conscious, production of organically grown crops in diverse agro-climatic conditions has been seen as a key to success in the agriculture sector, leading to diversification in agriculture. The Royal Government is in the process of evolving domestic standards in conformity with international standards for organic products and the relevant institutions, to facilitate the marketing of organic products. The limitation of arable land in Bhutan necessitates the need for production of high value products for export to niche markets. Most of the farming in Bhutan is organic, but this advantage has not been exploited for several reasons: lack of awareness of organic farming systems, lack of infrastructure and marketing facilities, limited access to capital, and lack of a proper certification and accreditation system.

Certification and accreditation issues are particularly important. Most exporters turn to international certification bodies to allow them to market their products as 'organic' in foreign markets. While the costs of certification vary,it can be significant, and Bhutan may need to draw upon its relationship with international bodies and the Bureau of Indian Standards to establish a national certification infrastructure.

5.7 Floriculture[1]

Encouraging farmers to grow flowers is another area which remains unexplored. Bhutan has the potential to grow a variety of flowers because of diverse agro-climatic conditions but the floriculture industry is yet to be taken up. Since India is now developing its floriculture industry at a rapid pace, important inputs may be available for launching the industry in Bhutan. Market research may be conducted to determine the markets and ascertain the profitability of setting up a floriculture industry in Bhutan. Cultivation of some varieties of orchids may be feasible and profitable.

Fig 5.3 Local vendor selling vegetables

Source:
[1]Agriculture Statistics-2005 Year Book, Department of Agriculture, Ministry of Agriculture, Bhutan.

6 Wood Sector

The Kingdom of Bhutan is renowned for its forest resources, which covers an estimated 70 to 72% of the country. They are of immense socio-economic and ecological importance for this Himalayan country, providing the habitat for diverse species of flora and fauna. The forest cover has fir, mixed conifers, chir pine, and broadleaf species such as teak.

The declared nature parks and reserves cover 26% of the country's land area. Much of the flora has remained undisturbed. Moreover, a number of rare animals can still be found since the environment has remained undisturbed. These are the golden langur, takin, blue sheep, snow leopard and the red panda, which are found along with tiger, leopard, gaur, Himalayan black bear, brown bear, wild pig, musk deer, and other types of deer.

Bhutan has a landmark environment policy that mandates keeping a minimum of 60% of the total land area of Bhutan under forest cover. Forests have been classified into three categories namely: Government Reserved Forest, Community Forest and Private Forest. The reserved forest is divided into protected areas for national parks, sanctuaries and nature reserves, and forest management units for harvesting of timber.

Forest Type	Area (ha)	Vol./ha. (m^3)	Stem/ha (m^3)	Total Vol. (m^3)	Total Stems
Fir and spruce	128,021	0.93	3.15	119,060	403,266
Mixed conifers	137,199	1.46	7.06	200,310	968,625
Conifers mixed with broadleaf	149,679	1.03	5.56	154,169	832,215
Upland hardwood	207,889	0.70	3.19	145,522	663,166
Total	**622,788**	4.12	18.96	**619,061**	**2,867,272**

Table 6.1 Extent and Area of Forest
(Source**:** Environmental Assessment Act-2000.)

a. Timber Demand & Production Potential (2005-2009) [1]

According to the provision of the Forest and Nature Conservation Act -1995, commercial timber production is to be undertaken by the Ministry of Agriculture based on approved Forest Management Plans. The sale and use of timber is based on the following provisions:

- The Ministry of Agriculture, through its agencies, will continue to harvest and market timber.
- The sale of timber is to be conducted through open auction by the timber producers.
- Only Bhutanese nationals can participate in the auction.

However, demand is fast outstripping supply as is evident from the price data in the following table:

Class	Government Auction Price 2006	Actual Price Fetched	Auction Price 2005
A (Blue Pine)	92 Nu/cft	211 Nu/cft	141 Nu/cft
B (Mixed Conifer)	90 Nu/cft	198 Nu/cft	109 Nu/cft

Table 6.2 Wood Auction Prices

Source:
[1]Forestry Resources Development Division, Department of Forestry Services, Ministry of Agriculture, Bhutan.

The following table gives demand and production potential projections for the period 2005-2009:

Territorial Division	Production Potential				Demand (cubic meter)	Difference
	Inside FMUs		Out side FMUs	Total		
	Existing	Potential				
Thimphu, Paro & Haa	5,379	5,562	22,342	33,283	18,424	14,859
Wangdue	2,134	677	34,026	36,858	19,921	16,928
Gedu, Samtse & Tsirang		1,031	19,312	20,343	4,259	16,084
Sarpang & Zhemgang	2,492	1,532	10,936	14,960	3,973	10,987
Bumthang & Mongar	1,664	967	14,934	17,565	8,741	8,824
Trashigang	810	1,593	18,035	20,438	11,709	8,729
Samdrup Jongkhar	0	0	10,975	10,975	2,808	8,167
Gasa Park Management	0	0	0	0	2167	-2167
Total	**16,514**	**20,805**	**2,07,895**	**2,45,214**	**94,362**	**1,50,852**

Table 6.3 Timber demand & production potential (2005 -2009) Source: Department of Forest, Ministry of Agriculture.

b. Domestic Consumption of Timber

The following table gives Dzongkhag-wise consumption of timber:

S. No.	Region /Dzongkhag	Consumption of Timber (Cubic Meter)
1.	Bumthang	3665.73
2.	Chhukha	16964.14
3.	Dagana	4128.42
4.	Haa	2988.57
5.	Lhuentse	6123.80
6.	Mongar	10517.90
7.	Paro	7581.13
8.	Pemagatshel	6105.18
9.	Punakha including Gasa	4552.70
10.	Samdrup Jongkhar	13533.83
11.	Samtse	22188.46
12.	Sarpang	17704.73
13.	Thimphu	14984.75
14.	Trashigang including Trashi Yangtse	30286.99
15.	Trongsa	3678.531
16.	Tsirang	14952.45
17.	Wangdue Phodrang	7454.84
18	Zhemgang	4624.28
	Total	**190,236.43**

Table 6.4 Domestic consumption of construction timber

c. Fuel Wood Consumption

The following table gives consumption pattern of fuel wood from 2004-2006 and projected figures for the next 5 years in million cubic meters:

S. No.	Year	Domestic sector	Other sectors	Total Consumption
1	2004	0.96	0.19	1.16
2	2005	0.98	0.20	1.18
3	2006	1.01	0.20	1.21
4	2007	1.03	0.21	1.23
5	2008	1.05	0.21	1.26
6	2009	1.06	0.23	1.29
7	2010	1.08	0.23	1.32
8	2011	1.10	0.24	1.34

Table 6.5 Fuel Wood Consumption

d. Raw Material for Wood-Based Industries

The wood-based industries in Bhutan are very important because they are the second largest revenue earner for the Government after hydropower. However, much of the industry is at an early stage of development and often use old technology. The total annual intake of the wood-based industry is in the range of 100,000 to 200,000 cubic meters.

The majority of the industries are small sawmills which utilize only local sources of supply. There are only two medium-sized industries, one an integrated sawmill, plywood and joinery factory, and the other a particle board factory. There is no accurate information about the state of operation of the mills. The raw material (wood) prices in many cases are fixed by the Government to sustain and develop the industry. For example, the broom handle industry gets wood at subsidized prices to earn foreign exchange, while the building industry is provided sawn wood at subsidized prices to discourage the use of round wood.

About 49 sawmills, concentrated in the western and southwestern parts of Bhutan, produce about 75 to 80 percent of the "total" sawn wood. A typical Bhutanese sawmill has an input capacity of 10 to 20 m^3 per day or about 4,000 to 5,500 m^3 per annum. The rated capacity, with a recovery rate of 50-55 percent, would be about 1,750 to 2,500 m^3 per annum, but the capacity utilization rate is often as low as 25 to 30 percent. About eight sawmills produce tea chest battens or other kinds of crates or boxboards. The tea chest battens are usually sold through a middleman who provides the needed materials such as plywood, etc., from others sources. Some sawmills are also producing blackboards and slate frames. In addition, there are about 33 units engaged in making local furniture with limited opportunities for earning hard currency due to the type of furniture and the expense of transportation.

Bhutan Board Products Limited (BBPL) is a medium size particle board factory located at Tala about 55 kms from Phuentsholing, which manufactures graded particle boards, decorative veneered particle boards, commercial veneered particle boards and laminated particle boards of interior and exterior grades. This plant manufactures graded wood particle boards in various thicknesses ranging from 6mm to 35mm with three different varieties viz. plain, veneered and decorative laminated boards. These products are extremely versatile, capable of meeting diverse requirements ranging from flooring to ceilings.

Bhutan Board has established an unbeatable market position in the highly competitive particle board market in India. The company is the first in Bhutan to develop an all India marketing network, which operates through four liaison offices located at four major cities in India namely Delhi, Bangalore, Kolkata and Pune. The marketing executives, area sales managers and marketing officers represent BBPL in other commercial hubs and important city capitals. They operate through their sub-zonal offices, which are under the control of concerned liaison officers. Their main job responsibility is to get the company's products specified in tenders and sell the products through various retail outlets.

Wood sector has the potential to serve regional markets, particularly Bangladesh and India, in specialist categories not adequately served by local producers or by imports from Europe and Southeast Asia. This sector could penetrate some niche markets with easily transported, high-value, low-volume products, but realizing this potential will require some changes. There must be access to single-species timber in appropriate sizes and quality.

e. Policy Issue

The timber market is highly fragmented i.e. both supply and demand parameters appear to vary considerably in different geographic areas due to the difficult terrain and lack of market access. There is insufficient data to reflect this variation and to form a precise judgment of what changes are occurring at local levels.

At the national level, there is a rapidly growing demand from both private and institutional users driving an increase in the commercial wood supply. In the medium term, supply should be more than adequate because the Royal Government of Bhutan has developed enough Forest Management Units (FMUs) from where the timber is supplied. However, in the long term, the following issues need more attention:

- More FMUs need to be identified, based on demand, and management plans developed for the FMUs.
- Timber demand for each Dzongkhag needs to be estimated in advance so that the gap between local needs and the capacity of the Forestry Development Corporation Limited (FDCL - in charge of commercial harvesting operations) to supply can be bridged.
- The Department of Forestry Services and the FDCL should collaborate in determining how best to allocate the resources and coordinate their activities so that the demand at the local level is met effectively.
- Wood-based industrial development should be private sector led. The Government intervention should be limited to creating the enabling environment and leaving productive investment to the private sector. Currently, the establishment of economically viable wood-based industries still faces obstacles. Potential investors perceive the forest policy as volatile. They are not sure of the availability of raw material. They do not have proper knowledge of national and export markets for value-added products and lack access to sufficient skilled workers. It should address, in particular, the availability of skilled workers by embarking on a major training program on wood processing for Bhutanese workers and technicians.

Analysis of the Wood Resource

Government policy is to encourage the utilization of the resource in the most efficient manner without depleting the forest cover and to that extent proper foresting is essential. However, the present situation is that projects relying on timber consumption are not being encouraged. As such, there appears to be scope for only the following projects:

- Timber seasoning kiln (Solar)
- Briquette of agro waste (Sawdust and shavings)

7 Non-Wood Forest Produce

For centuries, people of Bhutan have lived in harmony with nature in the far reaches of the eastern Himalayas. The Kingdom of Bhutan remains one of the most thickly forested countries in the world, and harbours an astounding diversity of plants and animals. The country's environment has benefited significantly from the deep-rooted Buddhist ethics of the people and a long history of conservation leadership.

The deep reverence Bhutanese people have for their natural environment exists in spite of, or more likely because of, their extreme dependence on it. The forests of Bhutan, in particular, provide critical materials for the daily subsistence of most Bhutanese families. The Bhutanese make considerable use of wood for houses, shingles, tools, fences, and numerous other items, as well as for cooking and heating. But it is the extensive use of non-wood forest products by the Bhutanese that is especially striking.

Non-wood forest products touch nearly every aspect of the lives of a Bhutanese. The country's forests provide food, fodder, medicine, oils, resins, fibers, dyes, and raw materials for baskets, traditional paper, houses, brooms, mats and numerous other items.

Until recently, most non-wood forest products were used locally by the Bhutanese people. Increasingly, however, these products are attracting the interest of outside buyers and consumers in far-away countries. This interest presents both opportunities and risks for Bhutan. Opportunities include cash income for the rural people, revenues for the Government for developing the country, and increased investment in rural infrastructure and processing centers. Risks include potential over-exploitation of natural resources, inequitable distribution of benefits, and shortages of raw materials that might otherwise be used for traditional and local needs.

