Gross National Happiness Commission,
Ministry of Agriculture and Forests,
The Royal Government of Bhutan

Data Collection Survey Report on Food Self-Sufficiency and Food Security in the Kingdom of Bhutan

August 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

NOMURA RESEARCH INSTITUTE, Ltd.
KAIHATSU MANAGEMENT CONSULTING, INC.

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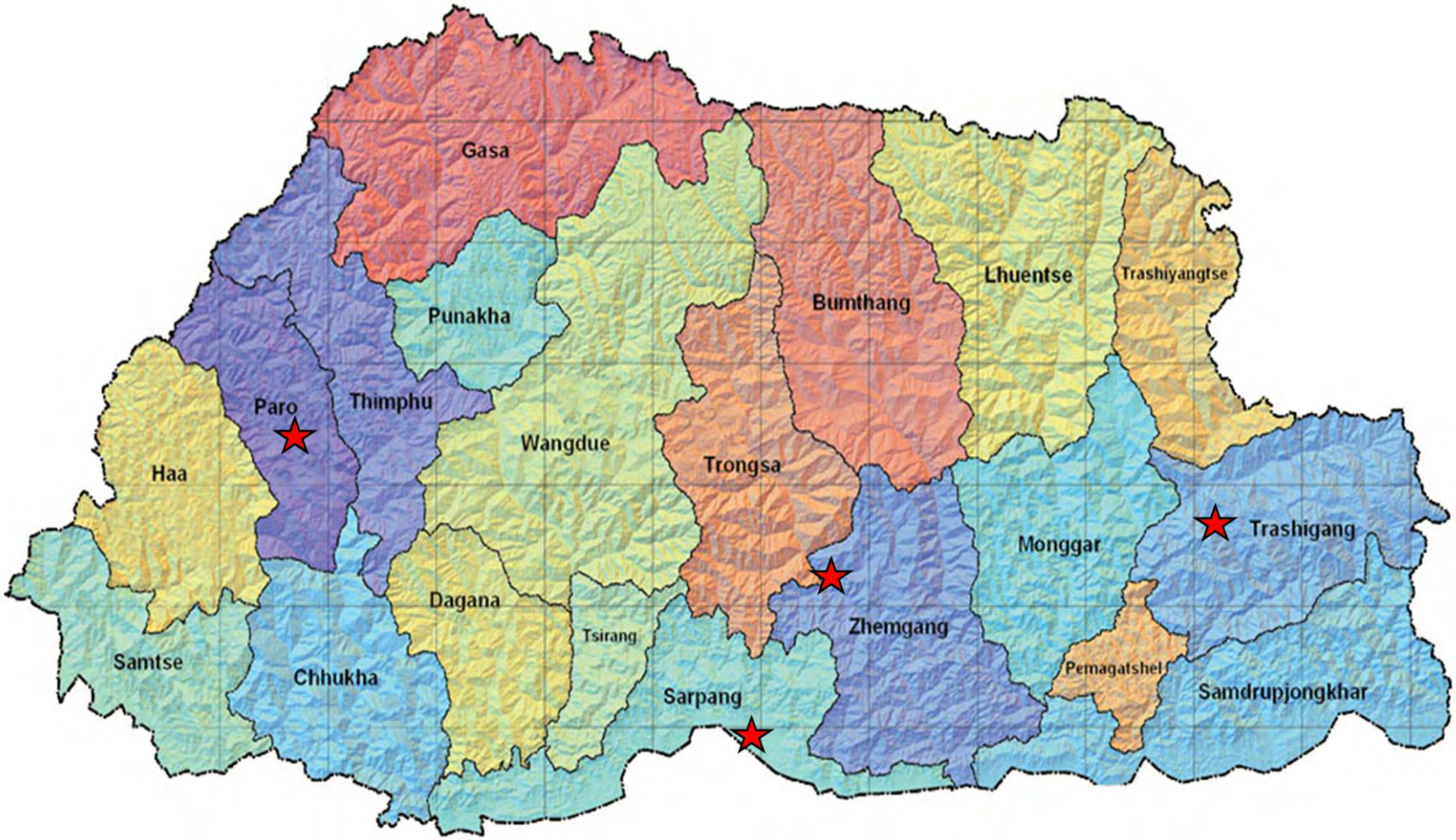
Location of areas surveyed



The stars on the map show the locations of the areas sampled in this study.

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Abbreviation

ALD	Alcohol-induced liver disease
ALOS	Advanced Land Observing Satellite
AMC	Agricultural Machinery Centre
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BAIL	Bhutan Agro Industries
BCCI	Bhutan Chambers of Commerce and Industry
BDFC	Bhutan Development Financial Corporation
BDL	Bhutan Dairy and Agro Products
BFPL	Bhutan Fruit Products
BICMA	Bhutan InfoComm and Media Authority
BIMSTEC	Bay of Bengal Initiative for Multi-Sectorial Technical and Economic Cooperation
BSE	Bhutan Salt Enterprises
CAFCO	Chuzagang Agricultural Farmers' Cooperative
CBU	Capital Build Up
CCA	Commodity Chain Analysis
CEO	Chief Executive Officer
CIC	Community Information Center
DPT	Druk Phuensum Tshogpa
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization
FCB	Food Corporation of Bhutan
FDI	Foreign Direct Investment
FFS	Farmers Field School
FIP	Financial Inclusion Policy
GDP	Gross Domestic Product
GNH	Gross National Happiness
GNI	Gross National Income
GNP	Gross National Product
HDI	Human Development Index
IFPRI	International Food Policy Research Institute
IV	Improved Variety
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KR II	Second Kennedy Round
LDC	Least Developed Country

MA	Minimum Access
MAFF	Ministry of Agriculture, Forestry and Fisheries (Japan)
MAGIP	Market Access and Growth Intensification Project
MHV	Mountain Hazelnut Venture
MOAF	Ministry of Agriculture and Forests
MOE	Ministry of Education
MOEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MOH	Ministry of Health
NCHS	National Center for Health Statistics
NFSR	National Food Security Reserve
NLC	National Land Commission
NPHC	National Post Harvest Center
NPPC	National Plant Protection Centre
NSB	National Statistics Bureau
NSC	National Seed Center
NWFP	Non-Wood Forest Products
ODA	Official Development Assistance
RAMCO	Regional Agricultural Marketing and Cooperative Office
RDA	Recommended Dietary Allowance
RMA	Royal Monetary Authority
RNR	Renewable Natural Resources
RSTA	Road Safety and Transport Authority
SAARC	South Asian Association for Regional Cooperation
SAFTA	South Asia Free Trade Agreement
SLMP	Sustainable Land Management Project
TPDS	Targeted Public Distribution System
TV	Traditional Variety
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USDA	United States Department of Agriculture
VAD	Vitamin A Deficiency
WFP	World Food Programme
WHO	World Health Organization

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Executive Summary

Chapter 1 Study Framework

1-1 Description of the Study

The objective of this study was to collect and analyze data about conditions related to the government's Food and Nutrition Security Policy and to study and summarize the ways in which Japan can contribute to Bhutan's agricultural sector (and the grain sector in particular) in order to achieve this policy.

The following four sampling areas were selected for the field surveys. These sampling areas were chosen so as to cover the areas of distinctive characteristics and are not necessarily the candidate areas for future projects.

Designated Sampling Areas

Region	Dzongkhag	Geog	Characteristics
Central	Zhemgang	Trong	Rice as the main cereal crop
East	Trashigang	Khaling	Maize as the main cereal crop
South	Sarpang	Chuzagang	Holds relatively large areas of flat lands
West	Paro	Dopshari	Reletively advanced agricultural areas

1-2 Policy Options for Food Security

Each country has its own strategy for achieving food security, and how Bhutan intends to achieve its food security has to be decided by itself. In the end, Bhutan is likely to consider one of the three strategies below or a compromise thereof, but this report was prepared to provide basic data for he Bhutan government to deciding its food security strategy.

① Raise the grain self-sufficiency ratio.

Bhutan has strong economic ties to India and has also been experiencing strong interference from China in recent years. Dependence on these countries for the food supply of the Bhutanese people would lead to the increasing subordination to these countries and the loss of its dignity as an independent country. Further, under the circumstances of economic problems such as foreign currency outflow and deterioration of the balance of international payments, it is essential to achieve as much self-sufficiency as possible, at least for grains.

② Importing by diversifying risk, rather than aiming for self-sufficiency.

To stabilize food prices and boost the self-sufficiency ratio will not work effectively, as this will increase the domestic production of grains which are more expensive than the imported ones. In fact, subsidies and outlays for various projects intended to protect the self-sufficiency ratio (domestic

farmers) are only driving the price of grains higher. The basic principle of this scenario is not to rely on a specific country as the single source of the food supply. To bring this about, a target of self-sufficiency ratio (≠100%) and the target year should be set, and gradual steps should be taken to reach the target.

③ Respect the free will of farmers.

Since the increase in grain imports threatens agricultural farming, imports should be used as the last resort. To achieve food security, the free will of farmers within Bhutan should be respected. The existing policy tries to make up for the shortfall between demand and domestic production. This policy should be continued.

Chapter 2 Socio Economic Conditions of Bhutan

2-1 Major Socio Economic Indicators

Bhutan has a population of 635 thousand people as of 2005, and it is projected to rise up to approximately 760 thousand by 2015 with an annual growth rate of 1.7-1.8%. The growth rate of GDP in 2010 is projected to be 8.1% driven by the significant growth in manufacturing, electricity/water, and construction sectors. The share of agricultural sector in the GDP is 17%. The trade in agricultural commodities in total had been in deficit, and the major source of food imports has been from India.

The percentage of population under the total poverty line had decreased from 31.7% to 23.2% between 2003 and 2007. However, a proportion of the subsistence poor has been increased during these periods. Poverty incidents are relatively higher in the eastern part of Bhutan.

2-2 GNH Survey

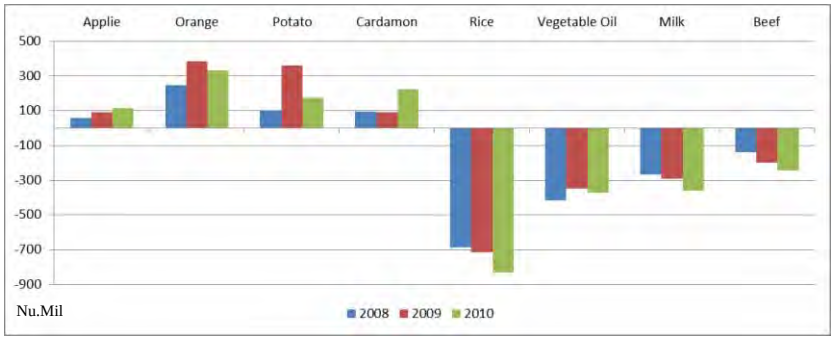
The Survey of the GNH in 2010 showed that 50% of people were happy in urban areas, whereas 37% of the people in the rural areas were happy. The GNH index had decreased from 0.622 to 0.608 between 208 and 2010.

2-3 Characteristics of Food Consumption and Distribution

The self-sufficiency rate of rice was 48% in 2010, whereas those of maize and cereals were 100% and 63% respectively. The self-sufficiency rates for fruit and potato were more than 100% in 2010, as the volume of exports of these commodities were quite large. The self-sufficiency rates for dairy products, milk, egg and mutton were over 70% in 2010. Those of beef and pork were around 20%, and that for fish was only 3% in the same year.

Food items accounts for about 11% of total value of import in 2010, and rice constitutes 2.2% of the total value of the import in 2010. There have been trade surpluses for several kinds of fruits and

vegetables. The trade for cereals, cereal products, oil and animal products are deficit. Especially, deficit in rice trade have been quite large, and it was Nu.833 million in 2010. Most of the import cereals have come from India, which has been a free-trade partner of Bhutan.



Source: RNR Statistics 2011

Trade Balance of Main Food Items

Chapter 3 Present Institutional Situation relating Food Security Policy

3-1 Agricultural Development Plan of Bhutan

The 10th Five Year Plan (2008-2013) emphasizes the enhancement of following fields of the RNR sector: food production, people's accessibility to food crops, domestic and international marketing and imports of food. The self-sufficiency rate for rice is targeted to reach 65 % by the end of the tenth five year plan. The mid-term review of the policy in 2011 states that the self-sufficiency rate for rice is expected to reach to 55 % by 2013.

The Eleventh Five Year Plan of Bhutan（2013-2018）sets key objectives of the RNR sector under the guideline, which are to i) Enhance food and nutrition security, ii) Improve Rural Livelihood iii) Accelerate and sustain RNR sector growth and iv) Promote sustainable management and utilization of natural resources. Production volume of cereal is targeted to 195 thousands Mt/annual, which is 35 % increase from the present volume of 143,638 Mt/annual by 2018. This plan is currently at the prefatory stage.

The Ministry of Agriculture and Forests (MOAF) is trying to expand incentive and subsidy in the RNR sector to achieve their development goals. Currently, there are two types of subsidies in the RNR sector: one is the subsidies for the agricultural inputs in the form of commission given to the sales agents and the other is the support on the transportation costs of these inputs from the ports to the sales agents. These subsidies enable farmers to buy agricultural inputs at low prices.

The budget of the MOAF takes up about 10% of the total amount of ministries in the fiscal years of 2008/09and 2009/10. The share of its budget is third biggest among all the ministries, followed by the Ministry of Finance and Ministry of Works and Human Settlement. In the fiscal year of 2011/2012, the

budget for road construction accounts for 55%of total budget in the agricultural sector, while that for irrigation construction and the promotion of mechanization is 2% and 0.4% respectively.

Among international agencies, IFAD, FAO, World Bank, and EU are main donors for the agricultural sector. As to the bilateral aids, India is the biggest contributor. 7% of total loans from external agencies go to the agricultural sector, and 9% of total grant went to the agricultural sector in the fiscal year of 2011/12.

3-2 The Food and Nutrition Security Policy of the Kingdom of Bhutan, 2010

Based on the four aspects of food security which are food availability, food accessibility, food utilization and food stability, this policy proposes four goals; i) To ensure availability of safe and adequate varieties of food to meet food requirements of the population at all times, ii) To enhance physical, economic and social access to safe, affordable and adequate food including resources (entitlements) to acquire food by households and individuals, iii) To promote appropriate consumption practices and enable optimum utilization of food by all sections of the society; and iv) To sustain conducive and stable environment for availability, accessibility and utilization of food. The policy also proposes to set-up of a high-level committee that involves all relevant stakeholders.

There are various regulations that aim to promote the policy of food security while there are some articles which hinder it. Among 19 legislations reviewed, the study team found out favorable provisions from 17 legislations such as water act, land act, and cooperative act, as well as unfavorable ones from eight legislations such as land act and nature and forest conservation rules.

3-3 Environment surrounding the Policy and Affecting Factors

The report by McKinsey states that 16% of rural population in Bhutan has migrated to urban areas between 1995 and 2010. According to the population census in 2005, the annual population growth rate in rural areas between 1985 and 2005 is 0.6%, whereas it is 6.1% in urban areas during the same periods. Employment condition in the cities has been deteriorating as more people moved to the cities, which can be seen by the increase in the unemployment rate from 4.1% in 2005 to 5.8% in 2011.

Due to the “Rupee Crunch”, the government restricts itself to release Indian Rupee into the market. This experience is stimulating people’s awareness for food security and food self-sufficiency. In 2008, India had banned exporting rice for one month. This caused some psychological pressure on the Bhutanese government and prompted the government to take actions to secure the imports of essential commodities. In 2012 , India and Bhutan held a bilateral talk for this matter and they confirmed that India would not implement the export ban of the essential commodities to Bhutan.

Chapter4 Status of Agricultural Production in Bhutan

4-1 Major Characteristics of Agricultural Production in Bhutan

(1) Issues on data

One of the major bottlenecks for the agricultural sectors in Bhutan is the lack of consistent and reliable statistical data. Even though sizable volumes of agricultural production related data are available, these published data are often seemingly incorrect and some figures are sometimes contradictory each other. Under such circumstances, it is difficult for policy makers to set the proper strategy and to measure progress on some of the intended activities and the achievement of targets. The analysis of this section is based on the careful interpretation of the published data.

(2) Crop production

Paddy, maize, and potato are the three major crops in Bhutan in terms of physical production, constituting about 70% of total quantity of production in 2008.

In terms of harvested areas, maize and paddy are two major crops, constituting about 50% of the total harvested areas in 2008.

The harvested areas of maize and other cereals have been decreasing after 2005, while those of paddy have slightly increased.

Paddy is a highly valued crop which represents 43% of total values of agricultural production in 2008, while maize is a minor crop in terms of the value of production.

Orange and other vegetables also represent sizable share in value terms.

Yield of paddy production has been increasing in the late 2000s, probably due to the introduction of new varieties. Yet yield of maize and potato production has been decreasing since the mid-2000s, mainly due to diseases and seeds degrading.

(3) Livestock production

The production of beef has not caught up with its demand and that of pork have been decreasing since the mid-2000s, mainly due to the increasing sentiment of censure for slaughter. The production of chicken has been increasing since 2008 due to the promotion efforts.

(4) Regional characteristics in agricultural production

There are significant regional gaps in the productions in paddy and maize per farmer. This is resulted from the regional difference in the farm land endowment and the difference in production yields. The level of the yield of paddy production depends on the agro-climatic zone and the level of mechanization and infrastructure, especially irrigation. The yield gaps at the farmer level are mainly caused by the difference in the variety of crops.

(5) Production costs and economic returns

Economic returns for farming are highest for the paddy production among the three major crops (paddy, maize, and potato) and it is lowest for potato production. However, the returns to family labor

vary significantly among the producers for the same crop, depending on the production yield and the scale of farming.

(6) Infrastructure and inputs for agricultural production

There are following problems and issues in the infrastructure and inputs for agricultural production in Bhutan:

- Insufficient availability of irrigation
- Availability of machinery and equipment is low
- Low usage and availability levels of fertilizer and chemicals
- Small landholding sizes for farmers
- Crop damage by wild animals
- Large areas of fallow land
- Conversion of wetland to other uses
- Remoteness of the many farms
- Labor shortage

4-2 Storage and processing

(1) Rice

Loss of output during storage due to rats and pests is estimated to be 15% of total output of rice. Most of the rice milling is done by the Indian made machines which are very crude, and thus the grain breakage is quite common.

(2) Maize

In most of the cases, farmers store maize in their houses typically hanging under the ceiling. Maize is consumed as a staple food in the form of *Kharang* (grits) or boiled cobs, mainly in the eastern regions of Bhutan. It is also brewed into *Ara*. These maize products are mostly consumed at home.

(3) Potato

Potatoes are stored for a maximum period of 4-5 months for seed purpose, home consumption, and for sales. Most of the farmers stored potato in their houses mainly on the ground floor. Small quantities of homemade potato chips are sold in the local markets.

There is a seasonal trend in the prices of the potato, which reaches the peak in October and November due to the high demand of seed potato in India during this period. Local potato begin to arrive at the market in as early as June every year, but the lack of large scale storage prevents the farmers from selling these early harvest potatoes during the higher price season.

(4) Daily Products

There is virtually no cold storage for dairy products and it thus limits the dairy farmers to market their

milk. There are a couple of dairy processing firms such as Drukyul, Zimdra, and Wanchuktaba in Bhutan. However, Drukyul and Zimdra import raw milk from India to produce packed milks.

(5) Meat Products

Even though slaughtering animal is avoided publicly due to a religious reason, slaughtering animals are conducted in most of the villages and the meats are distributed mainly to the households in the same or neighboring villages.

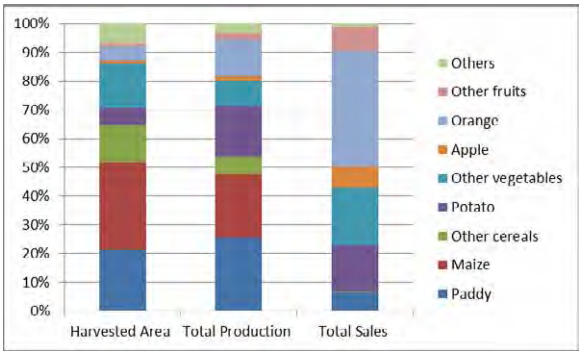
There are no formal meat processing firms in Bhutan.

4.3 Marketing and supply chain

(1) Commercialization rate

(a) Crop sector

The value of production of cereals is most significant of all crop categories. However, cereals are mostly produced for home consumption, and only 2.8% of the total productions of cereals are sold in 2008. The rates of commercialization for vegetables and fruits are much more significant, and they are 34% and 65% in 2008 respectively.



Crop composition of harvested area, total physical production, and total sales, 2008

Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Cereals constitute about 65% of total harvested areas and 54% of total production, but it makes up mere 6% to total sales values in 2008. On the other hand, vegetables and fruits play dominant roles in terms of the amount of sales. Vegetables constitute 36% of total sales values, whereas its shares of harvested areas and total production are 22% and 27% in 2008 respectively. Fruits constitute 55% of total sales values, whereas its shares of harvested areas and total production are 7% and 15% in 2008 respectively.

(b) Livestock sector

Large proportion of rural households produces dairy products and egg. Also, that the proportion of rural households that sell the dairy products and egg is significant, and the amount of cash earnings from selling these commodities is quite large. On the other hand, the proportion of households that produce and sell meat products are quite limited, and the amount of cash earnings from selling meats is also small.

(2) Marketing channels

Rice	Among the rice sold to the markets, most of them are directed to rural markets. There are few associations or cooperatives that faciliatate marketing of rice, but individual farmers bring rice to the markets by public transport. The miller is also involved in the marketing of rice. Another important marketing channel for rice is that of imported rice (mainly from India), and urban retailer who imports rice and supply to urban and rural poulaces play an important role.
Maize	The most of the maketed maize are sold on farm or at the local markets. Yet very small amount is sold through the auction yards of Food Corporation of Bhutan (FCB).
Potato	Of the total quantity of sold, significant amount is sold through the FCB auction yards. There are also some potatoes which are sold through the local traders and vegetable venders who sell at the weekend markets or to grocery stores.
Dairy products	The milk and the dairy product of Amul, which is the distributior in India, appear to have a significant proportion of share in the milk and dairy markets in Bhutan.
Meat Products	There are several urban wholesellers for meat products who import meat from India. Most of the livestock products produced in Bhutan are sold at the local level mainly to the neighbors or at the local markets.

4-4 Food Market and Situation of Nutritional Improvement

For the children under five years of age, the prevalence ratio of stunting, which indicates chronic malnutrition, has decreased from 56% to 37% between 1998 and 2008. However, the prevalence of stunting and underweight tend to increase as children get old. This is probably because children are chronically exposed to insufficient dietary intake, poor feeding practices, and frequent illness. According to a survey of Ministry of Health, children frequently consume rice, butter, potato and chili but consume meat, milk and egg less frequently. WFP pointed out that the varieties of food items in the school meals were limited, which might led to malnutrition for children. This survey also revealed that the current menus in the school did not contain the minimum requirements of fat, calcium, iron, , riboflavin, and Vitamin A, B1, and B2. While the prevalence of malnutrition among children is recognized by many related institutions, there are also increasing trends for the diseases which are caused by over-nutrition such as hyper tension, diabetes, and alcohol-induced liver disease.

The income elasticity for meat is the highest among the food items, followed by dairy products, fish and rice. The total volume of rice consumption in 2010 was 90 thousand MT, and is forecasted to be116 thousand MT in 2020 based on the estimation of the study team.

During the field survey, the study team found that following social customs existed extensively in the rural societies: i) exchange of labor in production, ii) barter trade, iii) borrowing and lending rice or maize, iv) food provision at festivals. Those customs appear to play significant roles for the food

security of the people at the community level.

Chapter 5 Potential and Development Concepts

5-1 Summary of Food Self-Sufficiency Rate and Food Security

(1) Food Availability

The grain supply has increased in Bhutan along with growth in domestic products. Domestic self-sufficiency rate has increased from 40% in 1999 to 60% in 2008. The supply of rice increased from 40% in 1999 to 60% in 2008 due to the increase in productivity. Domestic grown rice supplies about 50% of the country's rice demands.

Although demands for sources of protein such as beef, pork, chicken and fish have increased rapidly in recent years, the domestic supply are not able to meet the domestic demand. The self-sufficiency rates of these items are less than 30%. As to vegetables, about 90% of total demands are supplied by the domestic production in 2010, whereas 60% of cauliflower and 40% of cabbage are still imported.

The Food Cooperation of Bhutan (FCB) manages food items (rice, oil and sugar) through the National Food Security Reserves (NFSR). The NFSR is distributed to the deposit facilities of FCB, which are placed in 20 Dzongkhags, where products are sold and 1,700 tons of food items are stored. Apart from NFSR, FCB manages two separate food security reserves, those are; SAAC Food Security Reserves with storage capacity of up to 200 tons and the SAARC Food bank.

The problem on 'Food Availability' is ultimately resulted from i) a delay of productivity increase due to slow increase of per farm cultivation land and ii) a lack of the subsidy which gives an incentive to produce more rice.

(2) Food Accessibility

Main domestic products sold are horticultural products. Although breakdown of the products is apple 70%, orange 63%, and other fruits 30%, apple and orange products are mostly exported, and thus local markets provide more of peach, pear, plum, mango and bitter nuts.

The next common item in market is meat products. These products are pork 59%, beef and yak 45%, chicken 48% and fish 47%. Common dairy products sold are butter 56%, cheese 60%, hens eggs 57% and milk 8%. The least products in the markets are the grain products where only 5% of rice and 1% of other products out from entire productions are sold.

The biggest obstacles for accessing food in Bhutan are its landscape and limited infrastructure for the distribution of food. This lowers the level of food accessibility in some regions even though there are sufficient amount of food domestically.

(3) Food Utilization

Food utilization is commonly understood as the nutritional status of an individual. It is also the proper biological use of food with sufficient energy and nutrient intake by individuals having good feeding practices, food preparation and dietary diversity. Effective food utilization also takes into account of the knowledge of food processing, storage, safety and health care. These aspects of food security are given less importance since adequacy of food as calorie intake is taken guarantee of both food and nutrition security.

Nutrient intake factor among children under 5 years of age in Bhutan has greatly improved and thus, Ateliosis rate due to malnutrition has decreased from 56% in 1988 to 37% in 2008. This improvement is noticeable especially in the eastern region of the country.

Due to the effort of the Bhutanese government, adequate amount of major nutrition intake will be achieved. As the result, iodine deficiency prevailed in 1960s was overcome. Proper intake of Vitamin A and adequate feeding methods to new born baby are still remained unsolved and these are on-going challenge for the government.

Although nutritional conditions for the Bhutanese have generally been improved so far, there are a few small areas which suffer the nutrition problems caused by poverty. Further, the health problems which are related to balance of food intake are new challenges for the government.

(4) Food Stability

Bhutan is predominantly agricultural societies and the performance of agricultural production is dependent on weather and climate factors. Instability in agricultural production induce by climate is considered to be the main source of food insecurity, although political upheavals have also affected food production and distribution significantly. The major determinant of agricultural growth is rainfall which is erratic, and the growth rate of agricultural gross domestic production has also been affected by that.

Farmers have been using the same crop rotation system that has evolved out of limited experience. There is no evidence for the farmers making an effort for the development of crop rotation by spreading labor, maintaining fertility, reducing the risk of buildup of specific crop pests and diseases, and reducing erosion hazards. Although wheat is known to be a usual winter crop, land remains fallow in most places in winter. As a consequence, stable food supply system has not been established due to lack of each crop 2 to 3 months prior to harvest.

Although some report that crop production in Bhutan is affected by the floods and global warming, further researches are necessary to verify its causal relationship.

5-2 Situation on food supply basis for food security

60% of crops, 70% of livestock (meats and daily products), and 60% of vegetable are supplied by the domestic production and the rests are imported from India and other countries. Most of the food items cannot be supplied only by the domestic supply, except for main export items such as apple and orange.

Discussion in this Chapter is curried out based on factors mentioned below.

a. Rice

Bhutan has imported Nu.11 billion worth of rice in 2011, which is the biggest expenditure among food import. It is believed that Bhutanese food self-sufficiency rate can be increased from present rate of 50% to more than 70% through proper irrigation development. The self-sufficiency rate at the end of the 10th 5 year plan (2012) is set at 50%, and thus the government aims at 65-70% sufficiency rate during the 11th 5 year plan. For Bhutan, 100% rice sufficiency would not be "economically favorable" .

b. Meat products (chicken, fish, beef, pork and mutton) and dairy products

If the Bhutanese do not have a religious belief that killing animal is sinful, complete meat supply could have been achieved within the country. Due to this belief, import of meat products in Bhutan is the third highest, followed by rice and the daily products. Value of import for the daily products is quite high and it reaches 670 million Ngultrum, where self-sufficiency rate for the products was 50% in 2011.

c. Vegetables

Facing the Rupee crunch problem, Bhutanese government aims at 100% self-sufficiency for the vegetable products by the summer 2014. In Bhutan, the Recommended Dietary Allowance (RDA) for vegetable is set to 200g, which is less than 60% of its Japanese standard of 350g. About 60% of the vegetable is supplied by the domestic production.

d. Fruits

According to the master plan of MoAF, the main horticultural production centres are located in six Dzongkhags in the Eastern region of the country. Apples and oranges are the main export products which provide limited profits in agriculture sector in the country. Renewable natural Resources (RNR) centre is the main agent for the improvement of horticulture production, and the main RNR centre is located in Mongar where Japanese technical support is present.

Judgments to attain self-sufficiency rate are supposed to be made based on existing Bhutanese eating habits. However, the current eating habits of the Bhutanese appear not to be sound. The discussions on the food security in Bhutan have been based on the domestic demand that arise from existing eating

habits. Very few discussions have been made based on the relationship among food self-sufficiency, food-habits, and health in Bhutan which pursue Gross National Happiness of her people. Bhutanese life expectancy is at 67 years old, which is 16 years shorter than that for the Japanese which is 83 years old. It is probably the perfect time to discuss and redefine the true meaning of food security leaving from the concept of physical terms that just satisfy peoples' hungers.

5-3 Issues Related to Improving Bhutan's Food Security and Self-Sufficiency

The followings are the macro issues related to food security of Bhutan. These are cross cutting issues which cannot be tackled solely by MoAF.

① Concerns about slowing economic growth

The rupee crunch is beginning to impact the county's capacity to import. The rupee crunch presents a good opportunity to reevaluate Bhutan's economic structure, heretofore dependent on India, raise its food self-sufficiency ratio, and consider introducing a social security scheme for the poor and the disadvantaged.

② Tight public finances

During the period of Eleventh Five Year plan, the current expenditures are expected to rise by 75% from the current level. This is because the cost of cumulative maintenance and operation of infrastructure the government has invested in so far needs to be paid for out of the 11th 5-Year Plan. The resource gap, i.e. the difference between foreign aid and domestic savings, which was Nu. 9.5 billion in the Tenth Five Year Plan, will increase to Nu. 13.3 billion in the Eleventh Five Year Plan. This is because, attempting to move away from LDC (Least Developed Country) status, Bhutan has announced that some foreign aid organizations will be leaving the country. Consequently, foreign grant aid will decline from Nu. 50.2 billion to Nu. 47.3 billion.

③ Appreciation of Rupee and fragile financial system

The concentration of private sector lending in consumer-driven and non-productive sectors coupled with the high asset-liability mismatch in the banking system fueled external imbalances through private consumption. According to the announcement of RMA on April 2012, Bhutan is a poor country with rich people and the RMA has been borrowing rupee by availing itself of overdraft facilities not to pay off government loans or to fund government expenditures, but to bail out increasing private consumption. In this case, private consumption does not mean the consumption by private sector, but the individual consumption for non-productive purposes. The Central Bank of Bhutan has been taking overdrafts at 10% to bail out private consumption.

④ Deficiencies in agricultural finance

There are no financial products to encourage the local population to produce food. The government had previously encouraged consumption and adopted a low interest rate policy—10-12% for auto purchase loans, 10% for building loans. Meanwhile, borrowers

who needed money to invest to expand farming businesses or businesses in the food and beverage sector were charged high interest.

The Bhutan Development Financial Corporation (BDFC) offers loans promoting farming and livestock raising for agricultural development. Farming loans offered by BDFC in 2009 were for exporters of citrus fruits and apples, and for importers of farm products and machinery. Loans to promote livestock raising were for livestock, beekeeping, poultry farming and fish farming. Both types were 5-year loans extended at 15% annual interest (lowered to 13% as of May 2012), but basically, farmers forced to live hand-to-mouth have no access to such financial products.

⑤ Lack of topographical maps on which to base various plans

The lack of maps at 1:50,000 and 1:25,000 scale also causes much confusion for the policy making at the regional level. In some cases there is more than twice the difference in the area of gewog (village blocks) on maps held by the national government and those of the dzongkhag (districts), creating major obstacles to instituting policies for land use.

JICA in cooperation with JAXA has been providing ALOS satellite data for a number of years now but personnel who can utilize the data is not trained yet in NLC.

⑥ Complexity in the plans for regional administrative support

Various bodies are working to improve administrative services, but sometimes they are providing duplicated services which confuse farmers. Rather than conflicts between districts and between village blocks, this appears to be the result of duplications of various ministries' policies. For example, attempts to support village blocks, centralize administrative functions and provide one-stop administrative services at the village block level include the Interior and Culture Ministry's Community Information Centers and the Agriculture and Forestry Ministry's One Stop Shop, which all offer very similar content. Right now, there is no administrative function working to get an overall idea of these plans and assign appropriate roles and functions.

⑦ Restrictions on land use

There are some traditional rules that hider the flexible use of land which impede the promotion of large-scale farming. Even though interested parties attached to the land may want to expand the amount of land under cultivation when farmland has been abandoned, nationwide custom is that the landowner receives 50% of the crop, so this prevents land from being transferred smoothly. The existing administrative apparatus shows little commitment to measures for using land effectively, so land is abandoned and can set off natural disasters.

⑧ Lack of FDI principles and incentives

Bhutan has no legal framework for accepting foreign investment, and therefore it cannot attract any useful FDI. The Ministry of Economic Affairs is currently studying the situation, but there are no detailed written rules concerning incentives even though they have set Foreign Direct Investment (FDI) Policy, 2010, and incentives are decided ad hoc

in individual negotiations. This means that even if a company invests, there is plenty of potential for trouble with the authorities after the investment has been made. The lack of clear-cut rules can also work to Bhutan's disadvantage. For example, in a hydroelectric power generation project underway right now, Bhutan is responsible for building access roads and for conducting an environmental assessment, so it is quite possible that, due to the lack of regulations, Bhutan could be burdened with unfavorable conditions.

⑨ Inadequate measures to compete agricultural products imported from India

The value of vegetable production out of total value of production for the farming sector is now at the lowest level in five years. For reference, in 2009, rice accounted for 50% of farm production value and vegetables slightly more than 0.9%. Further, the trade deficit for vegetables are negligible compared to rice and has hardly been affected by lessening of the rupee crunch. It is questionable if government promotion for 100% self-sufficiency in vegetables, which will not have much impact to solve the rupee crunch, will lead to the sustainable food security in Bhutan.

⑩ Damage to citizens' health

Death from ALD (Alcohol Liver Diseases) accounts for 10-13% of all the causes of death in Bhutan. 185 people died from ALD at a national referral hospital in Thimphu between 2005 and 2009. ALD is caused by prolonged, excessive alcohol intake. In 2003, the number of patients was slightly over 900, a figure which had grown to 1,600 in 2009. The NSB's "Alcohol Use and Abuse in Bhutan (2012)" states that health care costs for treating ALD from 2005 to 2009 totaled Nu. 64 million, and that Nu. 13 million is budgeted for this yearly.

⑪ Lack of competent private sector companies

Where food security is concerned, it is the private sector's role to identify latent investment possibilities. Investment by private sector companies boosts the added value of farm products, while development of various types of food products improves year-round access to food, and functional foods can be developed which promote absorption of nutrients. There are only three major food processing companies, all of which are publicly owned, and all of them have the almost identical product lines.

The issues and potentials in the each stage of the supply chains in foods are presented below. These issues are mainly under the jurisdiction of MoAF.

① Issues at the production stages

・ Farm operations without effective strategy

In Bhutan, the levels of direct agricultural subsidies such as price guarantee are relatively small compared to other countries. Subsidies offered by the Ministry to farmers today come not from the government's current budget for subsidies, but are paid out as "commissions

to dealers" at the discretion of the ministry from its internal budget. Strong support for farmers, who grow food under difficult conditions, has been understandable, but the result has been that they are now becoming unable to grow crops with their own thinking. There are several farmer's groups which do not depend on the government support, and they are trying to achieve food security and self-sufficiency by themselves. Meanwhile, the Samdrup Jongkhar Initiative, based in Dewathang, Samdrup Jongkhar, is a farmers' group that could be a pioneering project.

- Inadequate road and irrigation systems

  Agricultural infrastructure such as roads and irrigation system are still in minimal. Road construction has not been able to keep up with the needs of the population, thinly spread out over mountainous terrain. Meanwhile, irrigation systems are in place over 27,100ha (66,976 acres) registered as wetlands, which account for 17% of the country's farming land[1]. In elevated areas, water sources are scarce and irrigation facilities tend to be small-scale. Facilities are also prone to damage from wind and rain, and farmers often lack the necessary skills to repair the systems. As most of the irrigation systems are small scale, so these irrigations can be managed and maintained by the farmers themselves if they are properly trained.

- Ineffective extension services as a main cause for low yield

  In addition to the fact that the research center has been encroached on by urbanization and is running out of space, this is also causing problems in testing and research and extension activities. Next, there are substantial differences in the abilities of the extension agents in charge of village blocks. Weak extension services are main causes for the low yield of crops. It will also lead to the lack of uniformity in growing methods and harvesting times even within the same district, which hinders collective purchase of agricultural inputs or sales of their agricultural products. Enhancement on the capabilities at the extension levels is needed. It is not necessary for the GOJ to setup special project for improvement of crop variety and the Bhutan government can introduce such improved varieties from adjacent countries by their own effort.

- Damage caused by wildlife

  More or less 30% of crops are damaged by wildlife in Bhutan. In Chuzagang, Sarpang, where fieldwork was conducted, elephants have been appearing regularly throughout the year[2], and damage is frequent, especially in the case of poor farmers who own only land

[1] *Strategy for Production of Agricultural Areas*, Dec. 2010, p. 5. Wetlands 27,100ha (66,976 acres or 17%), dry land 118,900ha (293,789 acres, 77%), orchards 6,800ha (16,789 acres, 6%). Total: 114,700ha (283,440 acres).

[2] Crop damage caused by elephants has been recorded in the Samtse, Sarpang and S/Jongkhar districts. According to RNR Statistics 2011, elephants were responsible for 17% of crop loss in Sarpang in 2008, the second-highest rate after the 20% recorded in Samtse.

where encroachment occurs. Although Japan does not have enough know-how to cope with the damages by big animals, Japan's solar-powered electrified fences can be applicable to deal with smaller wildlife. Providing these instruments to Bhutan through a flexible utilization of KR II scheme would be appropriate.

② Issues at the distribution stages

・ Organization level of farmer's cooperatives is not sufficient

Many of the farmer's cooperatives in Bhutan are quite new, and they do not have sufficient management capabilities to properly run their organizations. As of 2011, there were 754 farm cooperatives (including farmers' groups) registered with the Ministry of Agriculture and Forestry's Marketing and Cooperative Department. Given that Bhutan's first farm cooperative law was only enacted in 2001, both the government and farmers are still feeling their way as far as activities and methods of supporting cooperatives are concerned. Building up a farming cooperative organizational structure is an area where Japan can put its strengths to work. Japan has already provided know-how modeled on Japan's system of farming cooperatives as ODA to many countries. Many farmers' groups in Bhutan are also likely to be motivated.

・ Storage capacity for grains/vegetables is insufficient

There is a 630Mt-capacity refrigerated storage facility in Bhutan, but it can only store a 3-month supply (the biggest facility is at Mongar, with 300Mt capacity). The cold-chain storage facility is dated and uses CFCs and is probably not capable of stockpiling one year's supply of vegetables. According to the CEO of FCB, while FCB has been stockpiling a lot of dry goods such as rice or sugar, it does not have enough know-how to operate cold storage or to store refrigerated food products. Stockpiling strategies are an area that will be important for Bhutan in the future, and there is plenty of room for improvement here from the storage viewpoint, ranging from national-level companies like FCB to individual households. The capabilities of FCB in food storage have to be enhanced both in physically terms and in terms of institutional capabilities.

・ Post-harvest loss

Based on the interviews with farmers by the research team, the post-harvest loss of rice is estimated to be around 20 to 40%. These figures coincide with the estimation by FAO. Food loss, during production, harvest, post-harvest and processing, is a very serious issue in Bhutan, and the loss rate is compounded by issues such as poor infrastructure and lack of skills. While the loss rate is quite high, many people believe that spoiled crops can be used as livestock feed, thus increasing milk production. On the other hand, many farmers intentionally avoid using machinery such as Indian-made rice hullers or threshing machines because they work so poorly, preferring to do the work by hand instead because the loss

rate can be kept lower. Resolution of the post-harvest loss issue needs to be tackled by relating the problem of insufficient level of organization of cooperatives.

・ Agricultural product processing sectors Underdeveloped

The agricultural processing sectors are not developed. While the loss rate is quite high, many people believe that spoiled crops can be used as livestock feed, thus increasing milk production. On the other hand, many farmers intentionally avoid using machinery such as Indian-made rice hullers or threshing machines because they work so poorly, preferring to do the work by hand instead because the loss rate can be kept lower. There are several agricultural resources that can be processed domestically such as soybeans, mustard, and Matsutake mushrooms which are popular for Japanese tourists.

③ Issues at the consumption stage

・ Unbalanced diet

In a survey of farm villages in this study, teachers in the communities' schools, pupils and parents alike showed adequate understanding of the importance of eating 3 meals a day and of eating green and yellow vegetables and root vegetables. But even though they are told that these points are important, there are so few food preparation methods that even teachers do not know how to cook anything but *datsui*, and accordingly nutrition education simply becomes an empty rallying cry. Unbalanced nutrition intake is related to the cause of death and is also indirectly related to medical expenses by the government. The WFP is aware of this issue and expected the support of Japan in solving this issue. Generally speaking, it is difficult to change adults' eating habits, but change is possible if introduced at school age.

・ Concerns about the safety of vegetables

Bhutan does not have any food safety or testing standards yet. In 2009, the Bhutan Agriculture and Food Regulatory Authority (BAFRA) issued a directive requiring all registered importers to use English on all labels for imported foods. However, the markets are still full of foods labeled in Chinese or Thai. In its 2008 DPT Manifesto, the Druk Phuensum Tshogpa (Harmony Party) claims that Bhutan is the first country in the world to be producing only organically-grown crops. It is important to establish food sanitation standards and a testing system. At the same time, consumer awareness must be promoted and the necessary information on the safety of foods should be provided.

5-4 Direction of development on food self-sufficiency and food securities of Bhutan

Three future pictures of Bhutan are described adapting scenario planning method as follows.

Procedure of Scenario Planning

(1) Goal

Royal Government of Bhutan achieves "food security" by 2022, after 10 years time.

(2) Crisis Scenario (scenario driver)

The three scenario drivers are taken up as follows, based on the three strategies indicated in Chapter 1,;

a. Bhutan increases the "self-sufficiency of cereal"
(the first strategy indicated in Chapter 1)

b. Bhutan hedges risks by the diversification of import sources
(the second strategy indicated in Chapter 1)

c. Bhutan relies on the market (or farmer's will)
(the third strategy indicated in Chapter 1)

(3) Driving Forces

Based on the analysis of this study, the next eleven factors are selected as the driving forces from the viewpoint of high importance and uncertainty and influences on decision-making of food security.

Characteristics of Driving Force applied in Scenario Planning

Driving Force	Difficulty level of Control	Importance	Note (Other relating factor, etc.)
Currency	－ －	Small	
Self-sufficiency of rice	±	Big	Yield, Acreage, and Consumption
Diversification of food intake	－ －	Big	
Size expansion of farmland	＋	Big	Legal setup, and Brewing of farmers' incentive
Cultivated crop	＋＋	Small	
Land use	＋	Small	
Export of crop	±	Small	Legal setup, Upgrading of infrastructure, etc
Food price	－	Small	Except the supported price under agricultural support policy.

Poverty gap	±	Big	Upgrading of infrastructure, and commitment of the government.
Correspondence by the government	― ―	Big	The highest uncertainty and important risk factor.