The entire country's non-wood resources are summarized below:

a. Natural Dyes

Natural dyes comprise a group of non-wood forest products associated with Bhutanese traditional arts and culture. Cloth weaving is an important economic activity in the central and eastern Dzongkhags. At one time, the colouring of textiles was entirely done by using natural dyes. Many plants were cultivated for this and some were even exported to Tibet. Natural dyes are gradually being replaced by chemicals or ready-made coloured thread. Improvements in the quality of natural dyes, however, may revive their production. A project at Khaling in eastern Bhutan is compiling an information base on natural dyes and conducting research to improve such dyes.

b. Pine Resin and Lemon Grass

Pine resin collection and lemon grass distillation are recently introduced activities in Bhutan. More than 270 tons of resin are collected every year by villagers in the country's eastern districts and sold to a factory. As the work is carried out close to their farms, farmers supplement their incomes by doing such collection when they are free from farm work. These activities pump more than Nu. 30 million (just under US$ 1 million) into the country's rural economy. Lemon grass distillation employs some 400 families in the eastern Dzongkhags. To these families, this activity has become even more important than farming.

c. Forest Foods

Forests also play an important role in Bhutan's food security. Food from the forests becomes critical to rural areas in times of crisis, when transporting food to remote areas is difficult, or when people have no money to buy food. Because of Bhutan's varied and unpredictable climatic conditions, from time to time, the country faces localized droughts and other conditions causing crop failures.

During hard times, people search for food in the forests to supplement their meager supplies. Thus, an important plant is yam (Dioscorea sp.).

This plant has long tubers and requires a considerable amount of digging to obtain. Tuber hunting, though, is always a gamble. A vine may yield up to 10 kilogram's of tubers, or nothing at all. Yet the plant's exotic taste make the hard digging worthwhile. When food shortages become extreme, the bulbs that grow on the vines are also eaten. This occurs only under the most desperate situations as the bulbs, which are stewed, are bitter and cannot be eaten, too often.

Another commodity that sends poorer farmers into the forests during difficult times is seed, from which cooking oil is extracted. Many wild seeds can be used to produce oil. The seeds of the Symplocos tree, for example, are commonly used for this purpose, even in the good years. The seed of Gynocardia sp., a sub-tropical tree, is used less frequently because of its highly poisonous covering. Sal (Shorea robusta) seeds are collected and marketed in India as Bhutan still lacks the requisite extraction technology at the rural level. Neolitsea is cultivated throughout Bhutan particularly in the country's eastern districts. Aesandra butyracea, a multipurpose tree, is also an important source of oil.

A variety of forest fruits and nuts are regularly consumed but contribute little to food security. Some fruits are plucked and eaten by rural folks passing through forest, some may be taken home. Fruits and nuts, such as the walnut, Cornus, Zizyphus, and Morus, are occasionally marketed. Some wild fruits are rich in vitamins. Phyllanthus emblica, for example, is recognized as a rich source of vitamin C.

d. Bamboo

Bamboo grows naturally because of the country's largely undisturbed forests and the limited agriculture practiced in areas where bamboo proliferates. The Kingdom probably has the greatest variety of bamboo species of all the Himalayan countries, with contributions from Chinese-Japanese origins, and some Southeast Asian and South Indian locations.

Distribution

Bhutan has 15 genera and 31 species of bamboo. Possibly as many as 50 more species exist, but have yet to be identified. Most of the bamboos are of sympodial (clumping or clump forming) type but also includes two genera of monopodial type. Till date, an amphipodial type of bamboo has not been recorded.

The sympodial types found here are:

1. Ampelocalamus	5. Dendrocalamus	9. Neomicrocalamus	13. Yushania
2. Bambusa	6. Drepanostachyum	10. Pseudostachyum	14 Moopodial (running or non-clump forming)
3. Borinda	7. Himalayacalamus	11. Teinostachyum	1. Arundinaria
4. Cephalostachyum	8. Melocanna	12. Thamnocalamus	2. Chimonobambusa

Table 7.1 Sympodial Types of Bamboo

Current Uses and Potential

In Bhutan, over 136,000 cubic feet of timber (read bamboo) for hoisting prayer flags alone between 2002 and 2004, indicates the great need for farming the plant, to avoid depletion of the bamboo reserves. The other uses for the matured bamboo culms is as a construction material, for thatching or roofing, to make handicraft items; musical instruments like flute, and collecting, sorting, storing and transporting of most agricultural products. Some solid matured culms are used to make handles for agricultural farming tools. The leaves are used as fodder and young shoots as vegetable or food. Even young shoots are preserved as canned food by processing them into pickle. They provide raw materials for scaffolding in building construction and in rural areas small dwelling huts are also constructed with bamboo. Bamboos are also used in making bridges in the rural areas; farmland fencing materials, fodder for cattle, and young shoots are used as vegetable, which is a delicacy in some areas.

Figure No.7.1 Artisan of Bamboo Items

While bamboo has a huge potential, the forest reserves appear to be depleting and attention is required to have proper bamboo management guidelines in order to check further degradation of natural bamboo resources. With the demand for wood constantly increasing, the Department of Forestry Services has focused attention on the development of bamboo as an alternative and a 15-hectare bamboo plantation is to be set up in Samtse. The Cane and Bamboo Technology Centre in Guwahati, Assam has been actively involved in training Bhutanese artisans in cane and bamboo processing, bamboo-based housing, handicraft and furniture making.

e. Cane

Cane is the stem of the climbing palm of the genus Calamus and other related genera. Bhutanese cane belongs to the Palmae family and is commonly found in the country's tropical and sub-tropical areas. Palmae is represented by 170 genera and more than 2,500 species worldwide. There are 13 genera of Palmae found in Bhutan.

Figure No.7.2 Cane Products-Bhutan

Distribution

As with bamboo, knowledge of the distribution of Bhutan's cane is limited. Species so far reported in tropical areas are Calamus acanthospathatus and Calamus tenuis, found in Zhemgang, Trongsa, Punakha, Chhukha, Haa, Mongar, Trashigang, Samdrup Jongkhar, Pemagatshel, Samtse and Sarpang Districts.

Current Uses and Potential

Calamus acanthospathatus is a common climber which grows extensively in Bhutan. It yields strong cane and is used as a substitute for the rope and as a cable for suspension bridges. It is also used for wickerwork, baskets and containers. Thicker cane is used for making furniture frames, walking sticks and umbrella handles. The shoots of this plant are edible.

f. Wild Banana

Wild banana (Musa spp.) grows in Bhutan's sub-tropical and temperate regions at up to 1,800 meters. There are three varieties. Although, it has never been successfully managed, wild banana grows prolifically on "tseri" (shifting cultivation) land abandoned after cultivation, openings in the forests and on the most terraces. Regeneration is quick and growth is profuse in these particular areas.

Current Uses and Potential

Banana leaves are used in house construction, roofing and for making temporary sheds. The leaves and stems are also used as fodder for elephants and other animals. The flowers and fruits are, of course, edible. The fibers from banana leaves make good paper but these are not commonly used for this purpose in Bhutan.

g. Fiber

Bhutan's main sources of fiber are from various stems and leaves though fiber may also be extracted from roots, fruits and seeds. Bhutanese fiber species include odal (Sterculia villosa) for making rope, Girardiana spp. for producing ropes and gunny bags, Musa spp. for paper making, and Areca catechu. Other fiber-producing species are Cannabis sp. (bark), Urtica sp. ("jazu" in Sharchop-kha), Girardiana palmata ("zangjazu" in Sharchopkha), Boehmeria sp. ("pu yangzewa" in Sharchopkha), Agave sp., Daphne sp., Edgeworthia sp., Kydia calycina and Grewia sp.

h. Floss

Floss is obtained from tree pods and collected from kapas (Gossypium spp.) and semul (Bombax ceiba). The capsules of these trees yield floss, which is soft, yet strong. Rural Bhutanese collect floss to make pillows and mattresses. Another floss species reported is Ceiba pentandra.

i. Brooms

The most common species used to make brooms is Thysanolaena maxima, known locally as "kucho," "amkso," or "tsakusha." This species is found in Bhutan's sub-tropical areas (table 5). Other materials used for brooms are lemon grass, pal ("cari" or "sysam" in Sharchopkha), Phoebe, Sida, bamboo leaves and split bamboo culms and coconut leaves.

j. Medicinal Plant

A wide range of plant diversity covers Bhutan's main mountain ranges. From these rugged mountains come over 300 plant species traditionally used in preparing indigenous (Ayurvedic) medicines. Medicinal plants collected from Bhutan's temperate and lower zones are known under the traditional broad classification as "THRO-MEN", while plants from the country's alpine zone are known as "NGO-MEN".

In the case of "THRO-MEN" plants, specific parts of the plants (e.g. the roots, bark, wood, leaves, flowers or fruit) are generally collected, while for "NGO-MEN", the whole plant is gathered for its medicinal properties.

Scope for International Marketing

A number of medicinal plant species growing naturally in Bhutan have international market value. Among these are agar wood (Aquilaria agallocha), Rauvolfia serpentina, tshe (Ephedra gerardina), Himalayan yew (Taxus baccata), chutsa (Rheum nobile), chumtsa (Rheum accuminita), kutki/putish-ing (Picorrhiza kurroa), pangpoi (Nardostachys jatamansi), tsenduk rig (Aconitum spp.) and yartsa-gunbu (Cordyceps sinensis). All are in high demand for pharmaceuticals.

If present trends of ad hoc harvesting/collection continue, the scope for economical harvesting of all medicinal plants from the wild, on a sustainable basis, appear extremely limited. The only option remaining is to introduce large-scale cultivation through artificial propagation. Natural resources are presently being depleted in the natural forests due to non-scientific collection of the various species on an ad hoc basis. New settlements and the expansion of land under cultivation also threaten the survival of natural forests. Unless artificial propagation is adopted, it is only a matter of time before some of these plants become extinct.

k. Traditional (Hand-made) Paper

Bhutan uses the bark of two tree species in the manufacture of traditional paper ("deh-sho"): dhenap (Daphne) and dhekap (Edgeworthia). There are five species of Daphne and one of Edgeworthia (table 7.1). All six are found throughout the country but their distribution and frequency varies - a constraint in providing a continuous supply of raw materials to local cottage industries (table 7.3). The additional collection of this raw material would not only deplete existing stocks but threaten its sustainable management as well. Detailed surveys have yet to be carried out.

Processing

The method used to produce paper from the bark is quite simple and does not involve use of chemicals. The plants are stripped and dried and then, taken to production centers. In the traditional system, a few strips of the fibre are soaked in a pond and then beaten with a mallet on a flat stone. The fine pulp is placed on a bamboo screen and allowed to spread evenly by suspending it in water. The screen is then dried in the sun. Today the process has become more mechanised, using imported equipment and screens. Besides the greater quantity produced, the paper's quality has also improved. Following table gives the annual raw material requirements of Bhutan's paper-making units. The country has a number of family-operated paper-making units. The only semi-mechanised unit is the Jungshi Hand-made Paper Factory in Thimphu.

Botanical Name	Local Name	Distribution	Forest Type and Altitude
Edgeworthia gardneri	De shing (Dz), Shogo shing balingmeen, (Sh) Kagate and Argaule (N)	Kamji, Chhukha, Punakha, Putlibhir, Chasilakha and Trongsa (Tashiling and Shemgang)	Wet, sub-tropical forest; 1,670m -2,400 m.
Daphne involucrata	Seti barwal, Chhota, Argaule, Bimbiri (N)	Chhukha, Marichang and Tala	Mixed broad-leaved forest; 1,200m -2,000 m.
D.bholua	De shing (Dz) Shogo shing (Sh) Shugu shing (Sh) Kagate, Argayle (N)	Chhukha, Punakha, Deothang, Haa, Thimphu and Trongsa Districts	Evergreen oak, blue pine, spruce, hemlock and fir forests; 1,980-3,400 m.
D.sureil	Kagate, Argayle, Bhale and Kagate (N)	Chhukha, Punakha, Deothang, Trongsa and Trashigang Districts	Warm, broad-leaved and evergreen oak forests; 1,220m - 2,130 m.
D.retusa		Thimphu and Bumthang; Upper Mo-chu and Upper Bumthang-chu.	Rocky hillsides and wet ravines; 3,700m -4,200 m.
D.ludlowii		Bumthang	Mixed rhododendron, hemlock, and spruce forests; 3,350-3,580 m. endemic to

Table 7.2 Raw Material Sources for Traditional Paper

(Source: Flora of Bhutan, Vol. 2, Part 1, Department of Forest Bhutan Note: (Dz) = Dzongkha, (Sh) =Sharchopkha (N) = Nepali)

k.1 Availability of Raw Materials for Traditional Paper-making

S. No.	Location	Area (acres)	Quantity (kg.)
1	Korila	80	1,600
2	Gasawang-Khengkhag	30	600
3	Yalang	2,500	50,000
4	Trashi Yangtse		
5	Khamdang		
6	Phongmey		
7	Bikhar		
8	Wamrong	250	5,000
9	Dremtsi	50	1,000
10	Dhag-sa-Manang	498	9,960
	Total	**3,408**	**68,160**

Table 7.3 Availability of Raw Materials for Traditional Paper-making

k.2 Raw Material Requirement at Full Capacity

The existing traditional paper-making units require approximately 2,50,000 kg of raw materials at full capacity but the present sources seem to be inadequate in feeding these units. Raw material requirement for individual handmade paper making units is as shown below.

S. No.	Factory/unit	Location	Annual raw material requirement at	Agent
1	National Women's Association of Bhutan (NWAB)	Kurizampa (Mongar)	24,000	NWAB
2	Jungshi Hand-made Paper Factory	Thimphu	32,000	Norbu Tenzin
3	Paper Factory	Chorten Kora (Trashi Yangtse)	NA	Tshewang Norbu
4	Paper Factory	Raptey (Trashi Yangtse)	10,000	Thinley Wangchu
5	Paper Factory	Chazam	2,000	Tow Tshering
6	M/S Dewang Hand-made Paper Unit	Kabjisa (Thimphu)	94,000	
7	Paper Factory	Shingkhar Lauri	NA	Jamtsho
8	Paper Factory	Thramgom and Khaling	16,000	Sherub Tenzin
9	Paper Factory	Radhi	24,000	Tawpo
10	Paper Factory	Bomdheyling	NA	Thinley Dorji
11	Paper Factory	Thimphu	NA	Nakchung Tshering

Table 7.4 Paper-making Units and Raw Material Requirements

l. Essential Oils

Essential oils, also known, as 'volatile oils' are odoriferous substances widely distributed throughout the plant kingdom. They occur in some 60-plant families and almost any part of a plant may yield oil.

Extraction

Depending on the quantity and stability of the compound, essential oils are mainly extracted by three methods:

- Distillation by hot water or steam
- Pressed by hand or using machinery
- Extraction using such volatile solvents as hot oils, fats (maceration), or cold neutral fats (enfleurage)

Uses: Because of the odour and high volatility, essential oils have a variety of uses, in soaps and cosmetics, pharmaceuticals, confectionery, aerated water, scented tobacco and incense, among others.

i) Grass Oil

❖ **Lemon Grass Oil**

Lemon grass (Cymbopogon flexuosus) is found over the large areas in Mongar, Lhuentse, Trashi Yangtse and Trashigang Districts. It is common in chir pine forests, especially on sandy or gravelly, sloping areas. Lemon grass contains citral - its major constituent. Lemon grass oil quality is judged by its citral content and solubility in alcohol.

The oil is of a reddish-yellow to reddish-brown colour, with a strong, lemon odour. It is used in the perfume, soap and cosmetics industries. Lemon grass forms the starting material in the manufacture of synthetic Vitamin It is also used in pharmaceutical preparations, such as pain balm, disinfectants, and mosquito-repellent creams. The farmers on a contractual basis mainly produce the lemon grass oil in the eastern part of the country with the technical support from governmental agencies. Lemon grass oil is mainly exported to India and Europe. It has been able to capture niche markets in Europe where it is used as a fragrance by the perfumery and cosmetic industry.

❖ **Palmarosa Oil**

Palmarosa oil is obtained from rosha grass (Cymbopogon martini var. motia). It is a tall, perennial, sweet-scented grass, which grows from about 1.5 to 4 meters in height. It can also be cultivated.

Palmarosa oil is a pale-yellow liquid with a characteristic geranium odour. Oil quality is based on the total geraniol content. Palmarosa oil is used as a base for perfumes and cosmetics, for flavouring tobacco and in mosquito- repellent ointments.

ii) Leaf Oil

❖ **Winter Green Oil**

Commercial winter green oil is derived by water-distillation of the leaves of Gaultheria procumbens. Prior to distillation, the leaves are exposed to the enzymatic action of warm water. During this process, the aromatic chemical, methyl salicylate, is formed. Fresh leaves are practically odourless, containing no methyl salicylate whatsoever. Winter green oil which was once popular and well known in the perfumery industry, is becoming obsolete due to its substitution by synthetic methyl salicylate. The main producer of the oil is the United States.

Winter green oil is a pale yellow or pinkish liquid of intensely sweet-aromatic odour and flavour. The oil is still used in pharmaceutical preparations as a flavour corrector. In candy, chewing gum, toothpaste and other products, the oil has been completely replaced by synthetic methyl salicylate, which is much less expensive. The use of methyl salicylate in root-beer (an American carbonated, non-alcoholic beverage) has made its flavour extremely popular. Bhutan has nine species of Gaultheria.

iii) Wood Oil

❖ **Agar Oil**

Agar oil is distilled from the resinous portions of the wood of Aquilaria agallocha. This resinous wood is traded under the names "agar", "aloe wood" or "eagle wood". The tree occurs in patches in Bhutan's southern hills. Very little is known regarding why irregular portions of dark wood, highly charged with oleo-resin, appear in some trees but not in others, especially in and around old wounds and hollows. It is known that resinous infiltration occurs because of fungal attack but the specific fungus responsible for the formation of agar wood has not yet been identified. Attempts to impregnate trees by driving pegs from trees already containing agar wood into trees not yet infected have not been successful.

Only mature trees, 50 to 60 years old and infected with fungus, are exploited. The average resin yield is 3-4 kilograms per tree. Agar wood is classified as either real agar or "chum" agar. The former is hard and brown, while the latter is soft and varies in colour from light yellow to almost white. True agar is largely used as such, while agar oil is almost entirely distilled from chum agar, which has no value as wood.

The distillation process for agar oil consists of soaking agar wood in water for 60-70 hours. The wood is, then disintegrated into powder in a chopper. The powdered wood, suspended in water to which 5 percent by weight of common salt has been added, is placed in a retort and heated over a furnace. The retort has a swan neck with a device for replenishing the water without removing the lid during distillation. A florentine flask made of glass or copper constitutes the receiver for the distillate.

Distillation takes 30-32 hours. Because distillation takes place at atmospheric pressure, the process of total exhaustion of the wood is lengthy. The oil boils at high temperatures and the distillation waters are cohobated (i.e.

returned to the still and redistilled) to produce a reasonable yield. The oil yield ranges from 0.75-2.5 percent of the wood.

True agar is heavier than water and has a peculiar yet agreeable odour comparable to sandal-wood. It is highly prized and in great demand in Arab countries for burning as incense. "Agar-bathis", or incense sticks, are prepared from the exhausted and distilled agar wood. Agar oil is used for diluting perfume oil from sandal-wood oil or vegetable oils. It is a valuable perfume-retainer and prized by perfumeries for blending in their high-grade perfumes.

iv) Oil from Other Sources

- **Pine-needle Oil**

Pine-needle oil is obtained not only from pine-needles (Pinus spp.) but also from the needles or leaves of various spruces and firs. Distillation of needles from young twigs and stems seems to yield higher levels of oil.

The oil is used for treating rheumatism and related complaints. In the perfumery industry, it is used in the manufacture of bath crystals and soaps. It is also used in hospital disinfectants and room sprays, deodorants, general disinfectants and similar products. Once the oil is recovered, the exhausted needles are used for a variety of purposes. "Pine wool", for example, is manufactured from the needles. This type of wool can be woven into fabrics, knitting yarns, quilts etc.

- **Cedar Oil**

Cedar oil is manufactured by distilling shavings and sawdust from Juniperus macropoda (Indian Juniper, Himalayan Pencil Cedar). Following oil extraction, the shavings can be converted into linoleum. The potential for extracting cedar oil from J. recurva, which grows in Bhutan, should be explored.

- **Champ Oil**

Champ oil is extracted from the flowers of Michelia champaca, a large, handsome tree. The oil is obtained from the fragrant, deep yellow flowers by maceration or extraction.

The oil is one of the most famous perfumes of India and other Asian countries. It rivals ylang-ylang in its fragrant odour and is extensively used in the perfume industry.

- **Calamus Oil (calamus perfume)**

Calamus oil is obtained from the rhizomes of the plant Acorus calamus through steam distillation. It contains the glucosidic bitter principle, "acorin". The plant is found in marshes up to 2,400 metres in altitude. The oil is largely used in perfumery, spice blends and in the flavouring of alcoholic beverages.

- **Ginger Oil**

Ginger oil is obtained from the rhizomes of Zingiber officinale. The oil is used in pharmaceutical preparations and by the cosmetics and perfumery industries. A private project to produce ginger oil was established in Samtse.

- **Keora Oil**

Keora oil is derived from the flowers of Pandanus tectorius (P. odoratissimus Roxb.), a small evergreen shrub, or small tree, with a many-branched stem, supported by a number of stiff aerial roots. The flowers are usually large -a single flower can weigh upto 150 grams - and powerfully fragrant. The flowers appear in July and the plant continues flowering till mid-December. Flowers are particularly abundant from August to September. The oil is used in the preparation of cosmetics and perfumes.

Bhutan has many potential sources for essential oils which are yet to be exploited. The main obstacles are lack of technical know-how and the paucity of information on the extent of the resources.

m. Resin and Turpentine

Resins are obtained from mature chir pine (Pinus rox-burghii) greater than 40 centimeters in diameter, using the "French cup and lip" method. In Bhutan, tapping of chir pine is primarily carried out by Tashi Resin & Turpentine, a branch undertaking of Tashi Commercial Corporation, under a 50-year lease running from 1972 to 2022.

Bhutan's chir pine forests cover an area of approximately 810 square kilometers. Only about half of this area is tapped as the terrain is difficult for commercial extraction and the distribution of mature trees is widely scattered. The major obstacle Tashi faces at present is insufficient number of labourers on a dependable basis. Rural Bhutanese are too occupied in their own fields during crop seasons and tend to view resin tapping as a supplementary source of income normally pursued only during the agricultural off-season.

Resin collected from the various field depots is transported to the Resin and Turpentine Factory in Samdrup Jongkhar for processing into resin and turpentine. The processing plant's production capacity is 300 tons of resin per annum. All products are sold to India.

n. Vegetable Oil

Bhutan has many trees and shrubs which are potential sources of oil in both the country's sub-tropical and sub-temperate zones. There are a few common species traditionally used by villagers in different parts of the country but no systematic study has yet been carried out to survey national potential for producing vegetable oil. The socio-economic and ecological attributes and marketing needs associated with such production have also not been studied.

Bhutan consumes a high level of vegetable oils. The country's requirements are largely met by imports from India and other countries. Coconut oil, soyabean oil and mustard oil with the trade name "Dalda," for example, are all from India, while palm oil comes from Malaysia.

There exists a good opportunity for small-scale industries producing vegetable oil from locally available species. Surpluses could easily be marketed in neighbouring countries. The quantity and quality of production are the two main factors governing successful marketing. The major problem presently is the lack of proper study on the potential for vegetable oil production in the country.

Following are the known vegetable-oil-yielding forest species in Bhutan**:**

- Gante, bandre, dhorkho-shing (Gynocardia odorata)
- Yikka-shing, chiuri (Aesandra butyracea)
- Panche-shing, gunilo-kharaney (Symplocos paniculata)
- Sal, sakhuna (Shorea robusta)

o. Yew (English), Keyrang-shing (Sharchopkha), Dhengrey salla (Lhotsham kha)

Botanical name: Taxus baccata L.

Himalayan yew's foliage contains a chemical known as taxol, discovered in the recent years and now considered to be one of the most important drugs in the fight against cancer. Provided scientific principles are followed, foliage production can be maintained on a sustainable basis. Currently, however, there is little knowledge on the proper management of Bhutan's Himalayan yew.

According to the Flora of Bhutan, Taxus baccata L. is the only representative of the Taxaceae family in Bhutan. On average, it is a tree of 5 to 12 metres in height. Taller trees grow to 12 metres or more. The tree occurs in scattered localities from Haa District in the west to Mongar District in the east. Reportedly, it also grows in the Kharungla area of Khaling and in the Zukpula-Menthongla belt in Wamrong, under Trashigang District.

The Bhutanese yew's habitat is characterized by moist mixed coniferous forests or cool broad-leaved forests, from 1,800 to 2,700 meters in altitude. Yew is also listed as one of the characteristic species of the "spruce forest" (2,700 to 3,100 meters) vegetation zone. Yew in Bhutan is best treated as a subspecies of zuccarini pilger (Taxus baccata var. allichiana).

The Himalayan yew is an evergreen tree, generally middle-sized, though sometimes quite large, with a large, spreading crown. Most yew trees tend to be forked, fluted, and with depressions at branch-stem junctions. This is not regarded as a defect (Evans, 1984). Its bark is reddish-gray, thin and smooth, and peels off in longitudinal shreds. Its leaves are 1.5-2.75 by 0.2-0.25 centimeters, usually curved, acuminate margins, slightly unrolled, dark-green and shining above, brownish-yellow and somewhat pale beneath, single nerved and narrowing into a short petiole.

The yew growing stock for northwestern Bhutan is estimated at 1,459.70 cubic meters, equivalent to 1.10 percent of the total forest volume. The mean annual volume increment is estimated at 0.96 percent. Yew growing stock for central and eastern Bhutan is estimated at 1,238 cubic meters equivalent to 0.6 percent of the total. The annual volume increment is estimated at 0.76 to 1.50 percent. The total area of upland and lowland hardwoods is 1,385,940 hectares. This figure has not yet been separated into upland and lowland areas. Since the occurrence of yew is more likely in the upland areas, only upland hectares are considered here. Only 15 percent of the total area is considered in estimating yew volume.

p. Natural Vegetable Dyes, Gums, Waxes and Incense

Although Bhutan is largely covered with natural forests, a detailed survey of forest products has not been carried out. Hence accurate and authentic data on the various types of minor forest produce, such as edible products, dyes and wax, are still to be ascertained. Moreover, Bhutan has few industries or factories engaged in the collection and marketing of forest products. Collection and processing methods are still crude and traditional. Improving this situation would undoubtedly lead to an increase in both local and national revenue as there are many plant products that could be extracted. Other plants are simply not yet known and go to waste as their profitable use, if any, remains unknown.

Natural vegetable dyes

There are a number of dye-yielding plants. Local people obtain dyes from plants and minerals by simple, traditional extraction methods. These dyes can be grouped into five categories: leaf dyes, bark dyes, flower and fruit dyes, stem and root dyes, and mineral dyes.