Note) ++ (Very easy to control), + (Controllable), ± (High Compatibility to other factors), - (Difficult to control), -- (Very difficult to control)

Among these, the driving force "Correspondence by the government" has the highest uncertainty and importance.

(4) Possible Scenarios - Three Future Pictures related to Food Security -

a. Bhutan increases the "self-sufficiency of cereal"

Prices of imported foods from India increases, and the price differences between domestically produced foods and imported foods shrink, which increase the demands of domestically produced foods. This will increase farmers' interests in agricultural farming, and self-sufficiency rate increases, but simultaneously, increase in food prices endangers lives of the peoples, especially for the urban poor.

b. Bhutan hedges risks by the diversification of import sources

Diversification of food intake in urban area will be accelerated in the midst of Rupee appreciation, and agriculture in sub-urban area will be specialized in high-valued fresh products. Source of imported will also be diversified, and the government will usually balance the import source by checking international situation. Although domestic cereal production will be decreased and Bhutan will depend their supply of cereals on imports. Yet commercial crop farming will be developed, also there will be a few large-scaled farming for high valued agricultural products. Varieties of agriculture production will differ depending on areas, but the farming areas without outstanding locality will be weakened.

c. Bhutan relies on market (or farmer's will)

The income from hydro power generation sales to India will make the conversion rate of Ngultrum to Indian Rupee possible to be kept constant at 1:1., and food import from India will be accelerated. A variety of recipe and food diversification will be extended from urban area to other areas, and simultaneously new type of foods will be imported. As the result, the food self-sufficiency rate will be decreased. Also, since the price of Ngultrum is kept high level, food import also increases as the diversification of food intake proceeds.

Bhutan has to recognize the factors of environmental change and their risk as well, that would be caused by the future government's policy as was indicated by scenario planning. Also, it is necessary for Japanese ODA support to consider such environmental changes..

i) Risk Scenario 1:　Bhutan, which increases "the self-sufficiency of cereal"

If Kingdom of Bhutan follows this scenario, the Japanese government should support in these fields (so-called "as ever").

ii) Risk Scenario 2:　Bhutan, where risk hedge is done by diversification of import source

The support strategy of Japanese government should be placed to i) support of the development of locally produced item (eg. One Gewog Three Products), and ii) comprehensive community development which minimizes expansion of poverty deferential (eg. The model Gewog development project).

iii) Risk Scenario 3:　Bhutan, which relays on market (or farmer's will)

Through pursuing this scenario, concentration of population to urban area is accelerated and an increase of poor bracket in rural area is emerged.　To make them slow down, the study team believes that the Government of Japan should provide the support which creates employment and income through a new industrial development of non-agricultural field in rural area.

Chapter 6 Proposals

6-1 Necessary actions for food security

(1) Need to start serious discussions on food security

It is important n to revitalize the discussion on the food security in the long-term view for the future of Bhutan, and it is the best timing to call for the Bhutanese people to participate the discussion on food security as they pay attention to the problem of Rupee crunch. The arguments for the food security can be summarized into the three scenarios listed in Chapter 1, and it is the Bhutan government itself who decide the strategy.　There are pessimistic and optimistic views on the food security in Bhutan and the discussion on food security system in the future should start by reference to these ideas.

(2) Improvement on the legal framework on food self-sufficiency and food security

The improvement of food self-sufficiency and the maintenance of food security are important, and these two elements have been emphasized in some Five Years Plans so far.　The following table summarizes the propositions on the legal areas, which are derived from the comparison between the legal frameworks which promote food security and those restrict it.

Proposition on the legal frameworks for food security

Name of Legislation	Recommendations
Constitution of Bhutan, 2008	The Constitutions does not provide for food security directly but is implied in its provision related to the fundamental rights of a citizen and the principles of state policy. However, to further emphasize there is a need to provide food security as a basic right for every Bhutanese citizen or provide for provision of food security by the government under the principles of state policy.
Food Act of Bhutan, 2005	The Food Act of Bhutan is the single most important act in terms of food security, although it provides for protection of human health and to regulate and facilitate the import, export and trade of food in the preamble, it does not make specific reference to food security. Hence, recommend explicit mention of right to food security and need to make the Act more comprehensive by incorporating provisions on entitlements of special persons, subsidies for small and marginal farmers, food security reserves etc.
Land Act of Bhutan, 2007	Considering Bhutan is an agrarian society land Act reform would be crucial to food security. The current land ceiling needs to be reviewed as the maximum land holding of 25 acres may not encourage mechanized farming. There is also a need to review utilization of GRF land as once a land is declared Government Reserve Forest, the land remains unutilized in terms of agricultural activity. There is need to review the provision allowing conversion of 50 decimal of wet land to residential land by Thram owners inheriting only wet land.
National Environment Protection Act, 2007	The requirement of 60 percent forest cover though rooted in the conservation policy of the Government impinges on the already scarce availability of arable land. The percentage may therefore be reviewed.
The Child Care and Protection Act of Bhutan 2011	Bhutan has ratified Convention on the Rights of the Child (CRC) (Article 24 and 27) which provides the right of every child to adequate food and nutrition. However, the Child Care Act does not provide for such aspects and the act is limited to a child in conflict with the laws. Further, the government policy of midday meal in remote schools may be given legal backing by incorporating it in the Act.
The CSO Act, 2007	The CSO Act does not provide for entrance of CSOs in the microfinance sector thereby limiting the availability of credit to farmers in rural areas.
Moveable and Immovable Property Act of The Kingdom of Bhutan, 1999	The regulatory framework is not conducive for the development of microfinance in the country. Currently, an interest rate of 13 % per annum is charged for agricultural sector, which is more than the interest rates charged on construction loan. There is a need for provisions providing for preferential treatment to the agricultural sector.

Name of Legislation	Recommendations
Local Government Act of Bhutan, 2009	Mobilization of labor from the community often keeps farmers in the rural areas away from their farms to support the developmental activities of their community. There is a need to review the use of these powers.
Nature and Forest Conservation Rules, 2006	Bhutan has a stringent policy for protection of wildlife. In most instances farmers in the rural areas lose their harvest to wild life. There is a need to take a more pro farmer approach in the case of human wild life conflict.

(3) Development of agricultural production with the mitigation of the regional gap in agricultural production

There are significant gaps in the agricultural production and productivities, and government engagements to develop agricultural production are reflected by these facts. These development engagements include the enhancement of extension system through the support to RNR Centers and various supports on inputs of agriculture and on post-harvest stages.

These activities should be continued and improved in the future; especially the monitoring system of the extension should be reinforced.

The most important way of thinking is to analyze the advantage and the weak point of the area and develop it utilizing its characteristics in correction of the differential between areas. The following development potential is found by this JICA Study.

- ✓ "Model Gewog development projects" is expected in the Dzongkhags where food poverty ratio is high and having a lot of poverty pockets (eg. Zhemgang, Trashigang, Samdrup Jongkhar).
- ✓ Irrigation development project at the southern Dzongkhags where the government is expecting them as the core of rice production in the future (eg. Sarpang, Samtse, Samdrup Jongkhar).
- ✓ Expansion of upland rice in the mountainous area where irrigation facility is difficult to construct.
- ✓ Potato and potato seed production on October to November, which is the non-production period of potato in India (eg. mountainous areas of Eastern Bhutan, such as Trashigang and Mongar)
- ✓ Establishing farmers' cooperative at poverty area (eg. the Dzongkhags with color shown in Table 6-3)
- ✓ Development of commercial crops (especially fruits) in the Western Bhutan

(4) Present a development model for the improvement of food self-sufficiency

The government has played leading roles in agricultural production. On the other hand, one can notice the emergence of communities which try to realize food self-sufficiency without government help, and Samdrup Jongkhar Initiative is an example of it. It is imperative to promote the formation of farmer's groups who possess strategic minds. As it is desirable to cover all the aspects of the lives such as agricultural production, income generation, and nutrition improvement to promote the formation of this kind of farmer's groups, the development and extension model that are regional (Gewog) based should be implemented, rather than implementing the conventional development strategy which are limited to agricultural production,

(5) Nutrition improvement for the Bhutanese people

Health problems in Bhutan are closely related to the eating habits. The Bhutan government has concentrated on the quantity aspects of the food security so far, but it is now important to pay more attention to the quality aspects of safe consumption of food.

Examples of potential projects

- Extension of the food based dietary guidelines
  - ✓ Development of public relation strategy by a dispatch of expert
  - ✓ Extension of the guidelines through the mass media
  - ✓ Development and extension of new recipe based on the guidelines and traditional Bhutanese dishes
  - ✓ Utilization of the model Gewog project as a pilot project for recipe development
- Enhancement of nutrition management system
  - ✓ Support to produce double-fortified salts with iron and iodine for decreasing high prevalence of anemia
  - ✓ Support on the nutrition survey at the national level to capture the nutrition intake situation of the Bhutanese people
  - ✓ Community development for health
  - ✓ Support to apply a curriculum on nutritional visual education in the royal institute of health sciences

6-2 Contents of Japan's contribution

Japan is currently revising its future strategies now. As far as this study is concerned, the basic policies derived from study findings are as follows.

a. Rather than goods, provide more know-how

This study has identified the following areas which appear especially promising, such as

business management and provision of know-how in technical fields (particularly dispatch of experts envisaged by Bhutan):

i) Greenhouse crops (Horticultural Division , Agriculture Dept., MoAF)
ii) Strategic advisers for farm product storage strategies (BFC)
iii) Nutritional management advisers (Ministry of Education)
iv) Experimental rice growing and extension experts (Agriculture Dept., MoAF)

b. Loan projects are quite limited

As the current resource gap also makes clear, the state of the country's finances makes it difficult to start projects entailing large loans. Although projects such as making finance available in remote areas and providing farm loans to promote independent farming using two-step loan projects are usually very effective, special attention to financial conditions is needed in light of the state of public finances.

Generally speaking, Bhutan has no private enterprises with high solvency, and since there are sectors where financial institutions already provide products, such as import and export financing, the most appropriate recipients for two-step loans from Japan would be agricultural cooperatives.

c. Japanese technical projects as wide-area core projects

Horticulture Research and Development Project now underway at Mongar serves as a core project bringing together six districts in the eastern part of the country.

This example of success in the east to demonstrate Japan's contribution in the western part of the country will make it possible for senior officials to commit to a policy for the research center and the extension field, and it is hoped that Bhutan and Japan can build a firm relationship in these areas.

d. Having volunteers serve as extension officers is effective for meeting ODA targets

Volunteers from Japan are very active in Bhutan, partly because of trust felt toward Japanese and relatively good public order. Bhutan is also an exception because of the large number of senior volunteers who are active there. It is obvious that Kingdom of Bhutan is placing a big importance to Japanese volunteer scheme. It is clear that planning for projects in Bhutan should include volunteer projects as part of the strategic scheme, and this direction is expected to also be effective in the future.

e. Changing farmers' attitudes

The Kingdom of Bhutan should need to brew "famers with strategic thinking" to change farmer's attitude. This kind of capacity development should be done starting in less privileged areas where government support did not reach up to now, and promulgate its activities to nationwide.

Examples of potential projects

- Model villages (Gewog) project
  - ✓ Target region: Zhemgang
  - ✓ Implemented as technical project and the dispatch of JOCV
  - ✓ Components of support
    - Introduction of rice production technique
    - Technical training on the autonomous maintenance of irrigation system
    - Enhancement of the function of farmer's groups or cooperatives
    - Improvement of the nutrition of the meals at schools (development of recipes and extension of school farming)
- Application of Grassroots Grant Aid
  - ✓ Support of Samdrup Jongkhar Initiative as a development mirror

Outline of Proposed Project

Socio-economic Problems surrounding Food Security and Direction of Correspondence

	Plan	Procurement of Capital	Implementation of Project	Concern with Market and Society
Problems on Food Security	Absence of 1:25,000 and 1:50,000 geographical maps of planning base	Lack of financial accessibility for agricultural production	Certain rules for land usage obstructs timely expansion of farmland and effective utilization	No effective measures to cheap agricultural products from India
	Confusing admin services provided by different government agencies	Unclear principals and incentives on FDI		Health problems of citizen (malnutrition and alcohol poisoning)
	Private entrepreneurs for business partner are not fostered			
Correspondence by Other Donor and its Program	NA	The RMA is planning to introduce Micro Finance and FIP（Financial Inclusion Policy). The WB is planning to provide production loan through agricultural cooperative.	NA The 11th 5 Year Plan will deal with hollowing land.	A various type of Nutrition Improvement Projects are going to implement from now.
Direction of Japan's Assistance	Assisting of a mapping project which seems lesser political interference.	Examining of the project on institutional finance in coordination with WB	Discussing of possibility of supporting industrial development plan	Assisting of policy making on nutritional improvement for consumers
Contribution to Food Security	Indirect assistance to smoothen entire plan on increasing of food self-sufficiency and achieving food security			
Project	Map production & Capacity development of National Land Commission	NA	Masterplan on industry development	Nutritional Improvement Policy Formulation Project Recipe Development with Mass Medium
ODA Scheme	Technical Cooperation Project		Masterplan	Technical Cooperation + Dispatching volunteers
Cost (¥million)	350		80	108
Strong point of Japanese ODA Possibility to tie up with other donor	Abundant of ODA experiences on mapping project	Abundant of ODA experiences on cofinance and 2-step loan	Japan alone	Tying up with local mass medium to strengthen the capability on promulgation and advertisement.

Source) JICA Study Team

Problems of Rice Supply Chain and Direction of Correspondence

(Cross cutting issues which are not solved only by MOAF or the issues needing high-level political decision are not treated here)

	Production	Forwarding /Storage	Milling/Finishing	Wholesale/Retail	Market/Citizen
Problems on Rice Self Sufficiency	Strategic brain of farmer is not brewed.	Insufficient institutional composition of agricultural cooperative			
	Insufficient infrastructure of irrigation system and road network.	Insufficient storage capacity.	High rate of post harvest loss.		
	Low yield due to improper extension work, or difficulty in introducing high yield variety.				Competition with Indian import rice
	Damage by wild life				
Correspondence by the government of Bhutan	Increasing of rice production by the government support. The 11th 5Year Plan aims to increase self-sufficiency rate from 50% to 75%. Actual action plan are not raised yet.				NA (Let consumers choose Bhutan rice)
Direction of Japan's Assistance	Changing the farmer's mentality (fostering "Farmer's group with Strategic Brain") and Strengthening extension activity.				
Contribution to Food Security	Increasing self-sufficiency through production increase Strengthening Strategic Brain of farmers				
Project	①Rehabilitation of irrigation facility (+ capacity development) ②Strengthening of function of government agencies		④Model Gewog development project (capacity development of irrigator's association and agriculture cooperative, nutrition improvement for school children etc.)		
	③ Assisting activity of "Farmer's group with strategic thinking"				
ODA Scheme	①： Yen Loan + Project Type Technical Assistance, dispatch Expert (a part of which consists of Senior Volunteers and JOCV) ②： Dispatch Expert and Senior Volunteers		④： Project Type Technical Assistance + JOCV		
	③: Grass-roots Grant Aid (+ volunteer scheme)				
Cost (¥million)	①: Yen Loan: 1,200 (example of Philippines ALISP), Technical Assistance: 144 (3 x 3 person x 16 months) ②: Expert: 288 (3 x 4 person x 24 months)		④: 270 (3 x 3 person x 30 MM)		
	③: 10 x 3 projects				
Target of Capacity Development	①: Farmer's cooperative, DAO in Dzongkhag level ②: RNR Center, FCB etc.		④: Stakeholders in "model Gewog" (administrative officers in Dzongkhag, farmers in model Gewog, farmer's group, traders, etc.)		
	③: Self-sustained farmer's group and Farmer's cooperative with strategic brains				
Strong point of Japanese ODA Possibility to tie up with	(Strong point) Engineering of irrigation project, Rice production technology in highland and in the field of low temperature (Weak point) Measures to damage by wild life		Technology and operation know-how of agricultural/post-harvest machinery/facility. Management know-how of agricultural cooperative.		

Source) JICA Study Team

Problems of Vegetable Supply Chain and Direction of Correspondence

(Cross cutting issues which are not solved only by MOAF or the issues needing high-level political decision are not treated here)

	Production →	Forwarding /Storage	Distribution /Market	Processing	Distribution	Market/Export
Problems on Vegetable Self Sufficiency	Farmer's Strategic thinking is not brewed. (Unable to develop market)		Scarcity of agricultural cooperative.			
	Lack of road network.			Lack of processing technology and experience		
	Low yield due to improper extension work, or difficulty in introducing high yield variety.				Safety of vegetable.	
	Damage by wild life.		Insufficient storage capacity			
Correspondence by the government of Bhutan	Achieving 100% of self sufficiency in two years (2012-2013).			Strengthening the capacity of FCB (it seems to be difficult)		Accreditation of domestic product (no actual action yet)
Direction of Japan's Assistance	Changing the farmer's mentality (fostering "Farmer's group with Strategic Brain") and Strengthening extension activity. Assistance on production technology			Provision of storage facility and storage know-how.		Enlightening of consumers ("Food inspection system" for the future assistance)
Contribution to Food Security	Production increase (vegetable) Increase of farm income (fruit)			Provision of know-how on vegetable stockpile.		Consumer education
Proposed Project	①Transfer technology on greenhouse ②Strengthening of horticulture research/extention fanction in the western region (Mitthon)		④Model Gewog development project (capacity development of agriculture cooperative, nutrition improvement for school children, etc.)	⑤ Technical assistance on storage and distribution		⑤Development of recipe (+ Mass medium strategy)
	③ Assisting activity of "Farmer's group with strategic thinking" (same as case of rice)					
ODA Scheme	①: Dispatch of Expert ②: Dispatch of Expert		④: Project Type Technical Assistance + JOCV (same as case of rice)	⑤: Dispatch of Expert		⑥: Technical assistance tying with mass medium (Kuensel, Bhutan Observer etc.)
	③: Grass-roots Grant Aid (+volunteer) (same as case of rice)					
Cost (¥million)	①: 72 (3 x 1person x 24 months) ②: 72(3 x 1person x 24 months)		④: 270 (3 x 3persons x 30 months) (same as case of rice)	⑤: 72 (3 x 1 person x 24 months)		⑥: 108 (3 x 1person x 36 months)
	③: 10 x 3 perojects (same as case of rice)					
Target of Capacity Development	①: Farmer's cooperative, farmers nearby urban area ②: RNR Center, Extention Workers of nearby Dzongkhag		④: Stakeholders in "model Gewog" (same as case of rice) (administrative officers in Dzongkhag, farmers and farmer's cooperatives)	⑤: FCB		⑥ Whole nation through mass medium network
	③: Self-sustained farmer's group and Farmer's cooperative with strategic brains (same as case of rice)					
Strong point of Japanese ODA	(Strong point) Production technology for horticulture, especially for greenhouse. (Weak point) Measures to damage by wild life		Integrated management support. For example, a variety of development components, through combining a various ODA schemes are strong point.			

Source) JICA Study Team

Chapter 1

Study Framework

Chapter 1 Study Framework

1-1 Description of the Study

(1) Background

Bhutan, a landlocked country bounded on the north by China and India on the east, west and south, has a total land area of 38,394 km^2. Under difficult geographical conditions, the government has made ensuring food self-sufficiency and food security a priority policy as a precondition for achieving GNH (Gross National Happiness). However, policies on government undertakings to achieve these propositions have centered on promotion of agriculture only and have not been concerned with supporting the health of the people. In reconsideration of this policy, over the past few years, the government has been exploring a Food and Nutrition Security Policy.

Sixty-five percent of Bhutan's demand for grains is met from domestic sources (2008). Rice is one of the leading staple foods and accounts for 60% of grain demand, only about half of it is grown domestically. Supply of other items—meat, vegetables, fats and most other foods, including dairy products which are a secondary staple diet—depends on imports from India. Meanwhile, according to 2010 data from Bhutan's Ministry of Health, 44% of children over one year of age in the east, 34% in the west and 33% in the central part of the country are underdeveloped due to malnutrition in infancy. In addition to disease, this is due to a nutritionally unbalanced diet, and is viewed as an issue requiring urgent action.

Under these circumstances, the Food and Nutrition Security Policy states that it is "the situation when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." and identifies food availability, accessibility, utilization and stability as the four major priorities to be acted upon in order to make this policy a reality.

(2) Objective

The objective of this study was to collect and analyze data about conditions related to the government's Food and Nutrition Security Policy and to study and summarize ways in which Japan can contribute to Bhutan's agricultural sector (and the grain sector in particular) in order to achieve this policy.

(3) Areas and sectors sampled

The target survey area is the entire country, and the following four designated sampling areas were selected. These sampling areas were chosen as locales for concentrated collection of data needed for the study and are not necessarily candidate areas for future projects.

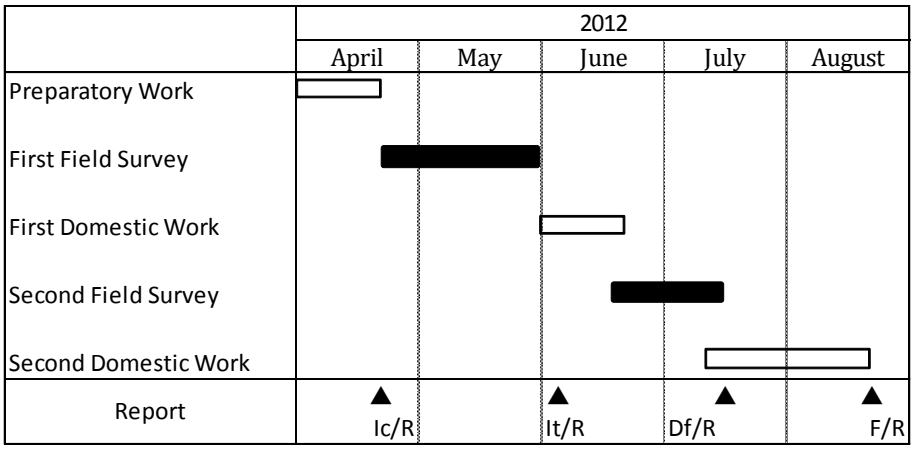
Region	Dzongkhag	Geog	Characteristics
Central	Zhemgang	Trong	Rice as the main cereal crop
East	Trashigang	Khaling	Maize as the main cereal crop
South	Sarpang	Chuzagang	Holds relatively large areas of flat lands
West	Paro	Dopshari	Reletively advanced agricultural areas

(4) Designated crops

This study covered grains (mainly rice) eaten as staple foods. In addition to rice, maize, which is grown in the eastern part of Bhutan and is a staple or secondary staple food, and potatoes were studied. Since farming in Bhutan is combined with livestock raising, the study will also touch on meat, dairy products and vegetables. Since this study required collection of nationwide data on food security and self-sufficiency, it does not focus on any specific regions and also includes data on food in general, including fruits, mountain greens and so forth, as needed.

(5) Study procedure and methodology

The overall schedule for the study is described below.



Fieldwork was conducted from April 21 to May 26, 2012, and from June 23 to July 14, 2012. Activities carried out at each stage of the study are detailed below.

A. Preparatory Work in Japan (early April 2012)

a. Literature reviews and interview surveys on the following points:

(i) The 10th Five-Year Plan (2008-2013)
(ii) Current status of food production, distribution, and consumption (grains, meat, milk, and others)
(iii) Current status of nutrition
(iv) Food and Nutrition Security Policy
(v) Factors and environments that affect the objectives of the Policy (population, urbanization, modernization, and economic growth)

b. Selection of the target research areas

c. Preparation of the Inception Report

B. First Field Survey (end of April to end of May, 2012)
a. Present the work plan to Bhutan counterparts

b. Obtain the necessary data and information on major related policies at the organizations concerned (government agencies in Bhutan, international donors)
- The Food and Nutrition Security Policy
- The 10th Five-Year Plan
- The 11th Five-Year Plan
- Current status of food production, distribution, and consumption
- Nutritional conditions and the impact of food consumption patterns

c. Learn the current conditions in each region and sector (livestock, grain, and others)
- Water resources, irrigation, infrastructure (roads, storage and processing facilities), machinery, types of agricultural products and crops, distribution of farmland, land utilization, soil, and markets
- Other donors' support policies (both multilateral and bilateral)

d. Obtain an idea of the factors and conditions that affect the Food and Nutrition Security Policy (population, urbanization, modernization, economic growth and others) and analyze their impacts on food production, distribution, and consumption (especially grains).

e. Examine the current status, problems, and potential for food production, distribution, and consumption (especially grains) based on the four viewpoints (food availability, accessibility, utilization and stability)
- Specify the food types (especially grains) needed to achieve the Policy
- Provide information on costs needed to activate the Food and Nutrition Security Policy

C. First period of consolidation in Japan (early to mid-June, 2012)
a. Summarize food production, distribution, and consumption conditions in Bhutan, including from the viewpoint of nutrition

b. Draw up the options for development of food (especially grains) production, processing, distribution, and markets

c. Draw up the Interim Report and the work plan for the second fieldwork

D. Second Field Survey (end of June to early July, 2012)
a. Examine the status and problems in the grain sector and forecast the future self-sufficiency ratio for grain and rice

b. Specify the food types (especially grains) necessary for achieving the Policy
- Understand differences between urban and rural areas; status of food availability, accessibility, utilization and stability; and differences between the plan and actual conditions
- Examine the possibilities for diversification of farm products and large-scale farming in order to achieve the Policy

c. Make proposals for possible areas of support and contributions by Japan and propose Japan's role to help achieve the Food and Nutrition Security Policy

E. Second period of consolidation in Japan (mid-August, 2012)
a. Create the Final Report

The main work in this study was to organize and analyze data gathered through interviews with experts in Japan and Bhutan and information obtained from the government and concerned bodies in Bhutan. In the sampling areas for fieldwork, the following activities were carried out: 1) interviews with village heads, schoolteachers, farmers, extension officers, etc.; 2) interviews with companies in the food business and intermediaries; and 3) research on the status of local administration, existing problems and so forth.

1-2 Policy Options for Food Security

(1) Food security strategies envisioned

Improvement of the food security ratio is not necessarily synonymous with food security. While some countries such as the Philippines, may adopt a national policy of aiming for 100% self-sufficiency in staple foods, others, like Japan, set aside the idea of full food self-sufficiency and hedge the uncertainty of food supplies by importing from a wide range of countries. A third option is to leave the securing of food to the market mechanism and import only the foods which the country lacks: this is the stance adopted by EU countries.

In other words, all countries have their own methods for achieving food security, and how Bhutan intends to achieve this is something that the country must decide for itself. In the end, Bhutan is likely to consider one of the three strategies below or a compromise thereof, but this report was prepared to provide basic data for use by the Bhutan government to decide on food security strategy.

① Raise the grain self-sufficiency ratio.

Bhutan has strong economic ties to India and in recent years has also been experiencing strong interference from China[1]. Depending on these countries for its population's food means being increasingly subordinated to them and sacrificing its dignity as an independent country. Further, an economic impoverishment such as foreign currency outflow and deterioration of the balance of international payments is brought about. It is therefore essential to achieve as much self-sufficiency as possible, at least for grains.

② Importing by diversifying risk, rather than aiming for self-sufficiency.

To stabilize food prices and boost the self-sufficiency ratio will not work effectively as a price control measure, since this will mean increasing production of more expensive domestic grains even though the domestic infrastructure is inadequate for this. In fact, subsidies and outlays for various projects intended to protect the self-sufficiency ratio (domestic farmers) are only driving the price of grains

[1] Diplomatic relations are not being established as of 2012. In 1998, both countries agreed to respect a boundary of before 1959, until the future discussion on border demarcation. But entering in 2000's, China put in the Bhutan territory, and started road construction. Further, since Chinese army and private citizen did an act of crossing the border, the Bhutanese government has protested. Collection of vegetative wasp is considered as the cause of Chinese crossing the border. The area of Bhutan was about 46,500 square km in the past, which has decreased to 38,400 square km and has changed to the shape of the country because a lot of northern part was made to Chinese territory at the new borderline announced in 2006.

higher. The basic principle of this scenario is not to rely on a specific country as a supply source. To bring this about, a final self-sufficiency ratio target (≠100%) and target year should be set and gradual steps taken to reach the target.

③ Within reason, respect the free will of farmers.
Since imports of foreign grain threaten farming operations, imports should not be implemented immediately. To achieve food security, the free will of farmers within Bhutan should be respected, and the existing policy of importing grain to make up for the shortfall between demand and domestic production after domestically-produced grain is distributed inside the country should be continued.

A comparison of food self-sufficiency rates among industrial countries is shown below.

Table 1-1 Food Self-Sufficiency Ratio in Industrial Countries

	Australia	U.S.	France	Netherlands	Germany	Japan	U.K.
Production value base	155	102	101	96	75	69	40
Calorie base	237	128	122	58	84	39	70
Grain self-sufficiency ratio	333	132	173	24	101	27	99

Notes: Applied 2009 data for Japan's figures. Import/export prices for major commodities were based on FAO price statistics and trade statistics.
Source: Prepared by MAFF, Japan from "Food Consumption Table" (MAFF), "Food Balance Sheets" (FAO).

Japan and the U.K. has only a limited amount of area for cultivation and attempt to achieve food security by diversifying the range of countries from which they import food. In the wake of a food security incident that occurred in 2008[2], Japan is pursuing even broader diversification of countries as import sources.

[2] Between late December 2007 and January 2008, 10 people from three families suffered food poisoning from eating *gyoza* meat dumplings made by a Chinese food manufacturer and imported and sold by a Japanese company. One young child was severely affected and was in a coma for some time. The meat dumplings were analyzed and found to contain methamidophos, an organophosphorous pesticide, resulting in the recall of 580,000 units of 23 products imported by the Japanese seller. Metamidophos in the amounts of 3580ppm (3.58mg/g) to 3160ppm (3.16mg/g) was detected in the meat dumplings regurgitated by the victims. This was far above permissible amounts for the substance and was enough to be lethal from eating just a few dumplings. Metamidophos had never been registered as an agrochemical in Japan and China had banned its sale and use from January 2007, but the ban was not fully enforced and some fatalities had occurred.

Chapter 2

Socio Economic Conditions of Bhutan

Chapter 2 Socio Economic Conditions of Bhutan

2-1 Major Socio Economic Indicators

(1) Population

According to Population & Housing Census of Bhutan in 2005, Bhutan has the population of 634,982 people with 126,115 households. The population is projected to rise up to approximately 760,000 by 2015 with an annual growth rate of 1.7-1.8%[1].

When one looks at the population at the district level, Thimphu has the biggest population sizes at approx. 100 thousand, or approx.16 % of the total population. Chukha (11.7%), Samtse (9.5%) and Trashigang (8.1%) follow this.

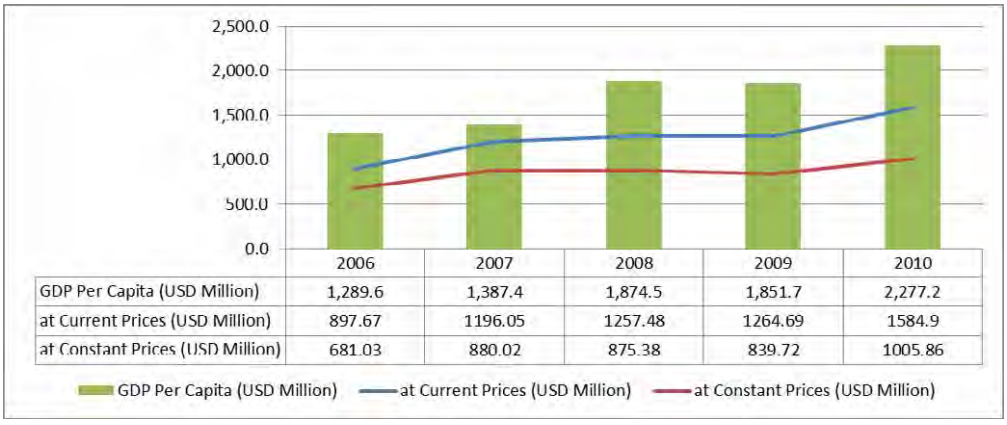
Table 2-1 Population by District

District	Population	Distribution to Total	District	Population	Distribution to Total
Thimphu	98,676	15.5%	Zhemgang	18,636	2.9%
Chukha	74,387	11.7%	Dagana	18,222	2.9%
Samtse	60,100	9.5%	Trashiyangtse	17,740	2.8%
Trashigang	51,134	8.1%	Punakha	17,715	2.8%
Sarpang	41,549	6.5%	Bumthang	16,116	2.5%
Samdrup	39,961	6.3%	Lhuentse	15,395	2.4%
Mongar	37,069	5.8%	Pemagatshel	13,864	2.2%
Paro	36,433	5.7%	Trongsa	13,419	2.1%
Wangdue	31,135	4.9%	Haa	11,648	1.8%
Tsirang	18,667	2.9%	Gasa	3,116	0.5%

Source: Population & Housing Census of Bhutan (2005)

(2) GDP

As shown in the figure below, GDP (Gross Domestic Product) has been increasing, and GDP per capita reached US$ 2,277 in 2010. The growth rate of GDP in 2010 is projected at 8.1% (a recent newspaper reports that the growth rate of GDP in 2011 was 8.3%), driven by the significant growth in manufacturing, electricity/water, and construction sectors.[2]



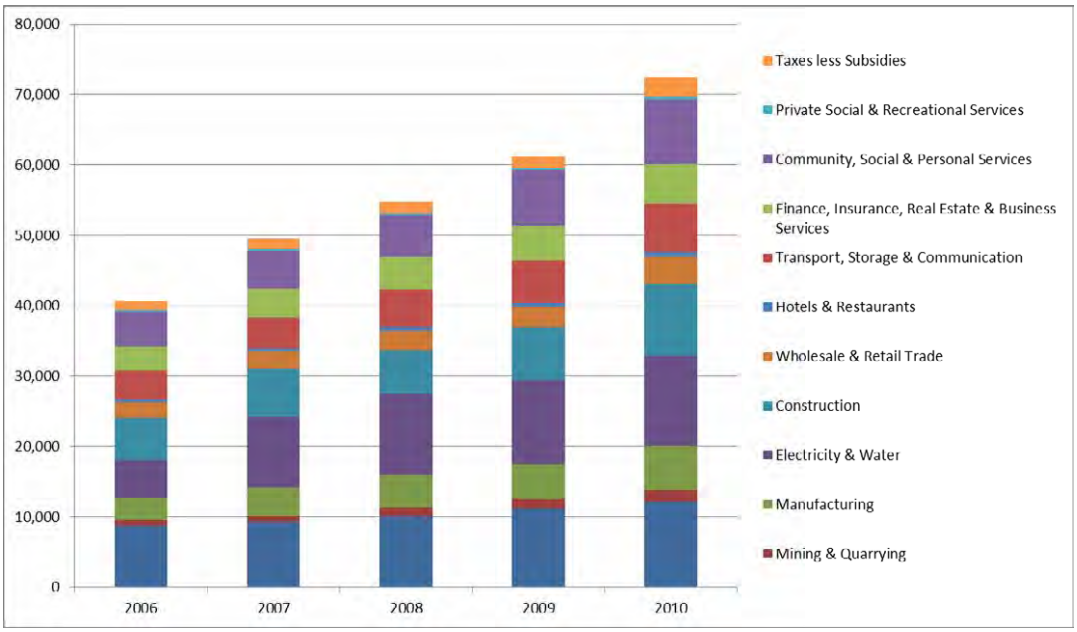
Source: National Accounts Statistics 2010, National Statistics Bureau

Fig. 2-1 GDP between 2006 and 2010

[1] Population Projections Bhutan 2005-2030, National Statistics Bureau

[2] Significant Activities and Outcomes During the FY2010-2011" Ministry of Finance

The figure below shows the sectoral composition of GDP in 2010. The major shares of the GDP consist of electricity/water (18%), agriculture (17%), construction (14%), transport/storage/communication (10%) and construction (9%). The share of the agriculture in GDP has declined from 21% to 17% between 2006 and 2010.



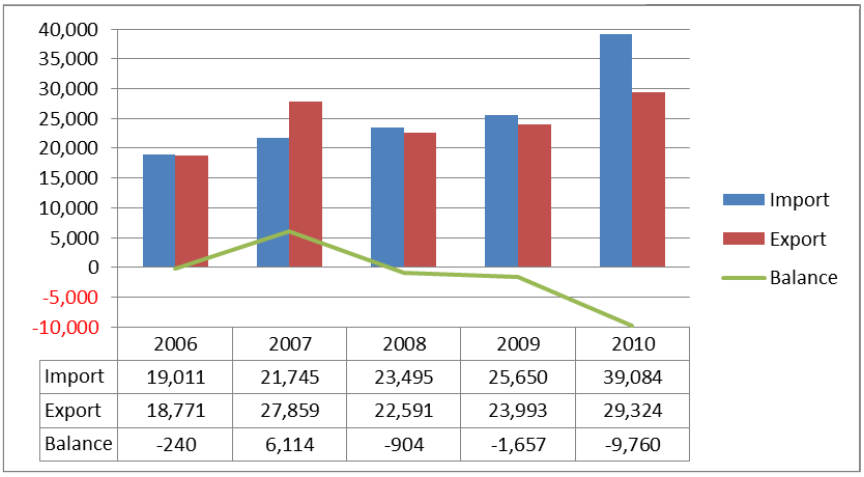
Source: National Accounts Statistics 2010, National Statistics Bureau

Fig. 2-2 Sectoral Share of GDP (GDP at constant Nu)

(3) Trade

The trade balance of Bhutan had been in deficit between 2006 and 2010, except for 2007. India has been the major trade partner of Bhutan, and the trade with India consists of 69%-78% of total import and 77%-95% of total export during this period. Even though the trade balance with India had been in surplus since 2006, it turned into deficit in 2010.

(in Million Nu)



	2006	2007	2008	2009	2010
Import	19,011	21,745	23,495	25,650	39,084
Export	18,771	27,859	22,591	23,993	29,324
Balance	-240	6,114	-904	-1,657	-9,760

Source: Bhutan 2010 Trade Statistics, Ministry of Finance

Fig. 2-3 Total Volume of Import and Export Between 2006 and 2010

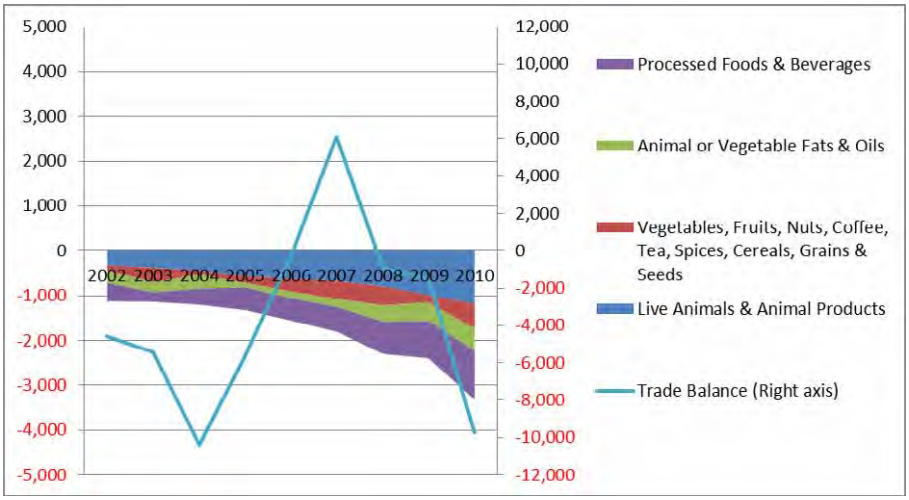
Table 2-2 Import and Export with India and Indian share% of the total volume (Unit: Million Nu)

	2006		2007		2008		2009		2010	
Import	13,053	69%	15,100	69%	17,340	74%	19,968	78%	29,338	75%
Export	14,488	77%	22,724	82%	21,480	95%	22,434	94%	26,001	89%
Balance	1,435		7,624		4,140		2,466		-3,337	

Source: Bhutan 2010 Trade Statistics, Ministry of Finance

The figure below shows the trade balance for the agricultural commodities between 2002 and 2010. The trade in agricultural commodities had been in deficit, and the level of the deficits had been increasing during this period. At a food category level, the deficits of live animals and animal products and processed food had been quite large[3].

(Unit: Million Nu)

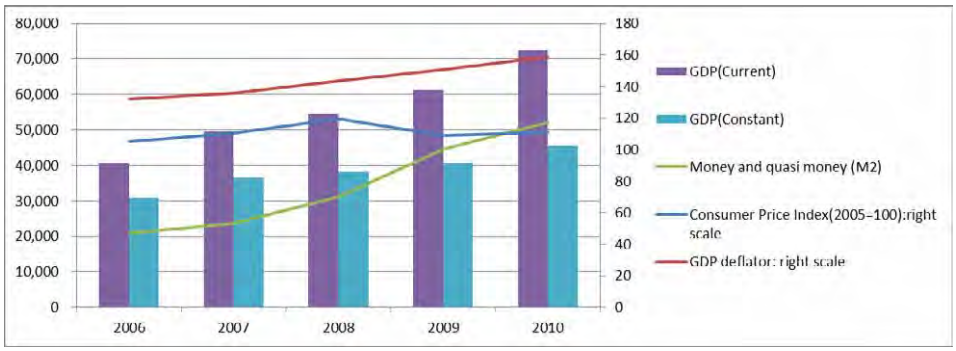


Source: Calculated by the project team based on data provided by RMA

Fig. 2-4 Trade Balance of Agricultural Commodities between 2002 and 2010

(4) Finance

(Unit at left scale: Million Nu)



Source: World Development Indicator

Fig. 2-5 Consumer Price Index and Money Supply

[3] However, at a commodity level, the trade deficit for rice is largest among the agricultural commodities.

As shown in the figure above, the consumer price index had been an increasing trend, even though it declined slightly in 2009. According to the consumer price index, inflation rate for the first quarter of 2011 has reached 9.64% as compared to 5.7% in the same period in 2010. The inflation on food item was 11.34% compared to 14.05% and non-food item of 9.15% as compared to 2.39% in the same quarter last year. Table 2-3 shows the inflation rates for each food item. Sugar/jam etc., vegetable, fruit, milk/cheese/egg, and fish have high inflation rates among foods.

Table 2-3 Year on Year Inflation Rate of Each Food Item (%)

	2010 1st quarter	2011 1st quarter
Food	14.05	11.34
Bread and cereals	10.98	9.76
Meat	20.70	5.75
Fish	15.82	10.59
Milk, Cheese, Egg	4.73	10.90
Oils and fats	7.61	8.77
Fruits	37.32	11.68
Vegetables	23.88	14.40
Sugar, Jam etc	-0.91	18.25
Non-alcoholic beverage	2.80	4.17
Alcoholic beverage	-0.97	5.11
Non-Food	2.39	9.15
Total	5.70	9.64

Source: Consumer Price Index, National Statistics Bureau

(5) Poverty

In Bhutan, households (and their members) consuming less than the food poverty line of Nu.688.96 per person per month, which corresponds to the food basket of 2,124 Kcal per day, are considered to be subsistence poor. On the other hand, the total poverty line is defined as Nu. 1,096.94, which adds thee non-food allowance of Nu. 407.98 to the subsistence line of Nu.688.96.[4]

The percentage of population that are under the total poverty line had decreased from 31.7% to 23.2% between 2003 and 2007, and from 24.7% to 16.9% as the percent of households between 2003 and 2007. On the other hand, a proportion of the subsistence poor was increased in 2007 compared to 2003[5]

Table 2-4 Poverty Incidence and Subsistence Incidence

	2003		2007	
	Percent of Population	Percent of Household	Percent of Population	Percent of Household
Subsistence (%)	3.8	2.6	5.9	3.8
Poverty (%)	31.7	24.7	23.2	16.9
Population of Poverty	173,462		146,100	
Total Polulation	547,179		629,700	

Source: Poverty Analysis Report 2007, 2003

[4] Poverty Analysis Report 2007

[5] It should be noted that a method to collect sample is different between 2003 and 2007, which causes a limitation to make a comparison between them.