Leaf dyes

Leaf dyes yield a variety of colours and are used by local people for dyeing hand-woven materials, a fairly large cottage industry in Bhutan. Species include Symplocos sp., Strobilanthes flaccidifolious, Holicia nilagirica and Indigofera.

Bark dyes

These can potentially be extracted from species such as, Terminalia tomentosa, Berberis nepalensis, Acacia spp. and Alnus sp. Due to lack of knowledge and experience, however, only dyes from the bark of walnut trees and Berberis sp. are presently extracted by the local people. Natural dyes play an important role in making traditional Bhutanese fabrics.

Flower and Fruit dyes

In Bhutan, flower and fruit dyes are the most important category of natural dyes. Most of the dye species are raised from seeds by rural people and then sold. Their fruits can be used as mordants. Particularly important are khomanyshing (Choenomeles lagenaria), robtangshing (Rhus similata), churoo, amla (Phyllanthus emblica), Cedrala toona, Michelia champaka and Mallotus phillipenensis. The dyes are normally used for colouring or dyeing silk clothes. Mallotus phillipenensis, for example, produces a red dye called "sinduri", which is commonly used in colouring cloth.

Stem and Root dyes

Stem and root dyes are used for many varied purposes. Dyes from Curcuma longa are used for colouring foodstuff, from Acacia catechu for tanning and dyeing canvas and leather goods, and from jackfruit for dyeing robes for monks.

Mineral dyes

Found throughout Bhutan, these dyes are obtained from natural mineral salts (dochur) and oxidized iron (marchelo).

Gums

Gums are translucent, amorphous exudations from the wounds of trees. Bhutan has not yet begun intensive gum tapping. Local people collect gum as and when required and the damage done to the trees is negligible. Gum (latex) from Ficus elastica is extracted for sealing bamboo baskets and other bamboo work, using simple methods.

Commercial processing of gums has not yet begun. The country's climate is favourable for the cultivation of gum trees, however, the launching of such commerce would be beneficial to the whole country. Bhutan presently has only a few gum-yielding species. Trees from which the people extract gum include: brongsh-ing (Ficus elastica), simal (Bombax ceiba), khair (Acacia catechu) and semla gum (Bauhinia retusa).

Waxes

Waxes are generally obtained from insect products, such as, the honeycomb-cells of bees and wasps (Apis spp.). Local people collect honeycombs after the bees or wasps leave their nests. The empty combs are melted and all crude material removed. The wax is generally used for smoothing the thread when weaving cloth or it is rubbed into the woven cloth to give it gloss and strength. Some waxes are now processed into candles, sealing materials and other products.

Incense

Incense sticks are manufactured from many plant species, which yield sweet scents. Most people use the leaves, barks or whole plant directly as incense. In Bhutan, the demand for incense sticks for religious use is high. There is no

large-scale unit manufacturing incense. However, there are many cottage and small scale factories manufacturing the same.
Some of the commonly used incense species are "shup" (Juniperus spp.), grown at high altitudes; "pang pee" roots (Nardostachys jatamansi) "sanze kachu" (Tancetum tibeticum); "poikar" (Cannarium sikkimensis); and Rhododendron spp. In the absence of these species, people use pine leaves or Artemisia spp. as incense.

The making of incense sticks provides an avenue for revenue generation for local habitants. The industry can be classified as a service based industry.

Summary of Non-Wood Resources[1] Availability
The Dzongkhag-wise summary of non-wood resources inventory is given below in table 7.5:

S. No.	Districts	Bamboo (No)	Cane (No.)	Mushroom (Kg)	Fern Tops (Kg)	Damburoo (Kg)	Lemon grass Oil (Kg)	Chirata (Kg)	Peepla (Kg)
1	Thimphu	0	0	20376	7389	390	0	0	0
2	Paro	27320	0	276964	13474	0	0	0	0
3	Haa	623	9330	6388	27414	2651	0	282	0
4	Chhukha	64531	51782	50635	93975	62259	0	53	32
5	Samtse	1263555	82667	391117	1188090	109367	0	8164	0
6	Punakha	3466	1519	18761	56374	15245	0	0	0
7	Gasa	0	0	1956	2803	292	0	0	0
8	Wangdue	127591	27257	94740	193076	27180	0	2201	324
9	Tsirang	46633	42736	65340	141657	4632	0	1404	221
10	Dagana	38081	28921	48932	155532	34037	0	1145	13312
11	Bumthang	110576	0	17984	0	13545	0	0	0
12	Trongsa	26956	52666	15322	62859	36618	0	0	0
13	Zhemgang	88957	22578	92133	109421	39211	0	12844	0
14	Sarpang	68026	39396	57309	167187	16503	0	619	0
15	Lhuentse	321856	64381	39757	203962	48940	39356	0	361
16	Mongar	81043	14732	32583	44327	17582	13569	0	10
17	Trashigang	100153	9006	52130	68059	19144	29542	0	0
18	Trashi Yangtse	36046	1347	33893	66275	54062	2944	0	0
19	Pemagatshel	0	0	23968	14559	339	0	0	0
20	Samdrup	65078	26341	55458	56981	19180	0	17863	250
	Total	**2470491**	**474659**	**1395746**	**2673414**	**521177**	**85411**	**44575**	**14510**

Table 7.5 Collection of Non-Wood Forest Products

Analysis of the Non-Wood Forest Resource
Bhutan has an abundance of this resource. Preliminary survey suggests that the following investment opportunities need to be evaluated further:

- Vegetable oil
- Bio-diesel (Kadamb non-edible)
- Bamboo & cane furniture
- Resin
- Fiber & floss mattresses
- Volatile oils (Essential oils)
- Wood oils (Pine-needle oil, Agar, Cedar, Champ, Calamus, Keora etc.)

Source:
[1] (a) Non-wood Forest Product- A report on Chhukha, Samtse, Sarpang, Gasa, Punakha, Dagana and Renewal Natural Resources Selected Statistics- 2002– Forestry Resource Development Division, Department of Forestry Services, Ministry of Agriculture, Bhutan.
(b) Forest Resource Potential Assessment (FRPA) for Bhutan Part II : Results.

8 Tourism Sector

Tourism has good growth potential, both because of the country's competitive advantages and because of problems in other potential destinations in the region. Realizing this fact, developing the potential will require an unambiguous strategy with appropriate policies and regulations, adjusting pricing policy (particularly non-peak pricing), undertaking more active marketing (by both firms and the Government), improving access to Bhutan, addressing seasonal issues, developing new products, and improving standards of accommodation and service.

The tourism industry offers great opportunity in terms of sustainable development and revenue generation for local habitants. The industry can be classified as a service based industry. To fully capitalize on the advent of a tourist, the system should be designed to provide inbuilt value addition to meet all the requirements of the tourist.

Although tourism has grown rapidly over the past decade, annual hotel occupancy rates remain low, in part because the market is highly seasonal and there is little repeat tourism. Tourism marketing is weak. The private sector lacks resources and the government plays a passive role. Moreover, the country is concerned about maintaining a balance between generating revenues and protecting its cultural heritage. Vacations in Bhutan are relatively expensive, without commensurate service. The service in hotels is usually friendly, but it is of poor quality and amenities are lacking. The main reason is that there is little competition to drive up standards, since tourists must pay before arriving and have little choice once they enter the county. Moreover, the range of tourism products is limited, though some improvements have recently been introduced. Access particularly by air, can be difficult, with the problems exacerbated by vagaries of the seasons.

8.1 Tourism Resources and Dzongkhag-wise Status[1]

Tourism has been promoted as a panacea for "sustainable" development. However, tourism's supposed benefits viz. generation of employment, development of infrastructure etc., have not "trickled down" or benefited Bhutanese people to the extent possible.

The country's tourism potential and present resources are detailed in Volume II of this report: "Inventory of Resources – Dzongkhag-wise". This is briefly presented below, along with an evaluation of the potential that exists for the development of tourism in each Dzongkhag.

8.1.1 Thimphu

Existing

Thimphu, the capital city, has many of the important tourist sites, Lhakhangs and Gompas in Bhutan. These are the Cheri and Tango Gompas, Phajoding, Institute of Traditional Medicine Services, Arts & Crafts Center, National Folk and Heritage Museum, Zorig Lobdra Choekor painting school, Royal Academy of Performing Arts, Voluntary Artists Studio, vegetable market, Takin Zoo in Motithang, Botanical Garden at Serbithang, Traditional cantilever bridge at Chari Gompa and Tashicho Dzong. It has many good camping spots and scenic viewpoints including rock climbing to a limited extent. The Lingshi and Naro Gewogs have herbal plants.

Potential

Thimphu has high potential to develop mountain biking trails and to build tourist accommodation in the scenic outlying areas of Tshalu Gompa, Chamina, Dato Gompa and above Sisina.

Source:
[1]Tourism Resources Inventory of Bhutan, Volume I & II August 15, 2005 & Bhutan Land of the Thunder Dragon –2005 and Department of Tourism, Bhutan.

8.1.2 Paro

Existing

Providing the only air access to Bhutan with its airport at Bondey, Paro has many temples and monasteries and several local festivals like the Paro Tshechu. The Jomolhari Trek, Laya Gasa Trek and Druk Path, which start (partly also end) in Paro are very popular tourist attractions. The Paro Dzong, emi Zampa, Taktshang monastery, National Museum and Kyichu Lhakhang are other famous attractions.

Potential

A new trek route to Drakey Pang Tsho lake connecting either the Druk Path or the Jomolhari Path, shorter trek routes from Taktshang to Bumdra and down to Sangchokhor and day hikes to Zuri temple (overlooking the Paro Dzong and Airport from the Museum), to Gorina Gompa, Hedi Gompa etc. could be developed. The ruins of Donamdzong may be cleared to create additional attractions in the valley. Paro valley has good potential for mountain biking (e.g. Kasadrapchu - Jili Dzong - Paro or Wochu - Dzongdraka -Bondey). Chuzom - Haa - Paro - Chuzom could be a great bicycling tour with good scenery and view of the mountain range from Chele La.

Figure 8.1 Paro International Airport

8.1.3 Haa

Existing

Haa Dzongkhag has many Lhakhangs, mainly dedicated to the Guru Rinpoche. Almost all the Lhakhangs are accessible by road except for a few in Sangbe and Sama Gewogs. Unique lakes in Sangbe Gewog are beautiful and worth visiting. Nub Tshonapata Trek is, so far, the only trek route open for tourists. Haa Lomba and Bonko Festival are two important festivals for visitors.

Potential

The Haa La - Kyu La route would be a 6 days trek and Haa - Sipsu route via Tarilla and Tsonapata lakes with alpine, broad leaved and subtropical forest along the route would be a 15 days trek. The old route from Haa to Paro has good views on the Jomolhari range and can make a beautiful short trek like the Druk path. Besides the potential for mountain biking through Chele La with a grand scenic beauty, the two popular festivals of Haa can be promoted as international fairs.

8.1.4 Samtse

Existing

The Dzongkhag has some small Lhakhangs and a few other religious sights, mostly for the local people. Samtse is known for its cement and dolomite industries, beverage and fruit processing and liquor industries.

Potential

The Sipsu-Haa route via Tsonapata lakes and Tarilla through alpine, broad leaved and subtropical forest could be developed into a 15-day trek.

8.1.5 Chhukha

Existing

Chhukha is known as Bhutan's trading center and it has many import and export houses and a number of industries. The Dzongkhag has many small Lhakhangs and other religious sights mostly for the local people.

Potential

Ethnic festivals which are special for southern Bhutanese (like Dasai and Diwali) could be attended by tourists, preferably in smaller villages. New trekking routes, especially for winter season, are possible, e.g. Tala-Kalikhola route, a four days trek with high potential for bird watching and fishing. This Dzongkhag also has a high potential for river rafting and kayaking, e.g. along the Wang Chhu. Tala Hydropower project (currently the biggest one in Bhutan with 1020 MW capacity) could be developed as an interesting site for tourist attraction.

Source:

[1]Tourism Resources Inventory of Bhutan, Volume I & II August 15, 2005 & Bhutan Land of the Thunder Dragon –2005 and Department of Tourism, Bhutan.

8.1.6 Punakha

Existing

Main attractions are the Punakha Dzong and temples like Chimi Lhakhang. Whitewater sports on Pho Chhu and Mo Chhu are already promoted. Punakha also has two hot springs, the notable one being the Koma Tshachhu.

Potential

Whitewater sports could be further developed in Punakha. Koma Tshachhu could be promoted, but needs proper development of the site for accommodating more tourists. Sinchu La Trek from Thimphu (3 days) during spring time could be promoted. Punakha also has good potential for mountain biking.

8.1.7 Gasa

Existing

Gasa has hot springs and medicinal springs with immense tourist potential along with Gasa Dzong, Wabso Dzong and Shabdrung's Shoes. Laya-Gasa trek (Paro to Punakha) and the famous Snowman trek lead through Gasa Dzongkhag. Another attraction is the unique traditional dress of the Laya people.

Potential

Gasa could develop the medicinal springs with proper hygienic toilets and shower facilities. The hot springs, which are already popular among the Bhutanese during winter time, could be made more accessible with the completion of a proper motorable road and the building of tourist guest houses.

8.1.8 Wangdue Phodrang

Existing

The Wangdue Phodrang Dzong with Tshechu festival in September, Black Necked Crane festival in November and the Phobjikha valley are popular tourist attractions. Many Lhakhangs, Gompas and other religious sights with relation to the famous Drukpa Kuenley are the other tourist attractions. The remains of the old traditional cantilever bridge below the Dzong across the Punatsang Chhu are also worth a visit.

Potential

Wangdue has several possible winter trekking routes which needs to be better assessed and promoted. A 5-day trek from Phobjikha - Ada - Kame Chhu with attractions of small streams and lakes, broad leaved forests, rhododendrons, orchids and birds watching, could be developed. Nika Chhu - Lunana Trek of 4 days duration could be one alternative of the Snowman Trek. Many smaller festivals held in several surrounding monasteries and temples could be promoted. Ballooning has been explored and seems to be feasible in Phobjikha valley. Bicycling from Wangdue to Phobjikha and windsurfing on Wangdue river could be promoted. Baso Chhu power project with a lake and traditional painted powerhouse could be promoted as another tourist attraction.

8.1.9 Dagana

Existing

There are cultural attractions in Tzesa and Kana Gewogs. Bird watching and orchid tours along the road are tourist's attractions in Gesarling and Trashiding Gewogs. Wachey cave is an interesting sight for tourists.

Potential

Dagana - Kalikhola could be developed as a beautiful 3 days trek for bird watchers and could be even extended for the 4th day to Tala from Kalikhola. Another ancient footpath route in medieval Bhutan starting from Goenekha (Thimphu) via beautiful lakes to Dagana could be developed into an 8-days trek.

8.1.10 Tsirang

Existing

Tsirang Toe Dzong, Dungphu cave and a few Lhakhangs are the main attractions identified in Tsirang.

Potential

Bicycling has great potential in Tsirang. Besides being a part of the Wangdue - Gelephu - Trongsa tour, Tsirang itself offers a one-day bicycle trip on the Mendegang farm road with great experiences of the rural life style. Sunkosh river has great potential for river rafting and kayaking. Trekking routes are possible along the old route from Damphu to Gelephu in 3 days and Damphu to Wangdue in 7 days. Flower tours could be better researched.

Source:
Tourism Resources Inventory of Bhutan, Volume I & II August 15, 2005 & Bhutan Land of the Thunder Dragon -2005and Department of Tourism, Bhutan .

8.1.11 Sarpang

Existing

Sarpang Dzongkhag has 22 Lhakhangs and Hindu temples (mostly new) including one big residence for the monastic community (Dratshang) under construction in Jigmecholing. The Tharpaling and Nimalung Lhakhangs are the winter residence of their namesake communities in Bumthang. A Geynen Neykhang is now completed at Gelephu. There are hot springs, and picnic spots by the Mao Khola.

Potential

Mao Khola can be developed for fishing and whitewater rafting during winter months. A number of trekking routes for winter months can be developed. Besides the 3-day trek along the old route from Gelephu to Damphu, a shorter trek can be developed along the Kanamakra stream east of Gelephu, which is the western boundary of the renowned Manas National Park. About a 6-day trek into the Black Mountains National Park starting at Jigmecholing and ending at Jigmeling could be researched.

8.1.12 Zhemgang

Existing

Zhemgang Dzongkhag can be divided into three parts - upper, middle & lower Zhemgang. The upper part consisting of Shingkhar & Bardo Gewogs is too remote and has little attraction to offer.

Middle Zhemgang, consisting of Nangkhor and Trong Gewogs, can provide possible sites for tourism promotion. Within these two Gewogs, there are varied flora and fauna and good scenic viewpoints. The Zhemgang Dzong and Duenmang hot spring are worth visiting. The lake at Buli is a very beautiful site and the smith house of Pema Lingpa is a historical place. Zhemgang town is situated on a very scenic hill.

Potential

The lower part of the Dzongkhag consisting of Jokar, Ngangla, Goshing & Phankhar are currently out of bounds for visitors for security reasons but would have great potential with the Manas National Park. Zhemgang has the potential to become Bhutan's bird watching centre. Although plenty of different birds and golden langurs can be sighted along the road, Zhemgang could also offer special bird watching treks like the 5-day Yebilapcha - Tshangla Dzong - Subrang - Zhurphe - Gongphu road head with Rufous necked hornbill, Blythe kingfisher, Green cochooa, Purple cochooa, Chestnut breasted partridge and many other common species along the route.

Other great treks could lead from Zhemgang to Manas for 8 days, or from Gonphu via Bjoku and back to Gonphu for 16 days, both with high bird watching potential, lots of other animals and beautiful waterfalls. The trek route to Duenmang hot springs needs improvement. Mangde Chhu could offer multi day rafting and kayaking trips down to Manas. The Manas National Park has extremely high potential for winter tourism with lots of endangered animals like tiger, elephant, rhinoceros etc., bird watching and fascinating subtropical forests. Zhemgang Tshechu could be made more attractive by including folk dances.

8.1.13 Trongsa

Existing

Besides the biggest Dzong of Bhutan, Trongsa has several monasteries and palaces like Samchholing palace and Kuenga Rabten palace (historically important). Several trek routes are possible and so too is whitewater canoeing on Mangde Chhu. There is also the trek route to Nabji Korphu, a pilgrimage site for most Bhutanese. There are many scenic viewpoints, the notable one being the Trongsa Dzong viewpoint. It is also the only other Dzongkhag besides Paro, which has a watchtower for its Dzong.

Potential

The trek route from the Trongsa Dzong viewpoint to the Dzong following the traditional path would be possible with a bridge across the Mangde Chhu. Camping sites need to be developed between Langthel Jangbi and Nabji Korphu. The Samchholing palace could do with a face-lift whereas Ta Dzong could be renovated like the Dzong itself. A route going down to Trongsa from Lunana following the Mangde Chhu is currently established and will be an interesting alternative for the Snowman trek. Chendebji could be the perfect village for home stays/farmhouse stays.

8.1.14 Bumthang

Existing

Bumthang is rich in cultural sites such as temples and monasteries like Kurje and Jampay Lhakhang (for both of them tourists need a special permit) and lots of other temples. Several local festivals provide good entertainment for visitors, as do several trekking routes. Tang Ugyenchholing and its museum are worth seeing. Duer hot spring under Chhokhortoe Gewog is far away but worth making a visit for health or leisure reasons.

Potential

An alternative trek route to Duer hot spring via Zhabjethang could be surveyed, but currently there are some routes on which treks can be developed, such as Gangkar Puensum Trek, Dibdela 105 Lakes Trek or the Kikila to Zhemgang Trek. There are plenty of opportunities for short treks/hikes for a day or two. The ruins of Chhokhor Deb need cleaning up and have the potential to be developed as a tourist attraction. The water tower and water reservoir behind Jakar Dzong could also be promoted.

8.1.15 Lhuentse

Existing

Lhuentse Dzongkhag has around 50 main religious and historical places including the picturesque Lhundrup Rinchentse Dzong. Mask dances are held in many of them. While there are many old temples, an important attraction is Khini Lhakhang in Metsho Gewog, which is said to have been constructed at the same time as Kichu and Jampay Lhakhangs in the 7th century.

One can visit Khentangbi or Jigme Namgyel Nagtshang, the ancestral home of the Wangchuck dynasty and many pilgrimage spots associated with Guru Rinpoche and Terton Pemalingpa, including Khenpajong, the hidden palace of the Guru, and Singye Dzong. However, both places are out of bounds for foreigners for the time being.

The ancient ruins of the underground palace of the Bangtsho King in Tsenkhar Gewog, traditional pottery at Gangzur done by women without using the wheel, ethnic festivals like 'Priu' in Gangzur, 'Haa' in Metsho and 'Lhacham' in Khoma Gewogs, Tshokar and Tshona lakes above Singye Dzong and a huge new lake in Jarey Gewog are some of the tourist attractions. Interesting trekking routes such as the Singye Dzong trek, the Aja Nye trek via Phuningla, the Rodongla trek via Khini Lhakhang, day-hike trails, picnic spots and camping sites are other attractions for tourists.

It has varied flora and fauna. Black necked cranes arrive in Membi Gewog in the first Bhutanese month and can be seen in the paddy fields at Tangmachu. The weavers of Lhuentse are famous especially for kishutharas from Khoma and Kurtoe Gewogs**.**

Potential

The Bangtsho ruins need to be excavated, studied and promoted. Although used by local pilgrims, the trek route to Aja Ney via Phuning La needs to be developed, as it is easier than the route from Yadi or Trashi Yangtse. The Rodong La trail already in use by tourists should be improved. As Minjey, along with Tangmachu, forms the rice bowl of Lhuentse, agricultural tourism can be promoted.

8.1.16 Mongar

Existing

Mongar Dzongkhag has more than 40 Lhakhangs and masked dances are performed in many of them. Mongar Dzong, although new, houses the artifacts of the old Zhongar Dzong. The ruins of Zhongar Dzong can be a worthy visit. Ethnic festivals such as Ache Lhamo dance and Zangdi in Gondu Gewog, Ngyenda Torja in Mongar gewog are famous. Two important pilgrimage spots Hungja Ney and Aja Ney are very popular with the local population, some from as far away as Thimphu.

A visit is worth to the rhododendron park at Thrumshingla and the Thrumshingla National Park, which is home to varied flora and fauna including tigers, red pandas and leopards. Dangling Tsho, Zunglen Tsho, Damtsang Tsho and Yogoe Tsho are the main lakes in the Dzongkhag.

Potential

The Aja Ney can be promoted as a part of the Om Ah Hung pilgrimage for serious pilgrims/religious tourists. Treks to Dangling Tsho can also be promoted, which can be linked to a trek to Merak and Sakteng.

8.1.17 Pemagatshel

Existing

There are more than 25 Lhakhangs in Pemagatshel Dzongkhag, with masked dances performed in many of them. Yongla Gompa in Zobel Geog is of national importance. Kheri Lhakhang, built by Nyaga, the grandson of Terton Pemalingpa, is the oldest monstery in the area. A lake in Zobel gewog with many camping spots and day hike trails is worth visiting.

Potential

Many trekking routes within the Dzongkhag to Samdrup Jongkhar and to Kengkhar in Mongar can be established to enable viewing of the varied flora and fauna and the gypsum mines. Yongla Gompa is a potential tourist destination.

8.1.18 Samdrup Jongkhar

Existing

Samdrup Jongkhar Dzongkhag has more than 30 Lhakhangs with masked dances performed in many of them. It has one nunnery and two Hindu temples (Shiva Mandirs). Tashithangji in Serthi, Drukhang Nye in Martshala, the four nyes in Lauri and a self-created Chorten, Khandroma Chorten in Gomdar Gewog are the popular pilgrimage spots. The stinging nettle weavers of Tashiphu in Lauri Gewog are well known. Tourists may see elephants, wild buffalos, tigers, jackals, deer and other animals, and a number of birds in the sub-tropical forests. A good campsite is in beautiful Tellung village with its big open fields and lots of birds which is a 4-hour walk from Dechenling along the Drangme Chhu.

Potential

The trekking road from Shingkar Lauri to Merak should be explored as it is still used by the Brokpas to bring their cattle to lower altitudes in autumn. Trekking route from Choekorling to Panbang/Manas and Manas National Park has extremely high potential for tourism.

8.1.19 Trashigang

Existing

Trashigang has more than 75 Lhakhangs with masked dances performed in most of them. Many of the Lhakhangs have very good statues and frescos. There is a nunnery at Phongmey and meditation and Buddhist schools in many Gewogs. Fascinating sights in this Dzongkhag are the ethnic lifestyles of the Brokpas of Merak and Sakten and their festivals, the ethnic festival in Kangpara, the work of the Bura (raw silk) weavers of Radhi, especially in the villages of Tshangkhar, Pakaling and Dekiling. Dyeing is done at home. Samples of designs and natural dyes used are displayed in the small museum of the Handloom Development Project in Khaling. Weavers are trained there and their products can be purchased. The Brokpas also dye and weave their distinctive clothes.

There are lakes of various sizes in Khaling, Kangpara, Nanong, Radhi, Sakten, and Uzarong and pilgrimage spots in many Gewogs. It is known for the Sakteng Wildlife Sanctuary, the only reserve in the world for the Yeti. The Sanctuary has varied flora and fauna and is particularly noted for bird watching. There are many trekking routes of varying degrees of difficulty, some following the old trade routes to other parts of the country and even to North Eastern India. Day-hike trails, picnic spots and camping sites abound.

Sherubtse College in Kanglung is the first and only degree college in Bhutan and Muenseling is the only school for the visually impaired at Khaling. An old iron mine at Busor, near Barshong village, was home to ironsmiths in the past.

Potential

Trashigang has high tourism potential given its wide variety of attractions, which are infrequently visited at the moment. Agricultural tourism can be promoted as also weaving tours.

8.1.20 Trashi Yangtse

Existing

Several temples and monasteries adorn this Dzonkhag including the Dechen Phodrang Lhakhang, with its scenic surroundings. Bomdeling Wild Life Sanctuary, with its rich natural resources and bio-diversity and winter home to black necked cranes is worth visiting. Jamkhar Gewog is a birding paradise, especially along the streams and rivers and adjoining Tongshang Gewog. The Bura weavers, local Tshechus in some small Lhakhangs, the last iron bridge at Duksom, the cantilever bridge below the old Dzong, the Chorten Kora festival, the Zorig Chusum school and the paper and wood factory are other attractions for visitors.