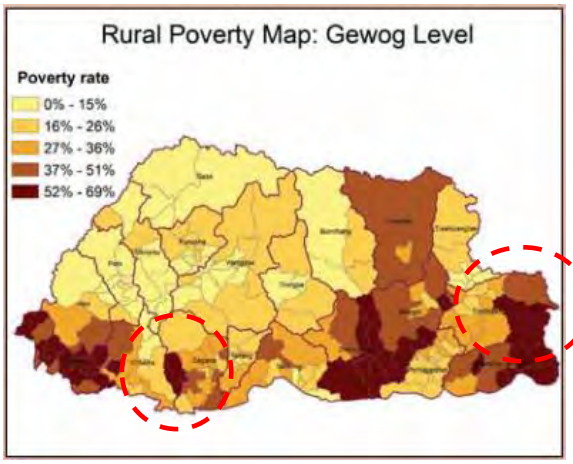
Poverty incidents are relatively higher in the Eastern part of Bhutan, and poverty incidents in Zhemgang, Samtse, Mongar and Lhuentse are more than 40% of their population.

Table 2-5 Poverty Incidence and Subsistence Incidence by District (%)

District	Population of Poverty Incidence (%)	Population of Subsisitence Incidence (%)	District	Population of Poverty Incidence (%)	Population of Subsisitence Incidence (%)
Zhemgang	52.9	17.8	Sarpang	19.4	3.3
Samtse	46.8	17.6	Wangdue	15.8	1.9
Mongar	44.4	10.2	Punakha	15.6	1.9
Lhuentse	43.0	11.2	Trashiyangtse	14.3	0.5
Samdrup	38.0	12.2	Tsirang	13.9	2.5
Dagana	31.1	9.7	Haa	13.2	5.1
Trashigang	29.3	7.0	Bumthang	10.9	0.9
Pemagatshel	26.2	4.5	Gasa	4.1	1.0
Trongsa	22.2	4.8	Paro	3.9	0.6
Chukha	20.3	4.5	Thimphu	2.4	0.1

Source: Poverty Analysis Report 2007

The poverty map by Gewog shows that there are significant differences in poverty condition within the districts. For example, there are some Gewogs that have high poverty rate in Dagana and Trashigang. This implies the existence of "poverty pockets" within districts.



Source: Poverty Maps of Bhutan(World Bank, National Statistics Bureau)

Fig. 2-6 Poverty Map

2-2 GNH survey

(1) GNH

Gross National Happiness is a term coined by His Majesty the Fourth King of Bhutan, Jigme Singye Wangchuck in the 1970s, who declared that he was more concerned with Gross National Happiness than with Gross Domestic Product. In 1998 Prime Minister Jigme Y. Thinley identified the "Four Pillars" of GNH, which are good governance, sustainable socio-economic development, cultural preservation, and environmental conservation. These four pillars are used as a prime guideline for their development policy and have been further classified into nine domains: psychological wellbeing, health, education, time use, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standards.

(2) The 2010 Survey

In the national survey in 2010, 33 indicators, which were derived from the nine domains, were utilized. The major results of the survey are as follows[6]:

- Men are happier than women on average.
- Out of the nine domains, Bhutanese have the most sufficiency in health
- In urban areas, 50% of people are happy; whereas it is 37% for the rural areas.
- Unmarried people and young people are the happiest groups.
- Urban areas do better in health, living standards and education. Rural areas do better in community vitality, cultural resilience, and good governance.
- The most important factors for happy life are high household income, sufficient household appliances, and land.

It is important to note that the ranking of dzongkhags by GNH differs significantly from their income level. For example, the GNH levels for Sarpang, Dagana, and Zhemgang are high even though their income levels are low.

The GNH is distinctive from GDP, as GNH tries to measure various aspects of life, including not only economic figures but also subjective matters like how they feel their happiness.

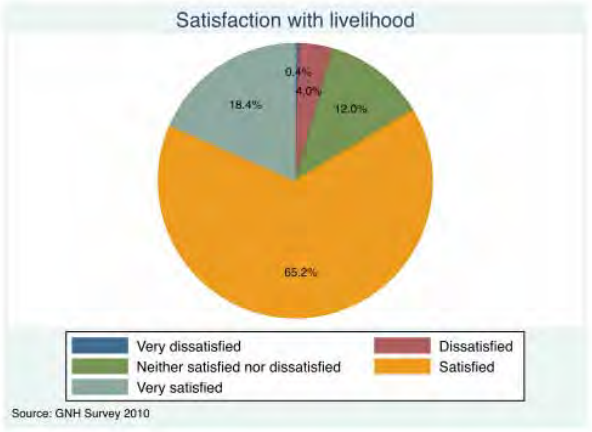


Fig. 2-7 Satisfaction with livelihood (Satisfied : 83.6%)

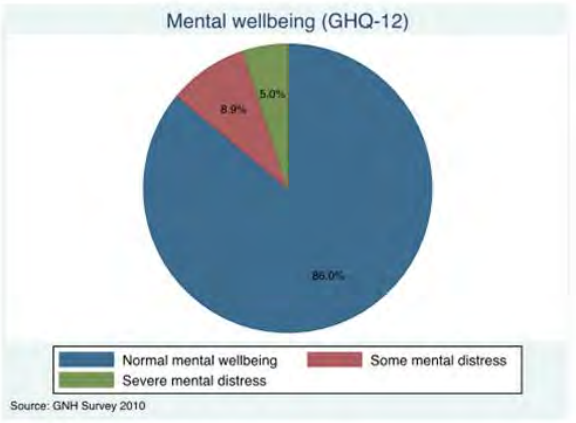


Fig. 2-8 Mental Wellbeing (Normal : 86%)

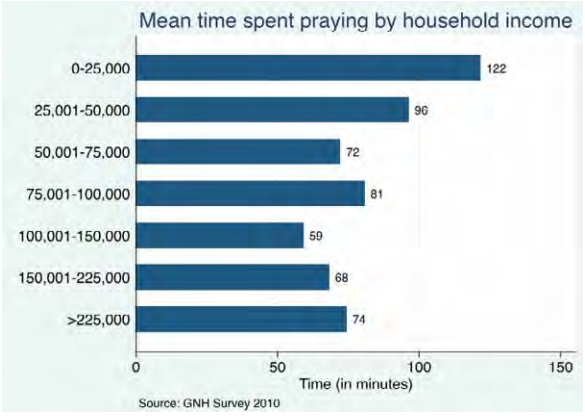


Fig. 2-9 Mean time spent praying by household income

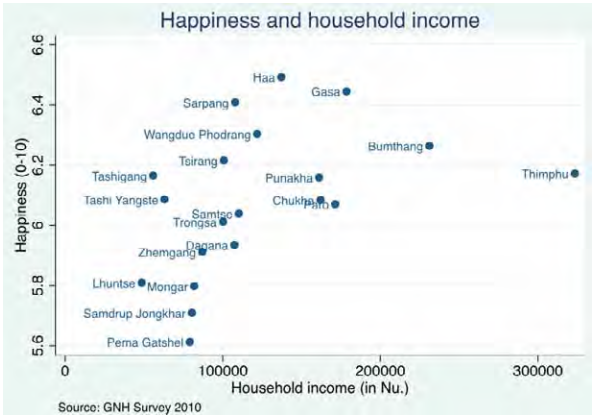


Fig. 2-10 Happiness and household income

Source: GNH Survey Findings 2010 (The Center for Bhutan Studies)

[6] http://www.grossnationalhappiness.com/articles/ Center of Bhutan Study

2-3 Characteristics of Food Consumption and Distribution

(1) Self-Sufficiency Rate of Main Food Items

The self-sufficiency rate shown in the table below are calculated based on the following method: Production / (Production + Import – Export). It should be noted that it is very difficult to grasp the actual self-sufficiency status in Bhutan. It is because that some foods are likely to be imported even there is a surplus domestically when transportation costs of domestic foods are higher than the imported ones. The figures of self-sufficiency rates vary depending on the data sources. Therefore, even though the sufficiency rate of a specific item is over 100%, people in some areas may import that item.

Based on the calculation method mentioned above, the self-sufficiency rate in rice was 48%, maize was 100% with cereal total of 63% in 2010. The self-sufficiency rate for fruit and potato were more than 100% due to the large volume of exports. With regards to the dairy products, milk (84%), egg (79%) and mutton (76%) had high self-sufficiency rates. on the other hand, those of beef (20%) and pork (23%) were relatively low, and fish (3%) had the lowest rate of self-sufficiency.

Table 2-6 Self-Sufficiency Rate of Main Foods (2010)

Food	Production (KG)	Imports (KG)	Exports (KG)	Self-Sufficiency Rate
Rice	47,997,000	52,010,011	75,993	**48%**
Maize	43,549,658	90,996	6,500	100%
Buckwheat	2,468,162	1,700	495	100%
Millet	2,602,450	656,236	0	80%
Wheat/Barley	3,313,773	5,977,703	0	36%
Cereal Total	99,931,042	58,736,645	82,988	**63%**
Fruites & Nuts Total	72,103,477	2,519,069	30,976,483	165%
Chillies	6,692,356	296,473	0	96%
Cabbages	1,619,188	1,150,387	751,485	80%
Potate	51,977,149	183,328	18,747,476	**156%**
Vegetable Total	90,938,986	8,718,165	19,761,585	114%
Spice & Pulses Total	8,640,857	3,783,545	1,679,159	80%
Milk	15,645,010	3,048,053	0	84%
Beef	748,620	2,963,643	0	**20%**
Pork	427,399	1,423,080	0	**23%**
Mutton	78,456	24,347	0	76%
Chicken	256,796	384,093	0	40%
Egg	1,993,121	514,223	0	79%
Fish	23,121	830,931	0	**3%**
Animal Products Total	19,172,524	9,188,371	0	**68%**
Oil and Fats Total	0	177,367	0	**0%**
Grand Total	290,786,887	84,597,480	52,500,215	90%

Source: Calculated based on Bhutan RNR Statistics 2011[7]

(2) Export/Import of Major Agricultural Products and Their Institutional Setup

・Trade of Agricultural Products

Food items[8] accounts for about 11% of total value of import in 2010, and rice constitutes 2.2% of the total value of the import in 2010. The table below shows the trade value of selected agricultural products in 2010. There are trade surpluses for apple, orange, nut, potato, pulse, mushroom, cardamom, and cordyceps, and the orange gained the biggest trade surplus of Nu.331 million. On the other hand, the trade balance of cereal products, vegetable, oil and animal products, are in deficits. The trade deficit for rice is Nu.833 million and the largest of them.

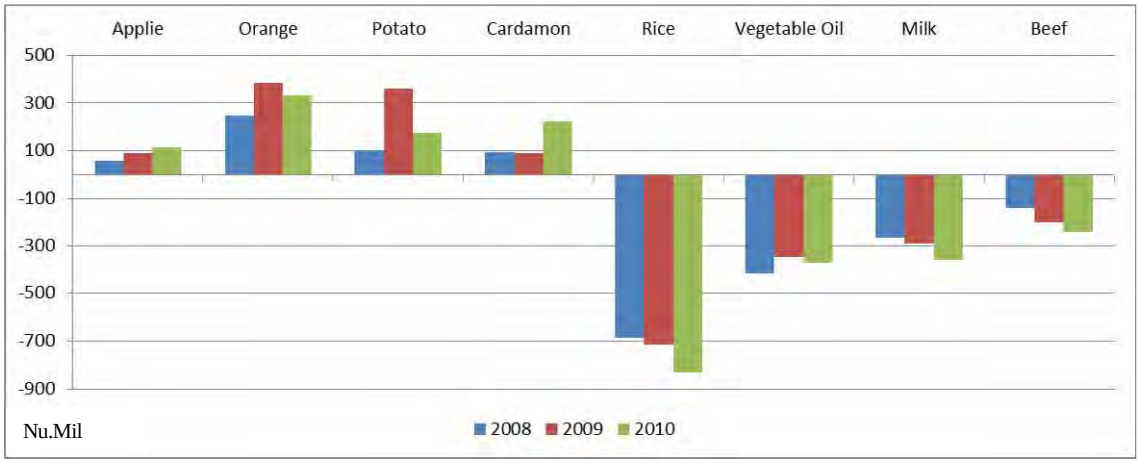
[7] The self -sufficiency rate of vegetable total is quite high as the self-sufficiency rate for Potato is 156%.

[8] Calculated based on the trade data from RMA. Foods include Live Animals & Animal Products, Vegetables, Fruits, Nuts, Coffee, Tea, Spices, Cereals, Grains & Seeds, Animal or Vegetable Fats & Oils, Palm Oil, and Processed Foods & Beverages.

Table 2-7　Trade Value of Main Food Items（2010）

Food Item	Import(Nu. Mil)	Export(Nu.Mil)	Balance（Nu.Mil)	Food Item	Import(Nu. Mil)	Export(Nu.Mil)	Balance（Nu.Mil)
Rice	848	15	−833	Cordyceps	0	45	45
Barley	29	0	−29	Lemon Grass Oil	0	0	0
Wheat	74	7	−67	Vegerable Oil	374	0	−374
Other cereals	85	0	−85	Egg	22	0	−22
Apples	2	117	115	Milk	359	0	−359
Oranges	1	332	331	Butter	50	0	−50
Other fruits	21	6	−15	Cheese	171	0	−171
Nuts	19	23	4	Sugar	169	0	−169
Potato	24	198	174	Pork	153	0	−153
Chilies	24	0	−24	Beef	242	0	−242
Vegetable	65	11	−54	Chiken	36	0	−36
Pulses	21	23	2	Fish	135	0	−135
Mushrooms	1	6	5	Mutton	5	0	−5
Cardamon	0	222	222	Total	2930	1007	−1,923

Source: RNR Statistics 2011



Source: RNR Statistics 2011

Fig. 2-11　Trade Balance of Main Food Items

As shown in Table 2-8, most of the imports of the main cereals are from India. The value of rice exported is only 0.7% of the total value of rice imported in 2010. The main destination of the exported rice is Singapore, followed by US and Australia.

Table 2-8　Import of Main Cereals in 2010

Rice Import 2010

country	volume (kg)	share
India	52,007,940	100%
Thailand	2,071	0%
Australia	0	0%
Japan	0	0%
Singapore	0	0%
World Total	52,010,011	

Wheat/Meslin Import 2010

country	volume (kg)	share
India	2,438,980	100%
Thailand	0	
World Total	2,438,980	

Corn Import 2010

country	volume (kg)	share
India	6,453,635	100%
Thailand	10	
World Total	6,453,645	

Buckwheat, Millet and canary seed; Cereals Nesoi Import 2010

country	volume (kg)	share
India	658,008	100%
Thailand	0	
Australica	0	
World Total	658,120	

Table 2-9　Export of Main Cereals in 2010

Rice Export 2010		
country	volume (kg)	share
Singapore	262,000	70%
US	72,000	19%
Australia	41,960	11%
Switzerland	30	0%
Hong Kong	3	0%
Japan	0	0%
Spain	0	0%
World Total	375,993	

Corn Export 2010		
country	volume (kg)	share
India	6,500	100%
World Total	6,500	

Buckwheat, Millet and canary seed; Cereals Nesoi Export 2010		
country	volume (kg)	share
India	495	100%
World Total	495	

Source: JETRO World Trade Data

・Trade System

Bhutan and India signed their first trade and commerce agreement in 1972, which postulates duty-free trade between the two countries. In 1980, Bhutan and Bangladesh signed the preferential trade agreement, in which Bhutan is obliged to impose no import duties on Bangladeshi goods. In return, Bangladesh lifted 18 tariff lines such as vegetable, apple, cardamom and so on. These tariff lines covers most of export goods from Bhutan, thus, the trade between the two countries is thought to be close to free trade.

Bhutan belongs to two regional trade agreements. These are SAFTA（South Asia Free Trade Agreement, whose members are Bangladeshi, India, Maldives, Nepal, Pakistan, Sri Lanka）and BIMSTEC（Bay of Bengal Initiative for Multi-Sectorial Technical and Economic Cooperation, whose members are Bangladeshi, India, Myanmar, Nepal, Sri Lanka, Thailand）. The SAFTA allows member countries different timeframes to bring down their custom tariff to 0-5%. The member countries of the BIMSTEC agreed to establish a free trade area by 2023, however meetings for trade negotiations are not held regularly[9].

Regulations on import and export, export promotions and trade negotiations are handled by the department of trade, Ministry of Economic Affairs. The department of Revenue and Custom, Ministry of Finance controls trade custom, and then BAFRA（Bhutan Agriculture and Food Regulatory Authority）under Ministry of Agriculture manages the permissions of food imports, quarantine check on animal, plants and their products, and the certifications of exporting foods. The permissions or certifications necessary for export and import are as follows:

Table 2-10　Necessary Permission or Certification for Export and Import

For Export	For Import
✓ Export Permission for the restricted and prohibited items such as animal and plants classified as endangered species, antique such as cats eye, prime and sawn timber etc. ✓ Export Certification for agricultural goods and foods (depending on export destinations. No need for Indian) ✓ Export Permission for alcoholic beverages to India	✓ Import License for import from the third countries via India ✓ No Import License for import from India except for excisable goods such as alcoholic beverage and drugs ✓ Special Permission for the restricted items such as chemicals, fertilizers, drugs, arms, live animal, plants, used machinery etc. ✓ Pre-permission for food import (but, No need for processed foods. No need for rice and vegetable from India) ✓ Animals, plants and their products are subject to quarantine check by BAFRA (five stations at the gate point)

Source: Bhutan Traders Manual (MOEA 2007) and Hearing at BAFRA

[9] A delay in negotiations of the regional trade arrangement makes MOEA prioritize negotiations for bilateral agreements. Bhutan is now negotiating with Nepal and Thailand respectively.

The detailed tasks of the related agencies in the trade system are described as the following table:

Table 2-11 Agencies and Tasks in the Trade System

Agency Role	Tasks	Regulatory framework
1.Department of Revenue & Customs Ministry of Finance.	Role: Collect revenue. Facilitate legitimate trade; enforce trade policy. Controls conformity with IP rights and IP laws International conventions Tasks: Clear goods for import/export. Collect taxes, customs duties, excise, and sales tax. Issue Excise import and export permit (regional offices)	Sales Tax & Customs and Excise Act and rules (2000)
2. BAFRA	Role: Ensure the quality and safety of goods and products related the MoAF. Tasks: Issue Phyto-Sanitary certificate for exports of agricultural goods. For any import or export of agricultural goods and food, necessary permit has to be obtained from BAFRA head office prior to import or exportation.	The plant quarantine act, Bhutan, 1993 Food regulations, 2007 Food Act, 2005 The Livestock Act of Bhutan, 2001
3. Ministry of Agriculture and Forests (MoAF)	Role: Responsibility over chemicals, fertilizers, pesticides. To ensure that only appropriate types and quality of pesticides are introduced. Tasks: Approve importation of pesticides.	Pesticides Act, 2000
4. National Environment Commission	Role: Responsibility over industrial waste and toxic residue. Ensure protection of human health and environment against toxic, hazardous and chemical substances. Tasks: Approve importation of chemical substances.	
5. Ministry of Economic Affairs (MoEA)	Role: Regulate internal and external trade and regulates the industry with the aim to develop industrial production and competitiveness Tasks: Register companies as import houses and issues import license. Issue import permit for restricted products under their authority. Issue the radiation certificate and the "health certificate for food" for exports to third countries (Regional office in Phuentsholing) Certify arrival of goods at destination with the "landing certificate" (Regional offices)	
6. Bhutan Narcotics Control agency/Drug Regulatory Authority/ Ministry of Health	Role: Control and prevention of Narcotic Drugs and Psychotropic Substances Tasks: Issue import and export permit for drugs and medical substances.	Narcotic Drugs and Psychotropic Substances and Substance Abuse Act, 2005. Medicines Act, 2003
7. Department of Forests Ministry of Agriculture and Forests	Role: Ensure projection and sustainable use of forestry, wildlife and related natural resources. Tasks: Regulate the transport, import and export of forestry products. Issue "Movement Order for finished wood product for export", "Movement Order for timber", on special	Forest and nature conservation act, 1995 Forest and nature conservation rules, 2006

Agency Role	Tasks	Regulatory framework
	approval of the Ministry, and "Imported timber Movement Order".	
8. Immigration Department Royal Bhutan Police Ministry of Home and Cultural Affairs	Role: Enforce law and order; provide immigration services Tasks: Control immigration; Regulate import and export of explosives Coordinate meetings with Indian neighboring states	Immigration act, 2007 Police Bhutan Act 2009 Explosive Act 1992
9. Royal Bhutan Army Border patrol Unit	Role: Civil law enforcement; Guarding of infrastructure Task: Conduct border patrol Issue permits for importation of arms and ammunitions.	Fixed arms and ammunition act, 1990 Army Act 1979
10. RSTA/ Ministry of Information and Communication.	Role: Provide and develop safe, reliable, efficient, cost effective and environment friendly transport services in support of strategies for socio-economic development of the country. Tasks: Supervise regulations applicable to road traffic (driver license, roadworthiness of truck,truck loads, truck permits for Indian trucks) Issue service license for trucks that entails them to transport goods in Bhutan, west Bengal and Assam. Issue permits for Indian trucks in Bhutan beyond Phuentsholing (normal and project equipment)	Road Safety and Transportation Act, 1999
11. BICMA/ Ministry of Information and Communication	Role: To create a conducive regulatory environment to promote a competitive and vibrant information, communications and media sector. Tasks: Issue permits for imports of wireless and remote sensing telecommunication and broadcasting equipment.	Telecom Act, 1999 Bhutan Information, Communications and Media Act, 2006

Source: Diagnostic Trade Integration Study 2012

・Exporter:

The total number of exporters is 93,[10] and about 30% of them engage in the trade of horticulture goods (such as orange and apple). More than half of them are located in Phuntsholing. The exporters of proceed food are only three (Bhutan Agro Industries Ltd, Bhutan Fruits Product Pvt. Ltd., Daga Shinday Tshogpa) which trade tinned fruit, juice, jam and tomato sauce and so on. Charru Tshongdel and Food Corporation of Bhutan deal with agricultural products, and the former exports red rice to United Sate.

[10] Table2-12 shows the total number of 115 among which a few companies have duplicate categories, therefore the net number is reduced to 93.

Table 2-12 Exporters in Bhutan

	Total Number	Phuntsholing	Thimphu	Samtse	Gelephu	Dagana	Paro	Samdrup Jongkhar;	Pemagatshel
Horticulture	34	18	4	2	5	3		1	1
Minerals	15	10		4				1	
Contruction Materials	12	10		2					
Furniture	10	6	4						
Herb and Spices	8	6	1				1		
Handicraft/Texitiles	7	2	5						
Beverages	6	4	1	1					
Chemicals & Seesntial Oils	5	4	1						
Base Metal Products	4	4							
Others	3	3							
Processed Food	3		1	1		1			
Agro Products	2	1					1		
Handmade Papers	2		1	1					
Mushroom	2	1					1		
Dairy Products	1	1							
Traditional Medicine	1		1						
	115	70	19	11	5	4	3	2	1

Source: The Exporter's Directory, Ministry of Economic Affairs (2010)

As procedures for exporters, following documents need to be prepared by them.