Potential

Yangtse - Bomdeling - Rigsum Gompa - Dechen Phodrang Lhakang - Yangtse could be a beautiful 3 days trek with black-necked cranes and Dechen Phodrang along the route. It could be extended for another 4 days via Gangkhar, Tokaphu and Doksum with the old Dzong, cantilever bridge and Iron Bridge falling in route.

8.2 Colourful Festivals The Buddhist festivals or Tshechus are one of the prime examples of the living culture of Bhutan that many have come to admire and treasure. The Tshechu is a festival in honour of Guru Rinpoche, the saint who brought Buddhism to Bhutan and the Himalayan world. These Tshechus are held in almost every district attracting hundreds of Bhutanese people in a spirit of festivity, celebration and deep faith.

Festivals have also promoted Bhutanese culture by creating employment opportunities for traditional musicians and dancers and encouraged the resurgence of local festivals in different parts of the country.

Annual Calendar of Tshechus (Approximate Dates)[1]

Festival	Town	Duration	Month
Trongsa Tshechu	Trongsa Dzong	3 Days	January
Lhuentse Tshechu	Lhuentse Dzong	3 Days	January
Punakha Dromche	Punakha Dzong	5 Days	February
Chorten Kora	Trashi Yangtse	1 Day	February and March
Paro Tshechu	Paro Dzong	5 Days	March
Nimalung Tshechu	Bumthang Dzong	3 Days	June
Kurjey Tshechu	Bumthang, Kurjey Monastery	1 Day	June
Thimphu Drubchen	Thimphu Dzong	4 Days	September
Thimphu Tshechu	Thimphu Dzong	3 Days	September
Wangdi Tshechu	Wangdue Dzong	3 Days	September
Tangbi Mani	Bumthang, Tangbi Monastery	3 Days	September
Jampay Lakhang Drup	Bumthang, Jampay Monastery	4 Days	October
Prakhar Duchoe	Bumthang	3 Days	October
Mongar Tshechu	Mongar Dzong	3 Days	December
Trashigang Tshechu	Trashigang Dzong	3 Days	December

Table 8.1 List of Tshechus -Bhutan

8.2.1 Eco-tourism in Bhutan[2]

Royal Society for the Protection of Nature (RSPN), the World Wildlife Fund, and the Nature Conservation Division (NCD) of the Ministry of Agriculture are promoting ecotourism in the country. An Ecotourism Management Plan for the Jigme Dorji National Park was drafted in 1998. Also the Integrated Community Development Programmes (ICDP) that are being implemented in several areas have made attempts to get local communities more involved in managing tourism within their own communities. Such community-based tourism is being encouraged in Laya and Soe within the Jigme Dorji National Park.

The RSPN has drafted an Eco-tourism Management Plan for Phobjikha valley which has been declared a conservation area for the endangered Black-Necked Cranes. The eco-tourism management plan for Phobjikha aims to integrate the conservation of the winter habitat of the cranes and development of the Phobjikha valley by providing the local community with ecologically sustainable income opportunities to boost the local economy. The programme aims to promote the development of alternative energy, eco-tourism, conservation and education programs, Black-Necked Crane research, and monitoring and development of infrastructure for eco-tourism. As such, the Phobjikha programme is the first real attempt at developing ecotourism in Bhutan.

Eco-tourism offers a way of achieving the benefits of tourism in a way that is consistent with the country's development philosophy. Adventure sports like rafting and kayaking is another form of tourism that is being promoted in Bhutan. Bhutan has a comparative advantage in this area as it is endowed with free-flowing and challenging rivers. Opening up rivers around the country for white-water rafting and kayaking will bring tourism to parts of the country that are otherwise not visited and help distribute tourism benefits to these areas as well. Other innovative schemes such as providing meditation centres in national parks, replicating traditional and religious festivals so that the real ones are not corrupted and sponsoring exhibitions could be explored.

Sources:
[1]Interactive meeting with locals in each Dzongkhag during resources mapping survey
[2]Deparment of Tourism, Ministry of Economic Affairs, Bhutan.

Tourism has been an important mechanism for publicising the country's culture and traditions to the outside world, and interactions with tourists have contributed to a sense of national identity, making Bhutanese proud of their country's unique culture and environment. Tourism has further enhanced the need to conserve the country's natural and cultural assets.

Bhutan's tourism potential is considerable with comparative advantages in many areas to ensure economic growth and diversification. Cultural tourism, eco-tourism and adventure/sports tourism (rafting, canoeing and climbing), which are based on the country's natural beauty, biodiversity and unique and distinct culture offer numerous opportunities for further development of the industry. The tourism industry can also generate jobs at a time when unemployment is becoming a problem with limited job opportunities in the Government and private sector.

Although the Government still maintains control over the industry, it has become much more diverse and complex since it was privatized in 1991. The private sector is being more involved in not only monitoring itself but also in developing future tourism policies. Tourism bodies like the Tourism Development Committee and the Association of Bhutanese Tour Operators have been established to foster partnership between relevant sectors involved in the industry and within the industry itself.

Both the organisations are still in their formative stages but have crucial roles to play in determining the future sustainability of tourism in Bhutan.

8.2.2 Sustainable Tourism in Bhutan[1]

Sustainable tourism means that tourism continues to generate revenue, especially foreign exchange, promote the country's unique culture and traditions to the outside world, and play an active role in the country's socio-economic development in a manner that is consistent with the Royal Government's policies aimed at sustainable development. Sustainable tourism, therefore, means that the growth of the industry will place emphasis on the preservation of the country's culture, environment and traditional lifestyle.

A few countries including Bhutan have demonstrated that tourism is not ugly. Bhutan is perhaps the best example where controlled tourism has been effective in ensuring the sustainability of the industry in the long run. It has contributed significantly to foreign exchange earnings and government revenues, to income and employment generation and to regional development to a certain extent. It has created opportunities for the development of locally owned and operated private sector enterprises.

The initial phase of setting up the tourism sector, of privatising the industry and of establishing Bhutan as an exclusive, distinctive destination has been achieved. The future development of tourism should now involve a process of refinement whereby attempts are made by the industry itself to:

- Mitigate any negative environmental and cultural impacts.
- Explore and develop the numerous niche markets, such as eco-tourism, that offer significant growth potential and are consistent with the other national development objectives and
- Increase the participation of local communities in tourism activities.

Sources:
[1]Tourism Resources Inventory of Bhutan-2005, Part I- II, International Tourism Monitor, Annual Report 2005-Edited by Martin Zeppezauer & Palden Dorji, ATC Austrian Tourism Consultants Ltd.

9 Mineral Sector

Bhutan has not been a notable producer of minerals, although there are traces of small-scale mining activities having been undertaken for over a thousand years. Slags are found of the ancient iron ore mining, which provided material for manufacture of artifacts, weapons and iron chain for suspension bridges. Remnants have also been found of ancient lead and zinc ore smelting. There are also stories of gold nuggets said to have been found in a few localities in the country.

Bhutan covers a small portion of the mighty Himalayan Range south of the main watershed of the Himalayas and mineral exploration began only in the early 1960's. The physiography of the country, of course, continues to have its impact on exploration activities, with conditions varying between extremes - from the hot and humid south to the inaccessible snow-clad and barren Great Himalayas to the north. Largely with the valued assistance of the Geological Survey of India, the Department of Geology and Mines has been able to map (geologically) most parts of the country and record a host of metallic and industrial (non-metallic) minerals in the country. As compared to other sectors of the Himalaya, the Bhutan Himalaya seems to be better endowed with the mineral resources. The mineral resources of the country are summarized and presented hereunder.

(A) Non-metallic/Industrial Minerals

9.1 Dolomite

Bhutan has inexhaustible reserves of dolomite all along the foothill region. Most of the deposits are approachable by fair weather roads from India, and from the nearest road heads by foot-tracks.

The largest of the deposits occur from Samtse in the west to Manas river in the east, a summary of which is presented in table 9.1:

S.No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Samtse-Rehti-Sarkitar, Samtse Dzongkhag	102	Inferred	20% MgO 30% CaO	Suitable as fluxing agent and for refractory purposes in steel industry	Parts of the deposit leased to M/S Jigme Mining Corporation Ltd. for 15 years through an open auction.
2	Uare-Deergaon, Samtse Dzongkhag	29	Inferred	20.50% MgO 30% CaO	Bands of dolomite intercalated with phyllite, slaty phyllite and quartzite	
3	Khanabharti North-Pagli-Titi-Hauree, Samtse Dzongkhag	426.55	Inferred	20.50% MgO 30% CaO	Bands of dolomite intercalated with phyllite, slaty phyllite and quartzite	
4	Sukti Khola, Samtse Dzongkhag	7.20	Proved	21.49%MgO 29.70% CaO	Exploration by drilling	

S. No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
5	Titring to Kalesore North, Samtse-Chhukha Dzongkhag	529	Inferred	21.35%MgO 29.80% CaO	Grey dolomite	Seasonal mining only possible at this juncture. These two deposits however, fall on the new Samtse-Phuentsholing highway.
6	Kalesore, Samtse-Chhukha Dzongkhag	2500	Inferred	21.14%MgO 29.73% CaO	Four bands of dolomite with 330 m thickness & 5.25 km strike length	
7	Dhanese, Sarpang Dzongkhag	730	Inferred	20.95%MgO 28.78% CaO	Thick beds of dolomite inter-bedded with grey slates	Poor accessibility
8	Kakulung, Sarpang Dzongkhag	2900	Inferred	20.00%MgO 2.30% SiO2	Two bands: Kanamakra-north band (over 20 km extension & 2 km max. thickness) & Kanamakra-south band (12 km length & 800 m max. thickness)	Seasonal mining areas possible east of Gelephu, which is not declared Game sanctuary area.
9	*Decheling, Samdrup Jongkhar Dzongkhag * Now in Pemagatshel Dzongkhag	2400	Inferred	21.00%MgO	Crystalline dolomite deposit with average thickness of 2 km and strike length of 20 km.	Falls on the Mongar-Nganglam highway under construction.

Table: 9.1 Dolomite-Bhutan

9.2 Gypsum

Major known deposits of gypsum are known from the Khothakpa area of Pemagatshel Dzongkhag, within short distance of each other as detailed in table 9.2.

S. No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Cherung Ri, Khothakpa, Pema Gatshel Dzongkhag	69.03	Proved	48.67% Gyp. 18.90% Anhy.	With phyllite intercalations	Leased to M/S Druk Satair Corporation Ltd. for 15 years through an open auction.
		56.44	Proved	58.22% Gyp 23.30% Anhy.	Without phyllite intercalations	
2	Uri, Pema Gatshel	13.60	Inferred	91.63% Gyp 1.26% Anhy.		Available for future development.
3	Khar, Pema Gatshel	0.03	Probable	87.87% Gyp 1.18% Anhy.		
4	Omsi Ri, Pema Gatshel	8.83	Inferred	91.00% Gyp. …% Anhy.		

Table: 9.2 Gypsum

9.3 Limestone

Limestone deposits are widespread in southern Bhutan from Samtse in the west to Nganglam in the east. Limestone is also found in Shumar/Paro/Tangchu formations in the interior parts of the country from Haa/Paro/Mirchang in the west to Tsebar, Wamrong in the east. The limestone deposits are not auctioned for mining and they are available for lease for use in any suitably proposed industries by the private sector.

The detailed summary of the important limestone deposits are presented in table below:

S. No.	Location	Reserves (mio)	Reserve Category	Grade	Description	Remarks
1	Tintale, Samtse Dzongkhag	0.38	Inferred	50.51%CaO 2.93% MgO	Bedded limestone interbanded with phyllite and quartzite	Needs further study for use by the existing cement plants in the Dzongkhag.
2	Pagli, Titi, Bhavani Khola, Uttare, Kalapani, Samtse Dzongkhag			Total known reserves of around 19.95 mio tons leased & being mined by PCAL. Some portions leased to M/S Lhaki Cement Pvt. Ltd. also.		
3	Khanabharti, Samtse Dzongkhag	0.26	Inferred	45.30%CaO 3.66% MgO	Bedded limestone intercalated with phyllites and quartzite	Falls on the new Samtse-Phuentsholing highway.
4	Kalesore, Samtse-Chhukha Dzongkhag	1.42	Inferred	44.47%CaO 1.51% MgO	Bedded limestone intercalated with phyllites and quartzite	0.20 mio tons chemical grade (51.29% CaO, 1.23% MgO)
5	Hauree Khola, Samtse-Chhukha			Estimated reserves of 17.22 mio tons leased and mined by BCCL.		
6	Rong Ri, Sarpang Dzongkhag	3.13	Proved	50-51% CaO 2.52 % MgO	Grey to light grey crystalline limestone inter-bedded with phyllite and quartzite	Leased to BCCL for calcium carbide manufacture.
7	Katle Dara, Sarpang Dzongkhag	0.11	Inferred	CaO>51.0% MgO<2.3 3%	Light grey crystalline limestone	Eastward extension of the Rongri limestone, which is known to extend further eastward as thin bands.
8	Dholpani-Bhurkhola, Sarpang Dzongkhag	0.21	Inferred	41.08-42.06% CaO; 1.87-2.24% MgO	Low grade limestone inter-bedded with phyllite and quartzite	Could be used to supplement other sources for the manufacture of cement.
9	Gomphu, Zhemgang Dzongkhag	4.30	Proved	Calcium carbide grade	Banded, light to dark grey, fine to medium grained crystalline limestone.	A local mini cement plant can be considered.
		7.32	Proved	Cement grade		
10	Marung South, Marung North, Kangrizhe, Kangrizhe North Extension, Kurung Ri, *Nganglam, Samdrup Jongkhar Dzongkhag *Now in Pemagatshel Dzongkhag			60.16 mio tons proven cement grade limestone all reserved for the one-million ton Dungsam Cement Project.		Investigation planned to prove more reserves in the remaining unexplored areas.
11	Tsebar, Pemagatshel Dzongkhag	3.94	Proved	42-46% CaO 1.02% MgO	Grey to light grey, fine-grained, crys-talline limestone	Could consider a mini cement plant although grade is just marginal.
12	Tokaphu, Wamrong, Trashigang Dzongkhag	20.4	Probable	46.01% CaO, 1.19% MgO	Bedded crystalline limestone in Shumar Formation	Second largest deposit after Nganglam area in Eastern Bhutan.
		8.5	Probable	CaO<45%		
13	Brekha, Trashigang Dzongkhag	2.0-3.0	Inferred	CaO 44.3% to 51.93% MgO 0.33% to 2.74%	Bedded dark grey crystalline lime-stone	Can be used with Tokaphu (Wamrong) limestone for a cement plant.