Table 2-13 Necessary Documentations for Export

Document	Number of copies	Responsible Body
Shipping bill	8	Shipping Company
Certificate of origin	8	Department of Trade
Commercial invoice	8	Exporter
Export declaration form	1	Department of Revenue and Customs
Certificate of payment	1	Bank
Phytosanitary certificate	1	Ministry of Agriculture
GSP form	1	Department of Trade
Insurance certificate	3	Insurance company
Packing list	8	Exporter
Export permit	1	Relevant ministries

Source: Bhutan Traders Manual (MOEA 2007)

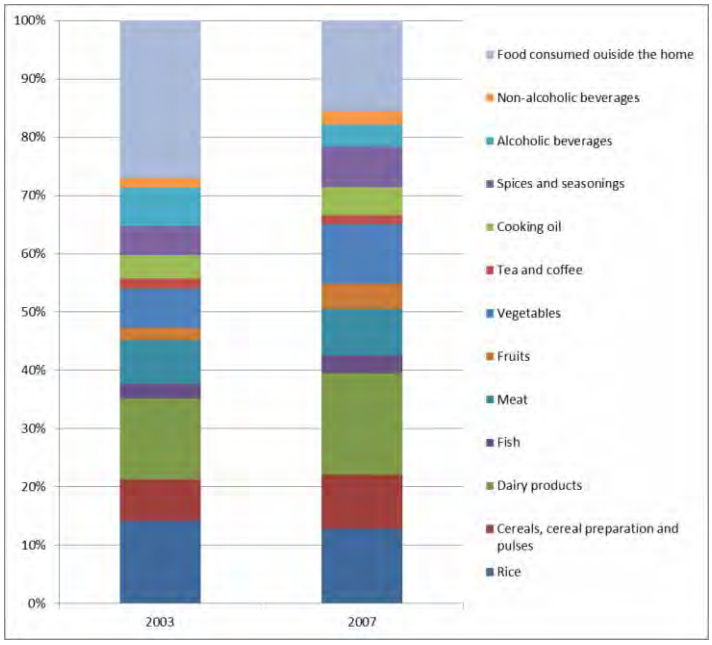
・Importer:

The total number of registered importers is approximately 1,300. 65% (855 importers) of them are located in Thimphu and 19% of them are located in Phuntsholing and Gelephu (242 importers in the two cities). Most of imported food items are distributed through these three cities.

(3) Consumption Activities

Comparing food consumptions between 2003 and 2007, vegetable, dairy products, spice, cereal/pulse, and fruit show increased proportions, while food consumed outside the home, and alcohol are on decrease[11]. The proportion of rice has been stable with 13-14%.

[11] However, the bureau of statistics mentioned that the in a reality, the amounts of food consumed outside and alcohol are increasing.



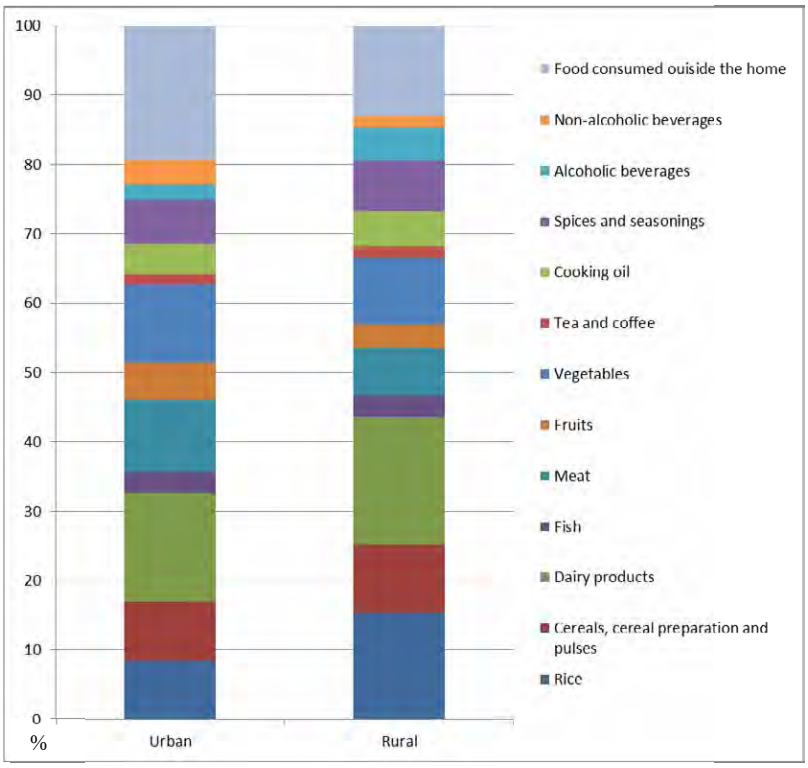
Source: Living Standard Survey 2003 and 2007

Fig. 2-12 Food Consumption between 2003 and 2007

Compared to the urban[12], the rural has more proportions of food items such as rice, dairy products and alcohol, which give us an assumption that rice and dairy products are consumed more due to easy accessibility in production sites. On the other hand, food consumed outside the home, meat, fruit vegetable have lower proportions in rural than urban.

According to the bureau, one reason of decreasing figure could be that the south area was excluded for security reason in 2003 LSS.

[12] According to the Living Standard Survey, urban area include all the district headquarter towns, satellite towns and Phuentsholing and Gelephu towns.



Source: Living Standard Survey 2007

Fig. 2-13 Food Consumption by Area (2007)

Chapter 3

Present Institutional Situation relating Food Security Policy

Chapter 3 Present Institutional Situation relating Food Security Policy

3-1 Review of the Tenth Five Year Plan of Bhutan（2008-2013）

Poverty reduction has been set up as the main objective and primary theme of the Tenth Plan (2008-2013) with strategic priorities and development targets to be achieved within the broad context of Bhutan's long term development vision and outlook.

The table below shows the key policy objectives and the strategic initiatives of the RNR sector, which emphasize the importance of enhancing food production, promoting accessibility to food, improving domestic and international marketing and imports of food.

Table 3-1 Key Policy Objectives and the Strategic Initiatives of the RNR Sector in the 10th Five Year Plan

The policy objectives of the RNR sector	
◆ Enhance sustainable rural livelihoods through improved agricultural and livestock productivity and expansion of commercial prospects of agriculture and other natural resource endowments; ◆ Conserve and promote sustainable commercial utilization of forest and water resources; ◆ Promote sustainable utilization of arable agriculture and pasture land resources; ◆ Enhance Food Security through sustainable and enhanced food production and availability, improved access to food and enabling effective distribution, marketing and import of food; ◆ Transform subsistence agriculture to small scale commercial agriculture without compromising food security.	
The strategic initiatives of the RNR sector	
1. Increased agriculture, livestock and forestry productivity and production; 2. Adaptive and applied RNR research to generate technologies relevant to farming community and departmental programs; 3. Creation of an enabling policy and legal framework for participatory and sustained use and management of natural resources; 4. Improving planning and management of programs in line with the pillars of GNH, MDGs, SDGs; 5. Strengthening RNR information management and it application to planning, monitoring and evaluation of plans and programs; 6. Strengthening delivery of extension services by integrating with one stop farmer services; 7. Creating an enabling financial environment to provide increased access to and types of credit and savings schemes; 8. Enhancing farm mechanization to improve agricultural labor productivity and efficiency, value addition and specialization in addition to alleviating farm labor shortages and drudgery;	9. Strengthening agriculture marketing mechanisms to expand local markets for primary products and enhance exports of NWFPs and other low-volume and high value niche export products through a higher degree of specialization, standardization and certification; 10. Promoting farmers cooperatives and marketing boards to facilitate domestic and international market linkages and improving supply chains; 11. Developing adequate levels of rural and agricultural infrastructure; 12. Diversifying the economic base of the RNR sector through the promotion of high value niche or organic products and agro and eco-tourism initiatives; 13. Enhancing integrity of natural resources through improved and participatory management of protected areas, sustainable utilization of forests, land and water resources; 14. Promoting economic growth and alternative employment opportunities; 15. Improving the monitoring and evaluation of RNR programs.

The targets especially for food security are shown in the table below. The self-sufficiency rate for rice is targeted to reach 65 % (production volume of 62,474Mt/annual) by the end of the tenth five year

plan. The mid-term review of 2011 remarked that the self-sufficiency rate for rice was expected to reach up to 55 % by 2013.

Table 3-2 The Targets for Food Security in the 10th Five Year Plan

The Target for Food Security	Comments in Mid-Term Review
1. Self-sufficiency in rice increased from 50% to 65%, from the present level of 54,325 Mt per year to 62,474 Mt per year	1. Achieved 50% rice self-sufficiency; will achieve 55% rice self-sufficiency by end of the 10th plan.
2. Cereal production including paddy increased from 140,000 to 150,000 Mt per year	
3. Portion of wetland with dry season irrigation increased from 40% to 70%	
4. Prime agriculture land identified and maintained purely for agriculture production	
5. Loss of/from crop damage by wildlife reduced from 40% to 20%	5. Implemented the Human-Wildlife Conflict Management Strategy.
6. At least 30-40% of farmers practice sustainable land management	
7. Livestock productivity enhanced from 1.9 kg milk/day/animal (2007 level) to 2.2 kg milk/day/animal	
8. Increased dairy production from 7,179 Mt (2007 level) to 7,897 Mt	8. Domestic egg production able to meet the internal demand, and milk and milk products are now supplied to about 18 towns.[1]
9. Increased meat (poultry, pork, beef and fish) production from 2,001 Mt (2007 level) to 2,202 Mt	
10. Quality and quantity of seeds and planting materials supply increased from 2% to 50% of requirement	
11. Availability and access of food crops increased from 100 Mt to 600 Mt	

The mid-term review reported other progress on enhancing production and marketing, which included a formulation of One-Gewog Three-Products (OGTP) Strategy and initiations of FDI (Foreign Direct Investment) in hazelnut plantation in the east with Mountain Hazelnut Venture and coffee plantation in Samtse. The report also highlighted the urgent and pressing issues of the RNR sector such as:

- The declining agriculture productivity as measured in terms of yield per hectare;
- High maintenance cost of farm roads, lack of proper criteria for farm road prioritization, and absence of farm road construction and management strategy; and
- The sustainability of farm mechanization in Bhutan, and it being totally dependent on KRII grants and a few private sector players.

3-2 The Eleventh Five Year Plan of Bhutan（2013-2018）

The eleventh five year plan is in process of drafting, for which GNH commission published a guideline that sets up the overall goal as “Self-Reliance and Inclusive Green Socio-Economic Development”.

The key objectives of the RNR sector under the guideline are to i) Enhance food and nutrition security, ii) Improve Rural Livelihood iii) Accelerate and sustain RNR sector growth and iv) Promote

[1] The self-sufficiency rate in egg calculated based on RNR statistics in 2010 is 79%, however surplus of egg is currently recognized.

sustainable management and utilization of natural resources. To achieve these key objectives, especially on production and marketing, the guideline established target outcomes as summarized in the below table. A production volume of cereal shall be increased to 195,000 Mt/annual by 35 % from the present volume of 143,638 Mt/annual

Table 3-3 The Development Plan of the RNR Sector（Production・Marketing）in the 11th Five Year Plan

Key Objectives	Key Outcomes	Key Interventions
Enhance food and nutrition security	・ Cereal self-sufficiency 195,000 Mt/pa; ・ Milk production 34,000 Mt/pa; ・ Egg 39 Mt/pa; ・ Vegetable 145,000 Mt/pa; ・ Fruits & nuts 100,000 Mt/pa; ・ Spices (cardamom & ginger) production 6,000Mt/pa; ・ Oil crops 2,000 Mt/pa ;	・ Cultivated area under farm mechanization 66,438 acres; ・ Area of crop production loss to vertebrate pest reduced 5,000 acres; ・ Proportion of Kamzhing brought under sustainable land management 15 %; ・ Proportion of area under assured and improved irrigation 25 %; ・ Consolidated underutilized Private Land for Commercial farming 2,000 acres; ・ GRF leased for commercial farming 2,000 acre; ・ Establish food distribution and marketing infrastructure - grading, packaging & cold storage 16; ・ Promote Brand Bhutan, organic farming and establishment of farmers cooperatives/enterprise 225; ・ Facilitate tie-ups with regional marketing agriculture firms; ・ Collaborative efforts on nutrition between MoH and MoAF; ・ Review roles/impacts of RNR extension ・ Inventory of all furits and vegarables and nutritional values developed for all Dzongkhags. ・ School Agriculture Prograame Promoted 300
Generate additional employment opportunities and increase mean annual rural household cash income.	・ Rural household (about 80,000) annual cash income RNR products Nu. 4,280 million; Off-farm RNR Nu. 856 million ; ・ Number of people employed 25,300	
Accelerate RNR sector growth through commercial farming and agriculture, livestock and forestry enterprises	・ Increase mean annual value of exports to Nu. 2,000 Million/pa; ・ Increase private sector investment/FDI in RNR sector Nu 1,000 million; ・ Annual growth rate in RNR sector 4 %; ・ Investment on large scale commercial farming enterprise 799; ・ Number of RNR based micro-enterprise (investment upto Nu. 0.5 million) - 13,096	

3-3 The Food and Nutrition Security Policy of the Kingdom of Bhutan, 2010

The Food and Nutrition Security Policy which is to be submitted to the cabinet around the end of July2012, proposes the four policy goals and their objectives as follows:

Table 3-4 Policy Goals and Objectives of the Food and Nutrition Security Policy

Policy Goals	Objectives
1. Ensure availability of safe and adequate varieties of food to meet food requirements of the population at all times.	1.1. Ensure sustainable domestic food production and productivity. 1.2. Strengthen sustainable management of natural resources for food production. 1.3. Maintain safe and adequate food reserves at strategic locations and enable efficient distribution mechanisms at national,

Policy Goals	Objectives
	regional and community levels.
	1.4. Enable increased levels of safe food imports and improve access to international food distribution facilities.
2. Enhance physical, economic and social access to safe, affordable and adequate food including resources (entitlements) to acquire food by households and individuals.	2.1 Increase efficiency in safe food marketing, trade and distribution systems within the country.
	2.2 Diversify sustainable rural and urban based livelihood options for income generation.
	2.3 Improve delivery of social support to poor and socio-economically vulnerable communities and individuals
3. Promote appropriate consumption practices and enable optimum utilization of food by all sections of the society.	3.1 Promote healthy food habits and dietary diversification.
	3.2 Promote appropriate Infant and Young child feeding practices.
	3.3 Promote nutrition education and other interventions to address malnutrition, obesity and other lifestyle diseases.
4. Sustain conducive and stable environment for availability, accessibility and utilization of food.	4.1 Develop and implement adaptation and mitigation measures for longer term climate and environmental changes.
	4.2 Improve disaster preparedness capacity to respond to disasters.
	4.3 Ensure interventions in markets and price stability of food commodities.
	4.4 Ensure use of clean and safe drinking water and improved sanitation.

Source: Food and Nutrition Security Policy (draft as of January 2012)

The Food and Nutrition Security Policy proposes to set up the High Level Food and Nutrition Security Committee where all related sectors are involved. This could provide strategic directions. The proposed members of the high level committee are as follows:

1. The Minister, Ministry of Agriculture and Forests, Chairperson
2. The Secretary, Ministry of Agriculture and Forests, Member
3. The Secretary, Ministry of Education, Member
4. The Secretary, Ministry of Health, Member
5. The Secretary, Ministry of Economic Affairs, Member
6. The Secretary, Ministry of Home and Cultural Affairs, Member
7. The Secretary, Ministry of Finance, Member
8. The Secretary, National Land Commission Secretariat, Member
9. The Secretary, Ministry of Information and Communication, Member
10. Representative, Office of the Gyalpoi Zimpon, Member
11. The Director, National Statistical Bureau
12. Representative of the Bhutan Chamber of Commerce and Industries (for Private Sector),
13. Representative of the Civil Society Organizations, Member
14. Representative of Farmers' Cooperatives/Federations,

15. Representative of Food Corporation/Corporate agencies dealing with food import/export and distribution,
16. Representative of International Organizations and Development Partners, as observer,
17. Any other observer member/resource person as deemed fit by the Committee,
18. The Secretary, GNHC Secretariat, Member Secretary

The policy also proposes that under the secretary of the high level committee, a national Technical Taskforce shall be instituted to produce the annual report, monitor and evaluate implementations of the policy. The policy proposes that he committees at Dzongkhag and Gewog levels also shall be set up.

3-4 Legal Arrangements for Food Security

There are various regulations which can promote food security while there are unfavorable ones. The contents are summarized in the following tables:

Table 3-5 Legal Arrangements Enabling Food Security

Name of Legislation	Relevant Provisions	Remarks
1. Constitution of Bhutan, 2008	**Article 7(9) provides that:** A Bhutanese citizen shall have the right to own property, but shall not have the right to sell or transfer land or any immovable property to a person who is not a citizen of Bhutan, except in keeping with laws enacted by Parliament. **Article 9(9) provides that:** the State shall endeavor to achieve economic self-reliance and promote open and progressive economy. **Article 9 (22) provides that:** the State shall endeavor to provide security to people in the event of sickness and disability or lack of ad- equate means to descent livelihood.	The Constitutions does not provide for food security directly but is implied in its provision related to fundamental rights of a citizen and the principles of state policy.
2. Water Act of Bhutan, 2011	**Section 4(a) provides that:** the purpose of the act is to ensure that the water resources are protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner. **Section 6 provides:** for a coordinated development, management, conservation and efficient use of water resources. **Section 15(d) provides that:** that the Ministry of Agriculture shall be responsible for land-use and irrigation, watershed management, water resources in forests, wetlands and protection of catchment areas;	The Act provides for the management of the water resources of Bhutan including conservation, development and utilization of water resources. This Act is important for food security as it recognizes access to water as a right of every citizen and a responsibility of the state to provide. It establishes the

Name of Legislation	Relevant Provisions	Remarks
	Section 38(a) provides that: the order of priority for water use shall be : i. water for drinking and sanitation; ii. water for agriculture; iii. water for energy; iv. water for industry; v. water for tourism and recreation; and vi. water for other uses **Section 39 provides that:** the allocation of water shall be done based on the principle that water is a resource owned by the State and that every citizen has an equal right to these resources. **Section 47 provides that:** the relevant Competent Authority shall facilitate harvesting of ground water, rain water, fog and any other sources to prevent local and seasonal water scarcity.	institutional arrangement for water management and recognizes the role of traditional water user associations and most importantly takes into consideration the increasing demands on water resources and future needs as vital for the food security of future generations.
3. National Environment Protection Act, 2007	**Section 18 provides that:** the conservation of natural resources shall be based on a participatory approach aimed at achieving an equitable sharing of the costs and benefits of conservation among resource users. **Section 71 provides that:** the Commission, in consultation with other relevant agencies shall ensure conservation and protection of wetlands, alpine regions, watersheds, and other vulnerable ecosystems in addition to the existing protected areas	This act aims to protect the environment by recognizing the principles of environment protection, establishing an autonomous body and also by providing for management of pollution and offering opportunity for public participation.
4. Food Act of Bhutan, 2005	**Section 18 (b) provides that:** on its own initiative, discuss any matter connected with the enhancement of food control in the Kingdom, with regard to production for the national market, import and export; **Section 18(e) provides that:** the *NFQSC in the case of a food emergency, shall identify the organizations or units responsible for taking action, specify the actions to be taken, coordinate a national response and keep records of any such food emergencies food emergency situation. **Section 33 provides that:** **BAFRA shall exercise all responsibility for and oversight of food inspection activities carried out in Bhutan.	The preamble of the Act provides for protection of human health and to regulate and facilitate the import, export and trade of food. This act is important for food security as it looks into the availability aspect of food such as food control and import and export of food to Bhutan. Further, it also encompasses the utilization aspect of food security as it lays down the responsibilities and procedures for food inspection by

Name of Legislation	Relevant Provisions	Remarks
		BAFRA. *NFQSC means National Food Quality and Safety Commission. **BAFRA means Bhutan Agriculture and Food Regulatory Authority.
5. Civil Society Organization Act of Bhutan, 2007	**Article 6(a)&(b) provides that:** CSO shall supplement and complement the efforts made by the government to protect human life and health and prevent and alleviate human suffering and poverty.	The Civil Society Act is important to food security as it enables a non-government sector to look into the welfare of the community.
6. Local Government Act of Bhutan, 2009	**Section 26 (b) *provides that:*** the local government shall ensure the provision of social and economic services for the general wellbeing of the residents of the communities in a sustainable and equitable manner. **Section 49 provides that:** (a) the *Dzongkhag Tshogdu shall promote balanced socio-economic development in the **Gewogs and ***Thromdes in the ****Dzongkhag; b) the Dzongkhag Tshogdu shall promote cooperatives, small and medium enterprises which contribute to generation of employment and welfare; e) the Dzongkhag Tshogdu shall protect consumers from unfair prices and counterfeit goods in accordance with the law; **Section 53 provides that:** a)the *****Gewog Tshogde shall frame and enforce rules for protecting the health, safety and well-being of the people of the Gewog. b) the Gewog Tshogde shall regulate and allocate safe and clean drinking water from water supply schemes. c) the Gewog Tshogde shall regulate allocation of irrigation water in accordance with the provisions of the relevant laws.	As per this Act, the local government is directly responsible for the provision of a wide range of services affecting food security such as irrigation, economic diversification, income generation, regulating community forest, increasing crop yields etc. However, the benefits of these provisions will only be clearer on the adoption of the rules under the Local Government Act. *Dzongkhag Tshogdu means a district council. **Gewogs means a county. ***Thromde means a municipality. ****Dzongkhag means a district. *****Gewog Tshogde means a county committee
7. Land Act of Bhutan, 2007	**Section 117 provides that:** where necessary in the interests of the nation and/or for those landowners whose land have been destroyed by natural calamities, the Government may exchange a rural registered land with the Government Reserved Forests land.	The Act is envisaged to manage, regulate and administer the ownership and use of land for socio-economic development and environmental well-being of the

Name of Legislation	Relevant Provisions	Remarks
	Section 147 provides that: the landowner shall have the discretion to opt for substitute land or cash compensation offered by the Government in case of the land acquired from rural areas. **Section 210 provides that:** the application for land to establish commercial agriculture farms shall be submitted to the Local Authority in a prescriptive format issued by the Ministry of Agriculture. **Section 130 provides that:** The Government may enforce, by an order in writing, fiscal measures or any other means to discourage under-utilization and under development of registered land. **Section 189 provides that:** As per the Constitution of Bhutan, petitions for *Kidu land shall be submitted to His Majesty the King. Kidu land shall be registered according to the provisions of the Kasho. **Section 190 provides that:** Applications for **rehabilitation land shall be submitted to the Commission through the Local Authority in the format prescribed by the Commission. **Section 257 provides that:** Only those who have agricultural land shall be eligible to lease ***Sokshing on individual as well as on community basis.	country through efficient and effective land administration, equal opportunity to land, facilitation of the operation of the land market, effective use of land resources and conservation of the ecosystem. This Act is important to food security as it recognizes ownership of land and security in terms of tenure of land ownership which is vital to food security. Further, it also incorporates aspects such commercial farming on GRF land, welfare schemes such as Kidu and rehabilitation land and opportunity to exchange rural land destroyed by emergencies for government reserve land. * Kidu land means the land granted by His Majesty the King through Kasho as Kidu. **Rehabilitation land means the land granted by His Majesty the King through Kasho to marginal farmers, farmers whose land has been destroyed by natural calamities, farmers living in ecological-risk prone areas, and landless households. ***Sokshing means a plot of the Government Reserved Forest land leased out for leaf litter production and collection.
8. Income Tax Act of	**Section 3 provides that:** provides that 30 per cent of the	Under the Personal Income Tax,

Name of Legislation	Relevant Provisions	Remarks
the Kingdom of Bhutan, 2001	cash crop income shall be allowed as a deduction to meet the cost incurred to secure the income.	the allowable deduction for income for cash crop is 30% while the allowable deduction for income from real properties is only 20%.
9. Nature and Forest Conservation Rules, 2006	**Section 15 provides that:** permits the following activities in Government Reserved Forests without a permit, for his own domestic use in rural areas, provided they are conducted in compliance with all of the requirements of these Rules and technical guidelines issued by the Department, from time to time (collection of mushrooms, ferns etc) **Section 16 provides that:** the Ministry may lease certain parts of the Government Reserved Forest for a fixed period of time to any person for raising industrial plantations, protection from environmental degradation, or for any other type of improvement works or other purposes.	This act protects sustainability of forest resources as forests are important to food security as a source of income, as a habitat for various plants and animals which are food sources, and as a vital part in the earth's ecosystems. In particular for food security, it allows for harvesting of forest produce for domestic consumption in the community and provides opportunity for lease of GRF land.
10. Livestock Act of Bhutan, 2000	**Section 6.1 provides that:** the Ministry may establish its own farms for the genetic improvement and conservation of livestock, poultry and fish. **Section 36.5 provides that** the Ministry shall identify quarantine stations to check flow of diseases into the country and institutions for conducting laboratory tests to ensure standards are maintained.	This Act aims is to regulate livestock breeding, health and production in order to enhance their productivity and preventing diseases to enhance rural income and livelihood.
11. The Plant Quarantine Act of Bhutan, 1993	**Section 5 (c) provides that:** the government shall prohibit the import into Bhutan from any country, or countries, outside Bhutan of plants, goods, plant products and soil which are likely to be a means of introducing or spreading plant pests into the country for the purposes of international plant quarantine. **Section 6 (d) provides that:** the government shall prescribe treatments for the elimination of plant pests from imported plants, plant products, goods and any other materials that may be infested, **Section 6 (e) provides that:** the government shall prescribe	This Act aims to prevent the introduction of pests into Bhutan, which are not present or widespread in the country as well as to control those pests already in the country by restricting their spread and by endeavoring to eradicate them. It helps food security by ensuring that plant, plant products and soil

Name of Legislation	Relevant Provisions	Remarks
	measures to be taken for the treatment of any notifiable plant pest by the owner or occupier of any land in Bhutan declared to be infested or suspected of being infested with a plant pest, **Section 6 (f) provides that:** the government shall prescribe measures to be taken for the diagnosis and prevention of pests for the purposes of quarantine.	is not endangered by pest in the country and new pests introduced in Bhutan.
12. The Seeds Act of Bhutan, 2000	**Section 3.2 provides that:** the National Seed board shall advise the Ministry of Agriculture on all matters related to development of national seed program in the country and the administration of this Act.	This Act aims to regulate import and export of Agricultural seeds, to prevent introduction of plant pests and diseases and to promote seed industry in the country in order to enhance rural income and livelihood.
13. Biodiversity Act of Bhutan, 2003	**Section 18 provides that:** the Competent Authority may restrict breeder's rights in relation to plant varieties protected by these provisions in order to permit small farmers, as defined in the regulations of this Chapter or at the discretion of the Competent Authority, to propagate seed which they have harvested on their holding and to exchange that seed with others on a non-commercial basis.	The Act confers on the person(s) who (jointly) bred and developed the plant variety or in her/ his or their successor(s) in title.
14. Cooperatives Act of Bhutan, 2001	**Article 25 provides that:** there shall be a Reserve Fund as a buffer fund of the co-operative to cover for its financial limitations that are brought about by economic or business dislocations such as price fluctuations or inflation or brought about by fortuitous events such as earthquakes and fires and to meet net losses in its business operations. **Article 11 (1) provides that:** Co-operative bank may be organized to provide financial services to primary co-operatives, federation of co-operatives and insurance co-operatives and to serve as the financial arm of the co-operatives in the economy. The Royal Monetary Authority (RMA), upon consultation with the MOHA and the Co-operative Sector, shall issue and implement the rules governing the banking operations of co-operative banks. A co-operative bank shall be registered with the MOHA after the issuance of the licensed to operate as a co-operative bank by the RMA. A registered and licensed co-operatives bank may offer all types of banking services	This act facilitates the development of co-operatives as strong and sustainable pillar of the private sector that will contribute to the economic development of the Bhutanese society, especially the poor. It also provides scope for the development of cooperatives bank as other financial banks generally do not reflect the needs of the farmers/rural folks.

Name of Legislation	Relevant Provisions	Remarks
	needed by member- cooperatives and may open a maximum of twenty person (20%) of its loan portfolio to the general public.	
15. The Cooperative (Amendment) Act of Bhutan, 2009	**Article 2(2) provides that:** the Primary Co-operatives means the first level of co-operative under this Act formed either by individual farmers, individual non farmers, farmers' groups, whose main purpose is the provision of quality products and services to satisfy the economic needs of the members and their communities. **Article 2(20) provides that:** Farmers group means a group of not less than three members deriving economic benefits from one or more economic enterprises related to Renewable Natural Resource Sector.	The amendments incorporates farmers group in the Act thereby facilitating the formation of farmers groups and giving farmers groups a legal entity.
16. Centenary Farmers Market Rules and Regulations	**Section 4 provides that:** all persons who produce and deal in agriculture, livestock and non-wood forestry products, cereals, ornamental plants, local seeds and seedlings excluding commercially packaged products and processed foods, hereafter referred as "farm produce" are eligible to sell in the Centenary Farmers Market subject to availability of stalls.	These rules provide access of national markets to local farmers to sell their farm produce.
17. Guidelines for Farm Road Development, 2009	**Section 4 provides that:** prioritization/ selection of farm roads will be done by the Gewog Tshogde based on the criteria set by the Department of Agriculture. The overriding principle of farm roads to production and potential production areas should not be compromised during implementation.	This Guideline has been developed in line RGoB policy in relation to providing market connectivity to villages with greatest agricultural potential that will help reduce rural poverty.

Table 3-6 Legal Arrangements not Conductive to Food Security

Name of Legislation	Relevant Provisions	Remarks
1. Constitution of Bhutan, 2008	**Article 5(3) provides that:** the Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time.	Although this provision from a conservation point of view is good but it has implication on food security because of the scarcity of suitable land for agriculture in Bhutan.
2. Water Act of Bhutan, 2011	**Section 44(i) provides that:** if the water resource for irrigation is deemed insufficient, a water user shall not initiate	*kamzhing means dry land **chhuzhing means wet land

Name of Legislation	Relevant Provisions	Remarks
	any activities that would require additional water, including conversion of *kamzhing to **chhuzhing.	
3. Land Act of Bhutan, 2007	**Section 64 provides that:** the land ceiling for a family and, those Organizations and entities not listed in Section 68 of this Act shall be 25 acres consisting of one or more land categories as specified in Section 19 of this Act. **Section 92 provides that:** a landowner without a house and having only inherited Chhuzhing in his Thram may apply for one plot of 50 decimals in rural area for residential land from such Chhuzhing to the Local Authority in accordance with Sections 167 to 169 of this Act. **Section 127 provides that:** if a Bhutanese citizen had submitted an application on the transfer of ownership of his land to the Local Authority before his migration to another country in accordance with the provisions of this Act, such land shall be transferred in the name of the beneficiary. Otherwise, such land shall be taken over as the Government land or Government Reserved Forests land.	Once a land is declared Government Reserve Forest, the land remains unutilized in terms of agricultural activity.
4. National Environment Protection Act, 2007	**Section 68 provides that:** the Commission shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the fragile mountain ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time. Any changes in the present national forest cover and protected areas shall be made only by the Parliament.	Although this provision from a conservation point of view is good but it has implication on food security because of the scarcity of suitable land for agriculture in Bhutan.
5. The Financial Services Act of Bhutan, 2011	**Section 14 provides that:** only a public limited company listed with the stock exchange in Bhutan, shall be licensed as a financial institution. However those financial institutions falling under Section 52 of this Act shall be exempt from the requirement to list on the stock exchange.	The CSO Act does not provide for entrance of CSOs in the microfinance sector and the proviso applies to financial institutions where shares are held directly or indirectly by the Royal Government of Bhutan
6. Moveable and Immovable Property Act of The Kingdom of Bhutan, 1999	**Section 17 provides that:** except as otherwise provided by this Act, or any other Act of the Kingdom of Bhutan, any person may stipulate for, allow and exact, in any contract or agreement, any rate of interest or discount that is agreed upon by the parties to the transaction; provided, however, that no lender other than a registered financial institution which has	The regulatory framework is not conducive for the development of microfinance in the country. Currently loans schemes such as Group guarantee lending scheme

Name of Legislation	Relevant Provisions	Remarks
	been duly licensed to engage in the extension of credit, may charge interest greater than 15 percent per annum expressed as a simple annual rate.	(GGLS) are provided. GGLS is provided for a maximum loan size of Nu.100,000/- and an interest rate of 13 % per annum is charged, which is more than the interest rates charged on construction loan .
7. Local Government Act of Bhutan, 2009	**Section 54 (k) provides that:** the Gewog Tshogde shall accord approval for hiring and mobilization of labour for the upkeep of communal facilities in accordance with the rules made by the Royal Government.	Mobilization of labor from the community often keeps farmers in the rural areas away from their farms to support the developmental activities of their community.
8. Nature and Forest Conservation Rules, 2006	**Section 65 provides that:** (1) Totally protected species (a) A person, who discovers any totally protected wildlife on his land, may use non-lethal means to attempt to scare the offending animal into the forest. Such person shall not attempt to kill or poison such animal, even if it threatens, kill or lifts livestock. (2) Other species A person who discovers any animal that is protected under Rule 63(3), above, on his land may kill such animal, only if necessary, to prevent destruction of his property, livestock, or crops. No legal action shall be initiated against any individual if proven that the wild animal under the category has been killed in his own agricultural field. However, statement of *Chiwog Tshogpa shall be accepted in case the animal was shot in private land while destroying crops/lifting livestock and later died in government land within 200 m from the boundary of the agricultural land.	*Chiwog Tshogpa means a member of the local government. Due to the stringent protection of wildlife in Bhutan, in most instances farmers in the rural areas lose their harvest to wild life.

3-5 Incentives and Subsidy to Achieve the Policy

The subsidies in the RNR sector are classified into two categories. One is the subsidy for 10% commission for sales agents of agricultural inputs, and the other is the subsidy for the transportation fees for the transportation company which distributes all kinds of inputs to each district. These subsidies enable 60 – 70% of farmers to buy inputs at the uniform low prices.

The mechanism and the flow of this subsidy are as follows. Every year the agricultural extension officers collect the requests from the farmers and make the proposed lists of agricultural inputs for the targets of the subsidy, which are submitted to NSC. NSC distributes those inputs to 72 sales agents in Bhutan, who are selected by local parliaments and located in district or gewog level. The sales agents are obligated to sell those inputs to farmers at the prices excluding the amount of commission. After sales of the inputs, the sales agents bill the 10% commission to the district, then the district pays the commission from their own budgets.

On the other hand, the subsidy for transportation fees is provided by the Ministry of Agriculture and Forest. The ministry selects one transportation company by bid tendering annually. The company transports every kind of agricultural inputs from NSC or other supply stations to each district. After the transportations, the company bills the transportation fees to the ministry through NSC. The annual amount of the subsidy for those fees is about Nu. 10 million. Tis subsidy makes it possible to keep the uniform pricing of inputs in all districts

Table 3-7 Current subsidies provided on an annual basis in the agriculture subsector

Category of Subsidy	Annual Amount (Nu)	Providers
Direct budget suppurt to NSC	10,000,000	MOAF
Subsidy on transportation	10,000,000	MOAF
Subsidy on 10% commission	10,00,000～20,000,000	Districts

Source: hearing at MOAF

Currently MOAF is studying a policy to guarantee minimum prices for several main crops such as rice, potato and all kinds of vegetables especially targeting large-scaled farmers under the agricultural development policy which is being drafted.

3-6 Environment surrounding the Policy and Affecting Factors

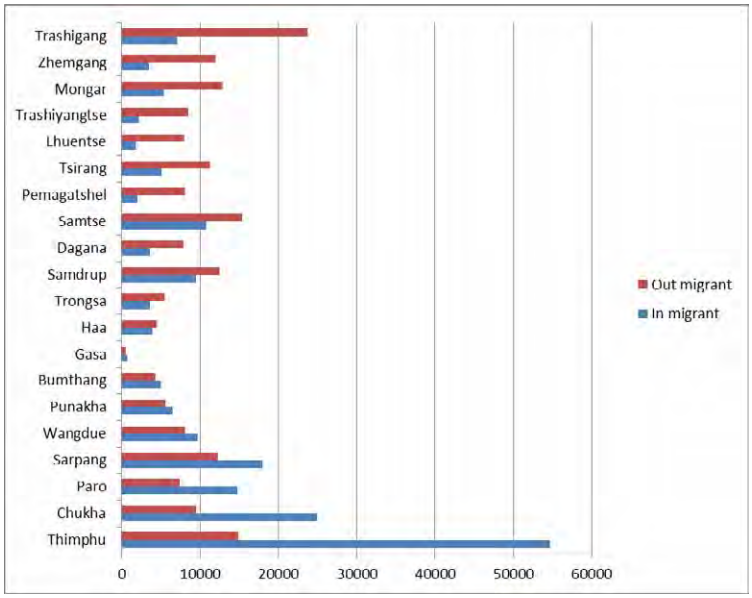
Bhutan is facing social and environmental changes which could affect a policy for food security. Among those factors, four major issues are listed up as follows:

(1) Migration

According to the survey in 2004, about a half of rural households (47%) responded that more than one member in their family have migrated out to other areas[2]. It was also answered that 59% of migrants

[2] Rural-Urban Migration in Bhutan. MoAF 2006

were male, which changed gender balance in rural areas. The report of McKinsey shows that 16% of Bhutan's rural population has migrated in the last 15 years.



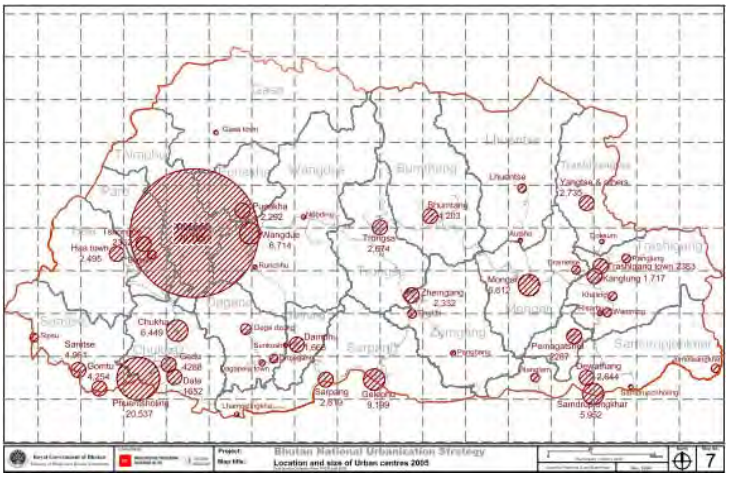
Source: Population & Housing Census of Bhutan(2005)

Fig. 3-1 Out migrants and In migrants by district (2005)

As shown in the above figure, Thimphu accepted the largest number of migrants (54,685) followed by Chukha (24,951), Sarpang (17,997) and Paro (14,759) in 2005. On the other hand, Trashigang lost the largest number of people (out migrants of 23,802, and net of 16,697).

(2) Urbanization and Increasing Unemployment Rate

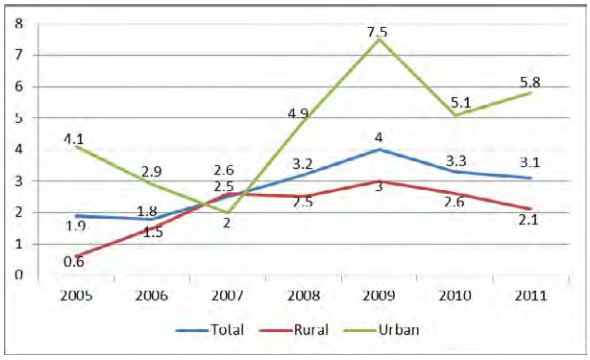
According to the Population Census in 2005, the rural population grew at an annual rate of only 0.6% between 1985 and 2005, compared to the urban population growth rate of 6.1%. The world development indicator also indicates increasing proportion of the urban population, which shows rural proportion decreased from 68% to 63%, and urban increased from 32% to 37% between 2006 and 2010.



Source: Bhutan National Urbanization Strategy 2008

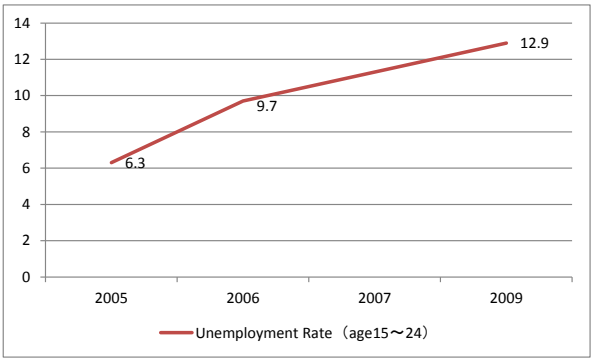
Fig. 3-2 Location and Size of Urban Centre 2005

As shown in the map above, the urban population is concentrated in Thimphu, and its urban population is 79,185. In parallel to urbanization, unemployment situation has been deteriorating with the highest unemployment rate of 7.5% in 2009. Especially, the youth (age 15 to 24) have been posed a higher rate.



Source: Labor Force Survey2009,2011

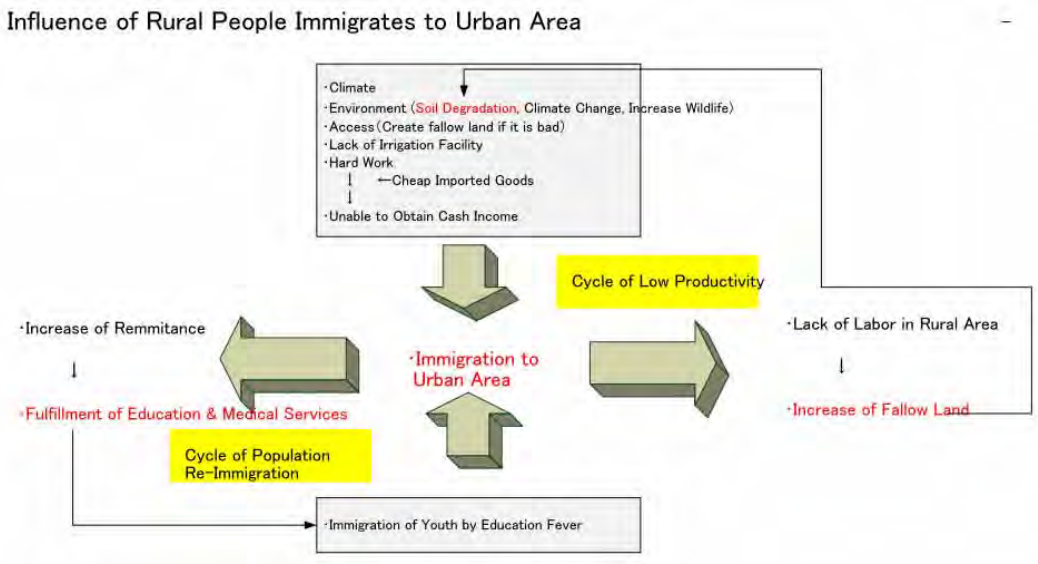
Fig. 3-3 Unemployment Rate(Rural and Urban)



Source: World Development Indicator

Fig. 3-4 Unemployment Rate（Youth）

The Bhutan National Strategy (Ministry of Works and Human Settlement) forecasts that in 2020 the population will reach over 770,000 and the urban population will reach 564,000. The strategy shows concerns that rural-urban migration is likely to accelerate in the case of the absence of mitigating measures, and this will lead to increasing congestion, environmental degradation, conflicts of interest, and socioeconomic problems in the cities, as well as a loss of active rural society.



Source: made by the study team

Fig. 3-5 Influence of Rural People Immigrates to Urban Area

Immigrations to urban from rural area lead to two vicious cycles. One is a cycle of low productivity, and another is a cycle of population re-immigration to urban.