S. No.	Location	Reserves (mio)	Reserve Category	Grade	Description	Remarks
14	Pelela, Wangdue Phodrang Dzongkhag	216	Inferred	50.56 to 53.26% CaO 0.56 to 0.85% MgO	Predominantly bluish grey in colour, limestone is thinly bedded to massive	High grade limestone may be suitable for chemical industries
15	Genekha, Thimphu Dzongkhag	0.900	Probable	CaO 52.00% MgO 1.40%	Crystalline lime-stone hosting Pb+Zn ore	High grade limestone but not fit for calcium carbide manufacture.
16	Khanku, Paro Dzongkhag	12.44 29.59	Proved Probable	CaO 46.94% MgO 2.50%	Crystalline lime-stone associated with mica schist & quartzite	Located right next to Paro Airport & mining not allowed for environmental reasons.
17	Wangcha, Haa Dzongkhag	5.00	Probable	CaO 52% MgO 2%	Bedded crystalline limestone in the Shumar/ Paro formation	High grade limestone, but physical characteristics not fit for calcium carbide manufacture.
18	Chilungkha, Haa Dzongkhag	0.447	Probable	CaO 52.5%		

Table 9.3 Limestone

9.4 Quartzite

Quartzite occurs as an important rock in all the formations of Bhutan Himalaya, eg. Baxa, Shumar/Paro, Thungshing & Thimphu Formations. Limited studies have been done to find out the suitability as raw material for manufacture of glass, ferrosilicon, silicon carbide, calcium silicide etc. Systematic mapping and investigation is warranted for identifying high quality quartzite for use in the high value chemical industries. Some of the deposits studied and available for further investigation and exploitation are given in table 9.4.

S. No.	Location	Reserves (Mio tons)	Reserves Category	Grade	Description	Remarks
1	Tintale (East), Samtse Dzongkhag	0.89	Proved	97.52% SiO_2, 1.06% Al_2O_3	Coarse grained, snow-white to greenish/ greyish white, hard, well jointed	Leased to Bhutan Ferro-Alloys Ltd. Pasakha.
	Tintale (West), Samtse Dzongkhag	3.49	Proved	97.54% SiO_2 1.06% Al_2O_3		Free for mineral concession.
2	Omchena-Pepchu area, Chhukha Dzongkhag	1.20	Proved	96 to 98% SiO_2, 0.39-2.19% Al_2O_3	White/smoky white quartzite with interbands of phyllite and basic sills	Leasehold area of M/S Druk Stone and Minerals Company Ltd.
3	Kamji-Kezari areas, Chhukha Dzongkhag	20.36	Inferred	95-97% SiO_2, 0.76-2.01% Al_2O_3	Fine grained, white to smoky quartzite is located in a 23-km belt from Kamji in the west to Kezari in the east	The Dungina-Pakchina, Padzekha Chhu and Singey Chhu deposits, which are leasehold areas of existing / proposed ferrosilicon plants fall in this belt.
4	Wakhar-Mukazor area, Trashigang Dzongkhag	0.76	Inferred	96 to 98% SiO_2 0.11-2.80% Al_2O_3	Highly jointed, fine grained, white to grayish white in colour	Investigated for M/S SD Eastern Bhutan Ferrosilicon plant in Samdrup Jongkhar.

Table: 9.4 Quartzite

9.5 Slate

Three major deposits of slate have been identified in Bhutan viz. Bhel (Bonsagama) and Khobja in Wangdue Phodrang, Pangthang and Pemagatshel east in Pemagatshel Dzongkhag as described in table 9.5.

In Bhel-Khobja area, about 100 m of the slate has been identified as a workable deposit. The slate is dark in colour with distinct cleavage planes and well-spaced joints. It is free from impurities and has the required characteristics for commercial applications, the full potential of which has not been explored so far.

S. No.	Location	Reserves (mio cu. m.)	Reserve Category	Grade	Description	Remarks
1	Sha Bhel, Wangdue Phodrang	16.00	Estimated	Dark, Good quality	Distinct cleavage planes and well spaced joints	Mined since the 1970's for roofing & still being mined on a small scale
2	Pangthang & Pemagatshel east, Pemagatshel	Not estimated	----	Poor quality	Thinly laminated, soft, steel-grey, slaty phyllite	Locally quarried for roofing purposes only.

Table 9.5 Slate

9.6 Marble

Marble in Bhutan is associated with all the technostratigraphic belts of Baxa, Shumar/Paro, Thimphu and Tethyn Belt. Marble is closely associated with the limestone in these groups of rock formations. The different deposits are detailed in table 9.6.

S.No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Khanku, Paro Dzongkhag	42.03	Probable	MgO <4.0%.	Suitable for decorative purposes. Finer varieties withstand chiseling and cutting by lathe for making various artifacts	Medium-coarse grained banded & white varieties. Once mined during the eighties but mining discontinued for environmental reasons.
2	Gida-Jemina, Thimphu	2.186	Proven	>90%CaCO3	Medium to coarse-grained, white and banded & is quite pure.	Being mined by Bhutan Marbles & Minerals Ltd.
3	Genekha, Thimphu Dzongkhag	----	----	MgO< 1.4%.	Banded marble extend over 1.25 km and 75-166m thick.	Suitable for ornamental building stone.
4	Mirchang-Tala, Chhukha Dzongkhag	----	----	MgO<4%	Three bands 30-80 m thick & extending 350- 950 m. Suitable for building and ornamental purpose.	Was once mined by BCCL.
5	Wangcha & Chilungkha, Haa	----	----	MgO 2.00%	Thick bands of white crystalline marble extends over 1 km.	Marble occurs associated with the limestone in the areas.
6	Tsebar, Pemagatshel Dzongkhag	0.700	Probable	CaO<50.70% MgO<1.20%	Marble occurs associated with cement grade limestone.	Marble occurs associated with the limestone in the areas.
7	Bunakha-Chapcha, Chhukha Dzongkhag	----	----	CaO 43.0%	Crystalline marble bands 40-50 m thick extends over 1 km.	Preliminary surface investigation only.

Table 9.6 Marble

9.7 Graphite

Graphite is found widespread in the graphitic schist of the Thimphu formation and a number of occurrences have been reported from different places. However, the major occurrence has been located at the Khepchishi Hill of the Cheliala, Haa Dzongkhag, which has been studied in detail (table 9.7). The exploitation of this resource may have Foreign Direct Investment potential at some stage in future.

S.No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Chelaila, Haa Dzongkhag	11.83 33.88 8.03	Proved Probable Inferred	10-25% N.C. 70-85% Ash	Crypto-crystalline to amorphous /flaky type within graphitic schist	Beneficiation tests & feasibility studies done.
2	Donga, East southeast Takti Chu, Chhukha Dzongkhag	0.217	Estimated	18.20% N.C. (Average)	Fine-coarse flaky graphite in the graphitic schist.	More detailed study proposed.
3	Depchasa-Dorjamsa & Dungna areas, Chhukha Dzongkhag	-----	-----	14.62% N.C. & 14.18 to 23.10 % Ash	Occurrences noted during reconnaissance mapping. More study needed.	Depchasa-Dorjamsa area is East of Tsimasham.

Table 9.7 Graphite

9.8 Talc

Talc occurrences extend from Samtse in the west to Sarpang in the east (table 9.8). Talc occurs as thin lenses, films, pockets and bands associated with quartzite, phyllite and calcareous quartzite. Thickness of bands varies from a few cm to 40 meters. Talc is being mined by many individual entrepreneurs and exported to India as a raw material from many places in Chhukha and Samtse Dzongkhags. Total known reserves of talc are 0.1414 mio tons.

S. No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Pa Chu-Seti Khola, Chhukha Dzongkhag	0.110	Estimated	Medium-high grade	Two lenses of white, pale green & dark grey colored talc with inclusions of quartzite, phyllite and dolomite.	Workable deposit. Average width 9.0 m. Strike length 300 m
2	Khempa, Chhukha Dzongkhag	0.0125	Estimated	Medium grade	White pale green talc foliated & grades into quartzite.	Average Width 3.0-20.0 m. Strike length 7m-48m
3	Thunuwa, Chhukha Dzongkhag	0.0036	Estimated	Low grade	Four small lenses of talc.	Average Width 5-40m. Strike length 30-70 m
4	Pagli-Sarkitar, Samtse Dzongkhag	0.0017	Estimated	Low grade	Three small lenses of talc intercalated with quartzite and phyllite.	
5	Molabanse, Samtse Dzongkhag	0.0053	Estimated	Low -medium grade	Three small lenses of green to white schistose talc.	Strike length upto 170 m
6	Lapchekha, Samtse Dzongkhag	0.0042	Estimated	Low grade	Five lenses of grey and light green soapstone.	
7	Sukti Khola, Samtse Dzongkhag	0.0023	Estimated	Low grade	Small lenses of talc with quartzite impurity.	
8	Budheni-Tin Doban, Samtse Dzongkhag	0.0018	Estimated	Low grade	Small lenses of talc, highly impure & sheared.	
9	Lhoring, Sarpang Dzongkhag		Surface investiga-	High grade	As small lenses within dolomite bands.	Light cream in colour and of steatite grade.

Table: 9.8 Talc

9.9 Coal

The coal occurrences are restricted to the foothills of South-eastern Bhutan in Samdrup Jongkhar Dzongkhag. The coal belt of 65 km length lies in between Deo Ri in the west to Leshang Ri in the east. Access is by dirt/seasonal roads or footpaths.

The coal is highly crushed, sheared and tectonised and therefore, always powdery or flaky. Lumpy coal is rare. The coal belt has been auctioned for 15 years and the Eastern Bhutan Coal Mines is in the second year of mining the coal.

Details of the known coal reserves are presented in table 9.9.

S. No.	Occur-rence	No. of Coal seams	Thick-ness (m)	Strike length (m)	Dip-Extn (m)	Re-serve (tons)	Re-serve Cate-gory	Grade	Fuel Ratio	% Fixed Carbon	Status of investigation/ Remarks
1	Jagartala	38	0.70-2.80	15-150	30	103,000	Probable	Sub-bituminous	-	46.0	Detailed exploration by drilling completed.
2	Bhangtar	5	6.50-12.30	236	50	98,000	Probable	Sub-bituminous	-	39.0-44.0	Detailed exploration by drilling completed.
3	Diglai Nadi	40	0.70-2.10	11-500	20	86,500	Possible	Sub-bituminous	2.05-2.67	52.5	Surface investigation
4	Gerua-Dimala Khola	5	0.45-5.00	125-500	20	44,000	Probable	Sub-bituminous	-	30.6-41.7	Detailed exploration by drilling completed.
5	Chamrang Nadi	8	1.00-4.50	10-175	20	72,600	Possible	Sub-bituminous to Anthracitic	1.42-1.72	43.0	Surface investigation
6	Kalapani Nadi	36	1.00-12.00	5-112	20	119,290	Possible	Sub-bituminous	1.22-2.0	41.5	Surface investigation
7	Nunai Nadi	4	0.90-1.70	30	-	-	-	Sub-bituminous to semianthracitic	2.76-5.69	-	Surface investigation, coal seams are thin and persistent.
8	Bhorila-Rash Ri	15	0.50-6.00	50.290	25	303,650	Possible	Sub-bituminous	-	40.1	Surface investigation
9	Nagor Khola	5	1.00-2.50	17-60	30	52,000	Possible	Bituminous	1.02-2.0-	41.0	Surface investigation
10	Khaurang-Leshing Ri	5	1.00-6.00	500	-	270,00	Possible	Bituminous to Anthracitic	-	-	Surface investigation
11	Deothang	12	0.50-3.50	2250	-	-	-	Sub-bituminous	-	-	Surface investigation, coal seams are thin and persistent.
Probable reserves: 245,000 metric tonnes							Possible reserves : 904,040 metric tones				
Total known coal reserves: 1,149,040 metric tonnes Say 1.15 million tonnes											

Table 9.9 Coal

9.10 Phosphate

The only occurrence of phosphorite is reported from the Maure-Kalikhola area of Sarpang Dzongkhag (table 9.10). Although, this has proven to be a small occurrence, search for similar occurrences in similar geological settings is highly desirable as rock phosphate is an important industrial raw material.

S. No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Maure-Kalikhola area, Sarpang Dzongkhag	-----	-----	2.10-10.80% P2O5 & 8.70-81.66% Fe2O3	Phosphorite mineralization within 7-21 m thick ironstone shales & carb phyllites extending over 820 m.	Host rocks found along Siwalik-Gondwana-Baxa sequence contact.

Table 9.10 Phosphate

9.11 Clay

Only two occurrences of clays are recorded in the literature in Thimphu and Wangdue Dzongkhags, which are described in table 9.11.

S. No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Wang Paon, Sisina, Thimphu Dzongkhag	0.070	Estimated (surface investigation)	Has moderate plasticity and can be easily moulded.	A lensoidal body 2400 m in length and 4 m thick. Found associated with metapelites of the Paro/Janshidanda Formation.	Extracted for local use only currently. May find use in ceramics and bricks industry and as a drilling mud.
2	Khelkha, Wangdue Phodrang	-----	Channel sampling	Impure clay	A lensoidal body of 50 m by 2 m non-foliated, massive & well jointed. Found over the pegmatitic granite of the Chekha Formation.	Insignificant quantity but should look for similar occurrences for bricks making.

Table 9.11 Clay

Larger deposits with potential to support red brick making units may be explored for in similar geological settings.

(B) Metallic Minerals

9.12 Tungsten

Tungsten mineralization occurs in the skarn rocks near the contact of Thimphu gneisses and Shumar metasediments in the Dholpani and Bhurkhola areas of Sarpang Dzongkhag (table 9.12). The mineralization in the area is unique, as it is the first of its kind reported in the Himalayas.

S.No.	Location	Reserves (mio tons)	Reserve Category	Grade	Description	Remarks
1	Dholpani	0.349 (with cutoff grade of 0.12%)	Probable under 1 m stoping width	0.25%	Reserves upto 75 m depth	Beneficiation tests have shown that ore is amenable to beneficiation but at the prevailing market price the venture is not feasible.
2	Bhurkhola (West)	3.00 (cut-off grade of 0.20%)		0.22%	Reserves upto 90 m depth	
3	Bhurkhola (East)	0.29 (cut-off grade of 0.20%)		0.26%	Reserves upto 90 m depth	

Table 9.12 Tungsten

9.13 Lead-Zinc

The lead-zinc deposits of the Genekha area are accessible by a 20-km dirt road from Sisina from 144-km post on the Thimphu - Phuentsholing highway (table 9.13).

S.No.	Location	Reserves (mio tons)	Reserve Category	Average Grade		Remarks
				Pb	Zn	
1	Chakula, Thimphu Dzongkhag	3.116	Proved	1.03%	6.33 %	Mineralization occurs as thin concordant, tabular to lenticular and "pod" like bodies, as disseminations, stringers and fracture fillings in the marble.
2	Romegang Ri, Thimphu Dzongkhag	0.514	Probable	3.74%	4.46%	
Total reserves		**3.630**		**1.41%**	**6.06%**	

Table 9.13 Lead-Zinc

Beneficiation tests have shown that extraction of metals from the oxidized ore of Genekha requires special metallurgical techniques.

9.14 Copper

The most important copper deposit is located at Gongkhola, Trongsa Dzongkhag, which is located at an aerial distance of 40 km north of Gelephu and access by 65 km trekking from Surey, 35 km north of Gelephu on Gelephu-Trongsa highway. Of the four blocks of the Gongkhola copper deposit investigated, Eastern and Central blocks have shown better ore reserves as shown in table 9.14.

S.No.	Ore Blocks	Reserves (mio tons)	Reserve Category	Grade Cu	Strike length of lode	Remarks
1	Eastern	1.8944 (With cut--off grade of 1.0%)	Probable (upto a depth of 120 m; one m stoping width)	1.52%	1850 m	Borehole samples have shown some content of gold and arsenic associated with copper mineralization.
2	Central	0.3493 (with cut-off grade of 1.0%)	Probable (upto a depth of 120 m; one m stoping width)	1.50%	450 m	

Table 9.14 Copper

9.15 Iron

Iron ore occurrences are rare in the Himalayas. Small reserves of low-grade iron ore are found near Mauree village, on the left bank of Sunkosh river in Sarpang Dzongkhag. Two small bodies, (Eastern and Central) selected for grade and reserve estimation, gave the results as shown in table 9.15.

S. No.	Ore Bodies	Ore type	Outcrop area (m^2)	Average Grade (% Fe)	Reserves (mio tons)	Remarks
1	East	Laminated	9,900	32.46	1.6335	This low-grade iron ore, if beneficiated, can be utilized locally for small-scale industries. Being mined by PCAL as a source of iron in cement raw mix.
		Massive	3,300	48.54	0.63525	
2	Central	Laminated	4,600	31.20	0.70840	
				Total	**2.97715**	

Table 9.15 Iron

9.16 Gold

A preliminary search for gold was done in a few selected areas from which the results are so far erratic and inconclusive as detailed in table 9.16.

S. No.	Location	Nature of occurrence	Grade (Au content)	Remarks
1	Menji area, Lhuentse Dzongkhag	Fluvial sands of Kurichu	0.001- 0.25 gm per 1524 kg of sand	Widespread distribution of fine and flaky gold is reported in the fluvial sand and gravel deposits.
2	Gongkhola, Trongsa Dzongkhag	Associated with copper in Gongkhola copper deposit	0.20 to 1.20 ppm in the Central Block	The feasibility of extracting gold from copper as a by-product has to be studied in detail.
3	Gurung Khola, Sarpang Dzongkhag	Associated with pyrite and chalcop yrite in carbonaceous phyllite	0.10 to 3.99 ppm	The feasibility of extracting gold from copper and iron as a byproduct has to be studied in detail.
4	Dholpani Bhurkhola, Sarpang Dzongkhag	Borehole samples analyzed from the Dholpani-Bhurkhola tungsten prospect has shown appreciable quantities of gold but no full analysis done yet.		The economics of exploitation of the Dholpani-Bhurkhola tungsten prospect would improve with gold content as a byproduct if the same can be extracted out from tungsten.

Table 9.16 Gold

Detailed and systematic exploration for the mineral is warranted based on the leads available from the above studies of gold occurrences.

Summary of the Mineral Resources Available for Processing

Analyzing the national level mineral resource data, it is obvious that large scale mining activities as in the neighbouring countries like India, China and Pakistan are not possible firstly on account of the small volumes of the available mineral deposits and secondly due to the fragile environment in the rugged terrain of the area. With the improvement in logistics and advancement in metallurgical processes, the Genekha lead-zinc, Bhurkhola-Dholpani tungsten, Chilaila graphite and Gongkhola copper deposits may become workable. However, medium to large scale metallurgical industries based on these minerals are not possible for environmental reasons. As such, the commercially exploitable metallic minerals can at best be concentrated and exported to neighbouring countries for processing.

Of the minerals found so far, limestone (cement and chemical grade), dolomite, gypsum, quartzite (construction material and chemical grade), coal, marble and slate are being mined both for local use and export. Based on these non-metallic minerals, industries of all scales have been set up and more are possible as long as they are not excessively polluting. Those worth considering for exploitation would be the minerals as follows:

1. **Dolomite:** The total known reserves of dolomite in Bhutan is about 51.33 mio tons proven and 15,979 mio tons inferred, found mostly along the southern foothills. Although more than one third of the reserve is in the game sanctuary areas, still there is enough available in the non-restricted areas for exploitation for use in industries.

   Presently, dolomite is being mined and exported mostly to iron and steel plants in India by M/S Jigme Mining Corporation Ltd. on a 15-year lease from the Government. Some amount of powdering is done in the country and exported as dolomite powder. Some of its other uses are as crushed stone aggregates, dimension stone, in ceramic and glass industry, magnesium source for agricultural soils and source of magnesium compounds. If entrepreneurs can find use of the rock in any of its above uses, the raw material is readily available in many parts of the country.

2. **Gypsum:** Bhutan has a total of 125 mio tons of proven reserves and 22 mio tons of inferred reserves of gypsum at Khothakpa and the surrounding areas in Pemagatshel Dzongkhag. Presently it is mined at the rate of about 150,000 tons per annum by M/S Druk Satair Corporation Ltd. on a 15-year lease. Most of the gypsum is exported to India in raw form except for some supplies to the three small plaster of paris plants located in the vicinity of the gypsum mines.

   Raw gypsum is used in portland cement, as soil conditioner, in pharmaceutical and glass industry. Calcined gypsum is used as molding plaster, casting plaster, wall plaster and in gypsum wallboard manufacture. Anhydrite is used as a source of sulfur in sulfur-poor countries. Abundant gypsum is available for value addition in any of the above uses.

3. **Limestone:** Of the many limestone deposits located, the extension of the Tintale deposit in Samtse Dzongkhag needs to be studied for the cement plants in the Dzongkhag that would run out of raw materials in the next 15 years or so. The extension of the Rongri limestone deposit in Sarpang Dzongkhag, towards both east and west needs to be investigated possibly for a cement plant in Gelephu area. In the interior, the 216 mio-ton deposit in Pelela area, Wangdue Dzongkhag is worth considering for a chemical industry or a cement plant. The 30 or so mio-ton deposits at Wamrong and Brekha in Trashigang Dzongkhag could support a cement plant.

4. **Quartzite:** The availability of high-grade quartzite has led to the establishment/proposal of seven ferrosilicon plants in the country. The high-grade quartzite belts are in the Shumar formation in Tintale area in Samtse Dzongkhag, Omchena-Pepchu area in the west to Kezari area in the east (about a 33-km belt) in Chhukha Dzongkhag, and Wakhar-Mukazor area in Trashigang Dzongkhag. All the ferrosilicon plants are based on the deposits within these quartzite belts.

   Quartzite can also be used for the manufacture of glass, silicon carbide, calcium silicide and silicon metal. For any such industries located in Samtse Dzongkhag, Tintale (west) is available for mineral concession. The eastward and westward extension of the Tintale deposit is also possible and needs to be investigated. For those industries to be established in Chhukha Dzongkhag, they have to look for additional deposits in the quartzite belt not leased by the ferrosilicon plants. In Eastern Bhutan where the Shumar formation is widespread, more studies need to be taken up based on the lead from Wakhar-Mukazor quartzite occurrence.

5. **Marble:** Marble is found in a number of localities in Bhutan. The deposit at Khanku, Paro Dzongkhag was mined once for construction and ornamental purposes. Presently, only the Gidakom marble is being exploited by M/S Bhutan Marble & Minerals Ltd. for marble slabs, chips and powder. It is reported that the Gidakom marble band extends northwards into Jemina area, which could be studied for mining. The other marble deposits available for mineral concession are at Genekha (Thimphu), Wangcha (Haa), Mirchang-Tala (Chhukha) and Tsebar (Pemagatshel). Most of the marble in Thimphu-Paro-Haa area is coarse grained whereas finer variety is required for slab and artifact making purposes. Such quality may be available/found in the marble deposits in other localities.

6. **Slate:** Out of the 16 million cubic metres of good quality dark coloured slate located at Bhel-Khobja area in Wangdue Dzongkhag, only 4,778,950 square feet has been mined almost all for roofing purposes. It is still mined on a very small scale for the same purpose. Slate is also used for black boards, billiard tables and making artifacts. If any of these products are found feasible for production on a commercial scale, adequate good quality slate is available at this locality.

7. **Talc:** Pockets of talc occurrences have been found in the Phuentsholing formation mostly in the foothills of Chhukha and Samtse Dzongkhags. The known total quantity of the mineral reported is 139,700 tons whereas the quantity mined and exported is 208,353 tons (2005). This shows that there may be more pockets of the minerals available in the southern foothills for small entrepreneurs/miners to explore and exploit. A systematic investigation for proving the exact reserves can lead to setting up of a talc concentration plant in the country instead of just exporting without any value addition.

8. **Lead-Zinc:** Out of the metallic minerals, the 3.630 million tons lead-zinc ore proven in Genekha area, Thimphu Dzongkhag appears to be the most promising. Because of the problems associated with metallurgical extraction from oxidized ores of the deposit identified by studies in the past, no further study has been undertaken on the deposit in recent years. Now with advancements in metallurgical extraction techniques, the problem may have been solved. This needs to be reviewed and a study could be undertaken if the ore could be profitably mined, beneficiated and exported for processing outside.

Source:
(1)The Bhutan Himalaya: A Geological Account- Special Publication 39, Edited by O.N. Bhargava, Geological Survey of India, 1995.
(2) Atlas of Mineral Resources of the ESCAP Region, Volume 8, Bhutan – United Nations ESCAP and Department of Geology & Mines of Bhutan, 1991.
(3) Department of Geology & Mines, Ministry of Economic Affairs, Thimphu.