(3) Relation with India

・Rupee Crunch (Crisis)

In the context of repayment of accumulated debts to India, the immediate problem so called "Rupee Crunch", in which the government restricts release of Indian Rupee, has become to be a top concern for people because of high dependency on imports from India. The Rupee Crunch hampers people from procuring goods such as materials for construction from India due to lack of Indian Rupee, and causes inflation in goods. Especially around the border areas, it is seen that dealers who trade with Indian face difficulties to purchase goods including vegetables from Indian traders due to lack of Indian Rupee. This experience is stimulating people's awareness to move forward to increasing domestic productions.

Table 3-8 External Debt

	2006/07	2007/08	2008/09	2009/10	2010/11
Convertible Currency(USD)	308.8	350.4	347.4	385.4	550.1
Indian Rupee	**18,369.9**	**18,948.4**	**21,400.7**	**22,777.9**	**34,062.3**

Source: Monthly Statistical Bulletin, RMA (2012April)

・Export Ban of Rice

India had been importing cereals between the time of its independence and 1970s. However, the experience of the food crisis in 1965 and 1966 made the government shift to the new agricultural policy called "green revolution", in which India made agricultural investments on high quality seeds, fertilizers, chemicals, and irrigation facilities. As the result of the green revolution, India achieved its self-sufficiency for rice, and then started rice export in the middle of 1990s.

However, soaring prices of cereals worldwide between 2007 and 2008 made Indian government take measures to ban the rice export for curbing the domestic inflation. At the same time, the government increased both the minimum support price and the minimum export price. As the result of these regulations, the volume of the rice export decreased from 630 million MT in 2007 down to 338 million MT in 2008[3].

India banned the rice export to Bhutan in March 2008, however, this export ban was lifted one month after as a result of a high level bilateral talks between two countries. As the ban lasted only one month, there was no significant change in the total volume of the rice import from India between 2007 and 2008. However, this experience caused some psychological pressure on Bhutan. In February 2012, Bhutan requested India to exempt essential commodities from its export ban. Table 3-11 shows the list of exemption requested by Bhutan.

[3] USDA Statistics

Table 3-9 Indian Reactions to Soaring Rice Price

	Non-Basmati Rice	Basmati Rice
Oct 9, 2007	Ban export	
Oct 31, 2007	Lifted ban, set the MEP (Minimum Export Price) at $425/MT	
Dec 27, 2007	Increased the MEP to $500/MT	
March 5, 2008	Increased the MEP to $650/MT	Set the MEP at $900/MT
March 17, 2008		Limited export ports
March 27, 2008	Increased the MEP to $1,000/MT	Increased the MEP to $11,000/MT
Apr 1, 2008	Ban export	Increased the MEP to $12,000/MT, and limited export ports
May 10, 2008		Started export tax
Jan 27, 2009		Decreased the MEP to $11,000/MT
Feb 2, 2009		Lifted export tax

Source: Report on oversea agricultural status in Asia (MAFF, 2010)

Table 3-10 Bhutan's Rice Import from India between 2005 and 2010 (KG)

2005	2006	2007	2008	2009	2010
45,288,661	47,288,661	53,086,600	52,161,392	No Data	52,007,940

Source: JETRO Trade Statistics

Table 3-11 Exemption for Bhutan

Items for Exemption	Volume Exempted for Bhutan at the Time of the Export Ban (MT)
Milk Powder	1,600
Wheat	24,000
Edible Oil	2,400
Pulses	1,200
Non-Basmati Rice	21,200

Source: Hearing at MOEA

BOX: Food Security in India

・Targeted Public Distribution System

India has the Targeted Public Distribution System (TPDS) for rice and wheat targeting the poor. In this system, the Food Corporation of India procures those cereals from farmers at the minimum support price regulated by the government, and then sells them to consumers holding ration cards through the established network of Fair Price Shops at the lower price. The minimum support price works as an incentive for farmers, although it causes financial burden to the government

・Buffer Stock System

India has the minimum inventory in case to intervene in the markets at the time of price soaring.

・National Food Security Mission

The National Food Security Mission prepared by Ministry of Agriculture in 2007 set guidelines for agricultural extensions for increasing productivity of rice, wheat and pulses. India also provides several kinds of subsidies for agricultural production for fertilizer, food, electricity, and irrigation.

・Price Competition

There are a huge gap in prices of goods and wage between India and Bhutan which can discourage production and consumption of domestic products in Bhutan. For example, at the central market in Thimphu, Bhutanese rice cost Nu. 55 – 65 per kg, on the other hand, Indian rice cost only Nu. 20 – 30 per kg. Also, the wage for the Bhutanese is Nu. 150-200 per day, but it is Nu. 100 per day for the Indian.

(4) Climate Change

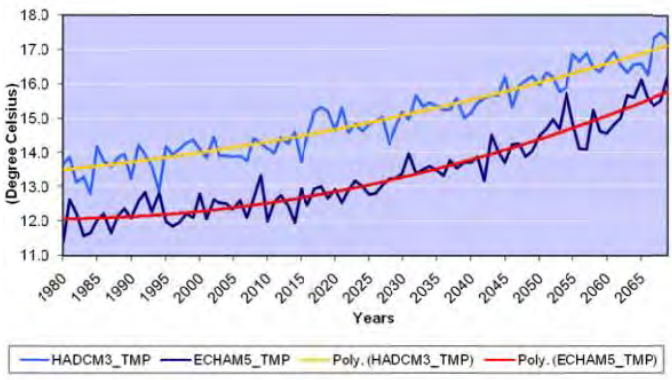
Bhutan National Human Development Report (2011) consolidates impacts caused by climate change in Bhutan. The table below shows a portion of those impacts which have been selected as issues related to food security by the study team.

Table 3-12　Climate Changes and Risk

Climate changes shifts and shocks	Climate risk and impact
Increase in mean temperature in paricular during winter and in high altitudes	
●Melting of mountain glacierts	・Loss of water reserve
	・Risk of glacier lake outburst floods
●Increase in temperature and evaporation	・Loss of soil moisture
	・Migration of invasitve species
	・Forest degradation
Increase in mean temperature in paricular during summer in southern Bhutan	
●Increased evaporation	・Increased drought period
	・Reduced growth period
	・Expansion of arid and semi-arid lands
●Occurrence of agricultural pests	・Loss of agricultural production
Reduction in long term precipitation in particular during the monsoon seasons	
●Drought	・Reduction or loss of agricultural
	・Land degradation
Increase in immediate precipitation due to more frequest extreme climate shocks	
●Flooding	・Damage to agricultual crops and soil erosion
	・Reduced accessbility due to damage to infrastructure
	・Increased risk of land slides

Source: From Bhutan National Human Development Report 2011, UNDP (2011)
Abstracted matters which would influence food security

The trends in annual mean temperature between 1980 and 2069, based on down-scaled simulations of both the HadCM3[4] and ECHAM5[5] climate models are shown in the figure below. Both simulations show the temperature increase of 3.5℃ between 1980 and 2069.



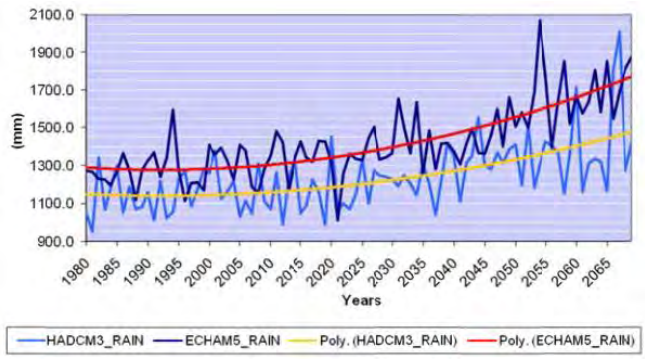
Source: Vulnerability and Adaptation Assessment Vo.1, Technical Paper, National Environment Commission

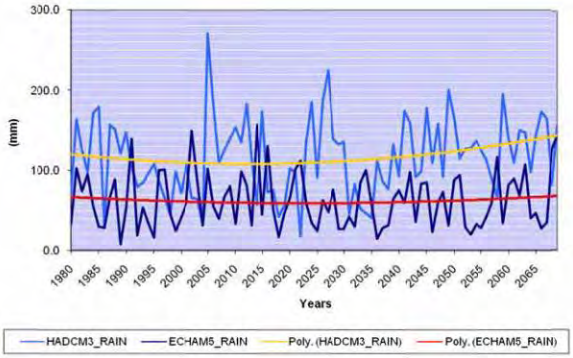
Fig. 3-6　Annual Mean Temperature between 1980 and 2069

The monsoonal (seasonal) rainfall is simulated to increase between 1980 and 2065 from 1,300 mm to 1,750 mm based on the ECHAM5, and from 1,150 mm to 1,500 mm based on the HadCM3. On the other hand, the simulations of winter/dry season precipitation show decreases in rainfall from 1980 and 2020. The report of National Environment Commission shows a concern that possible changes in the rain

[4] Hadley Centre General Circulation Model (version 3)
[5] European/German General Circulation Model (version 5)

pattern of less precipitation in dry season and more during monsoon season could cause mismatch between water supply and demand, as well as leading to floods and droughts.





Source: Vulnerability and Adaptation Assessment Vo.1, Technical Paper, National Environment Commission

Fig. 3-7 Monsoonal Rain Fall between 1980 and 2065

Fig. 3-8 Winter/Dry Season Rain Fall between 1980 and 2065

The field survey in Zhemgang and Trashigang found several cases of landslides which damaged agricultural land. An estimated 95,439 ha of degraded land were observed by MOAF in 2005.[6]

3-7 Other Donors' Interventions

Among other donors' active projects, those related to food security are listed as follows:

IFAD (The International Fund for Agricultural Development)
● Market Access and Growth Intensification Project (MAGIP)：2011-2015 IFAD has been targeting the east area, then implemented First Eastern Zone Agricultural Project（FEZAP, Second Eastern Zone Agricultural Programme Agriculture（SEZAP）, Marketing and Enterprise Promotion Programme（AMEPP）, in the past twenty years. MAGIP as a subsequent project set up mainly two components: Support to Poor Subsistence Farming Communities; and Agricultural Intensification and Support to Market Access.
SNV
● Off-Season Vegetables Under the MAGIP funded by IFAD, SNV provides advisory services to the Supply Chain and Market Development Component, led by the Regional Agricultural Marketing and Cooperatives Office (RAMCO). ● Non-Timber Forest Products[7] SNV supports this pilot at Lauri gewog of Samdrup Jongkhar district under the IFAD-funded Market Access & Growth Intensification Project (MAGIP) in which eight NTFP groups sustainably manage and harvest NTFPs

[6] Bhutan National Human Development Report 2011, UNDP(2011)
[7] Bamboo, mushroom, traditional medicine etc.

● Cooperative Sector Development SNV supported the Department of Agricultural Marketing and Cooperatives in the formulation of the Capacity Building Master Plan for Cooperatives and Farmers' Groups and has designed more than 8 manuals to support its role out.
WFP (World Food Programme)
● School Feeding Programme Since 1976 WFP has been supporting school feeding with annual beneficiaries of about 36,000. Under the current programme, it targets children from pre-primary school up to the grade 8th. WFP has a plan to withdraw by 2018.
FAO (Food and Agriculture Organization of United Nations)
● School Agriculture Program：2012 Under coordination with WFP and Ministry of Education, FAO has been supporting the school farming. ● Policy Support FAO is supporting to make a comprehensive agricultural development program for Ministry of Agriculture and Forest which covers ten years from the 11th and 12th five plan.
Global Environment Facility (World Bank)
● Sustainable Land Management Project (SLMP)：2006-2012 Under the National Soil Services Centre of MOAF, SLMP targets three districts (Chukka, Zhemgang, and Trashigang) to promote prevention of soil degradation, improvement of soil fertility, vegetation and grazing resource, and water management etc.
EU (European Union)
● RNR Programme Phase2：2011-2013 EU provided a fund for RNR sector program under the 10th five year plan. It focuses on support for institutional intensifications and a formulation of master plan for production and marketing. ● Livestock Sector Support：2006-2013 Under the department of livestock, it supports the project for improving feeds, quality of breeding, marketing and decease control.
HELVETAS Swiss Intercooperation
● Rural Livelihood Project ：2012-2015 HELVETAS targets several gewogs of Zhemgang and Sarpang, and aims a poverty reduction through an improvement of marketing capability and good governance. The initial year is planned to introduce participatory planning methods at the chiwog level and capacity building for planning, market chain facilitation and production technologies

3-8 Information on Budget to Achieve the Policy

The tables below show the approved budgets and results of each ministry for 2008/9 and 2009/10 under the 10th five year plan.

Table 3-13 Approved Budget for 2008/9 & 2009/10 (Nu. Million)

	current	capital	others	total	proportion
Ministry of Works and Human Settelement	734.62	6637.14		7371.76	17%
Ministry of Agriculture and Forest	2062.73	2363.52		4426.25	10%
Ministry of Economic Affairs	469.56	2045.21		2514.77	6%
Ministry of Finance	931.05	710.66	13693.73	15335.44	36%
Ministy of Health	1888.96	1985.92		3874.88	9%
Ministry of Foreing Affairs	700.09	83.91		784.00	2%
Ministry of Information and communications	283.20	1164.43		1447.63	3%
Ministry of Home&Cultural Affairs	1790.18	1185.01		2975.18	7%
Ministry of Labor and Human Resources	330.44	441.44		771.88	2%
Ministry of Education				3145.23	7%

Table 3-14 Results for 2008/9 & 2009/10 (Nu. Million)

	current	capital	others	total	Achievement
Ministry of Works and Human Settelement	693.89	4301.07		4994.95	68%
Ministry of Agriculture and Forest	1739.30	1393.40		3132.70	71%
Ministry of Economic Affairs	367.67	1421.24		1788.91	71%
Ministry of Finance	893.13	548.27	13337.26	14778.66	96%
Ministy of Health	1636.70	1058.40		2695.10	70%
Ministry of Foreing Affairs	580.68	46.35		627.03	80%
Ministry of Information and communications	249.20	457.70		706.90	49%
Ministry of Home&Cultural Affairs	1692.08	763.73		2455.81	83%
Ministry of Labor and Human Resources	286.13	269.16		555.29	72%
Ministry of Education				2085.10	66%

Source: Created based on the report of GNHC Mid-Term Review 2011

The budget allocation for the 11th five year plan will be announced by November 2012, in which the proportion of agricultural sector is inferred to be increased.[8]

As to the national budget of the fiscal year of 2011/2012, the amount of the agricultural sector is Nu. 5,362 million, and accounts for 13% of the national total. Among the agricultural sector, the budget for road constructions accounts for about 55%, while that for marketing and cooperative and increase of rice productivity (mechanization) is 0.9% and 0.4%.

Out of the budget for the agricultural sector, the amount of the MoAF is Nu. 2,564 million[9]. Among the total of MoAF, the amount of the department of agriculture is Nu. 752 million with a share of 29%.

Table 3-15 Budget Appropriations of MoAF for the Fiscal Year 2011-2012

	Budget Amount (Nu. Million)	Share
Secretariat	259.387	10 %
Department of Agriculture	751.955	29 %
Department of Livestock	492.028	19 %
Department of Forest & Park Services	814.878	32 %

[8] Hearing at Ministry of Finance (unofficial comments)
[9] The budget for the agricultural sector includes big amounts of road constructions allocated for local governments. Therefore, the total amount is not equal to that t of MoAF.

Council of RNR Research	40.517	2 %
BAFRA	128.732	5 %
Department of Agriculture Marketing & Cooperatives	77.412	3 %
MoAF Total	2,564.909	

Source: budget document of MOAF (as of July5)

The amounts of loan and grant for the agricultural sector in the fiscal year of 2011/2012 are shown in the following tables. Among national total of loan, the amount of the agricultural sector accounts for 7%. As to grant, the share of the agricultural sector is 9% of national total.

Table 3-16 Loan Funding on Agriculture for the Fiscal Year 2011-2012

Agency	Loan Amount (Nu. Million)
1. Asian Development Bank	
Road Network Project	55.496
2. International Fund for Agricultural Development	
Agriculture Marketing Enterprise Promotion Program	50.252
MAGIP	13.973
Total	119.721

Source: made by budget document of MOAF

Table 3-17 Grant Funding on Agriculture for the Fiscal Year 2011-2012

Agency	Loan Amount (Nu. Million)
1.Asian Development Bank	
Farm Roads to Support Poor Farmers' Livelihoods	58.887
Road Network Project	351.618
2.Bhutan Trust Fund for Environmental Conservation	
Sound and Light Fencing for Human Wildlife Conflict Management	1.900
Indigenous Repellent to protect crops from wildlife	0.275
3. Centre for Integrated Mountain Development	
RNR Research of Bhutan	0.180
4. EUROPEAN COMMISSION	
Support to Livestock Sector	10.595
Support to Agriculture Production Sector Project	11.794
5. FAO	
South Asia Pro Poor Livestock Policy Programme	0.678
Regional Project for the Conservation and Sustainable use of PGR in Asia	0.395
Land degradation assessment & monitoring	0.140
Strengthening the Capacity of the Key Stakeholders on NWFP Processing	1.100

Agency	Loan Amount (Nu. Million)
& Development	
School Agriculture Program	2.761
6. Global Environment Facility	
SLM Project	66.344
Integrated Livestock & Crop Conservation Project	7.253
7. Government of Austria	
Improving Mandarin Production	1.104
8. Government of India	
Strengthening of Livestock Development Initiative	74.229
Marketing Programme	10.595
9. IFAD	
MAGIP	2.815
10. International Rice Research Institute	
Study on Tracking Improved Varieties in South	0.078
11. Netherlands Development Organization	
Capacity building of cooperatives & farmer group	1.780
12. Shin Nippon Biomedical Laboratories Japan	
Support to development of organic and medical plants	1.000
13. Swiss Association for Technical Assistance	
Market exploration for selected agricultural products in India through Fabindia	3.350
14. UNDP	
Food security through improved home gardens	5.563
15. WFP	
Support to national human wildlife conflict management	4.848
16. WWF	
Support to human wildlife conflict fund	2.000
Total	621.282

Source: made by budget document of MOAF

Chapter 4

Status of Agricultural Production in Bhutan

Chapter4 Status of Agricultural Production in Bhutan

4-1 Major Characteristics of Agricultural Production in Bhutan

(1) Issues on data

One of the major bottlenecks for the agricultural sectors in Bhutan is the lack of consistent and reliable statistical data. Even though sizable volumes of agricultural production related data are available, these published data are often seemingly incorrect and some figures are sometimes contradictory each other. One major reason for the unreliability of the published data is the fact that data collection system is decentralized at departments and agencies levels, which lead to the inconsistencies among the data collected by different ministries. Another reason is the insufficient trainings and monitoring to the interviews in the surveys where fields officers are responsible to collect data most of the cases. Furthermore, most of the officials who manage the surveys do not have sufficient knowledge on sample design, which leads to the inconsistencies of the data of sample surveys[1]. Under such circumstances, it is difficult for policy makers to set the proper strategy and to measure progress on some of the intended activities and the achievement of targets[2]. When the staffs in MoAF use the published data, they generally refer to the seemingly most appropriate figures using their "educational guesses"[3].

In order to provide as much correct picture as possible under such circumstances, the examination of this section adopt the following strategy to analyze data.

- Based on the advice of the Policy Planning Division (PPD) of the Ministry of Agriculture and Forestry which is responsible for data aggregation, this section mainly use the dataset provided by the division for the analysis of the agriculture production related issues. The dataset are aggregated using the data collected in the Agricultural and Livestock Statistics or Census between 2004 and 2010, but some of the figures in the dataset are slightly different from the published Statistics and Census as it uses a different method of aggregation. Yet these differences are negligible.
- However, these dataset include seemingly inaccurate figures. The analysis of this section tries to distinguish the data which seem to be reliable and those not reliable.
- Many officials in the Ministry state that the data of Agricultural Census in 2000 are unreliable. Thus, this report does not present these data, as it may be misleading.
- This section will refer to the results of Commodity Chain Analysis (CCA) survey[4], as it

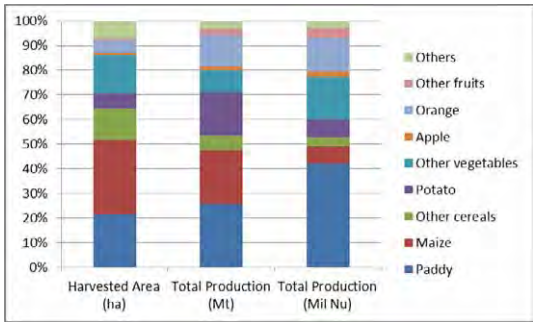
[1] These statements are based on the interview with the staff of the Ministry of Agriculture and Forestry.
[2] For the details of the RNR statistical systems in Bhutan, please refer to Bhutan RNR Statistics 2011 and RNR Statistical Framework 2012.
[3] These statements are based on the interview with the staff of the Ministry of Agriculture and Forestry.
[4] The Commodity Chain Analysis is a part of the FAO- Netherlands Partnership Program, which aimed to address Bhutan's food security issues. Four commodities – citrus, rice, maize and potato were selected in the analysis as they appeared to have potential to fuel agricultural growth and rural development. These commodities have been analyzed in detail with a pro-poor focus using the Commodity Chain Analysis (CCA) methodology, which consisted of flow analysis, technical analysis, micro analysis and economic and social impact of the chain.

contains detailed information on the marketing channels of major commodities. Yet a couple of the CCA survey data presented here are significantly different from the results of Agriculture Census 2008. In such cases, the results of the Census should be considered to reflect the more accurate picture, as the CCA surveys are sample surveys with a few hundred farmers.

(2) Crop production

(a) Harvest areas and productions of major crops

Fig. 4-1 shows the crop composition of harvested area, quantity, and values for all the farmers in Bhutan in 2008. One can see that maize take up the largest harvest area and 2008, but it is relatively minor in terms of the value of production. Paddy is the second most important crop in harvested area. Paddy is actually highly valued and represents 42% of total value in 2008. Potato is also significant in terms of the quantity of production. In fact, these three crops (rice, maize, and potato) constitute about 70% of total quantity of production in 2008. Orange and other vegetables also represent sizable share in value terms[5].



Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Fig. 4-1 Crop composition of harvested area, quantity, and values in 2008

Table 4-1 and 4-2 show the amount of production and harvesting areas for the major crops respectively[6]. One can notice that the harvested area for paddy had increased slightly between 2004 and 2007 but has decreased after 2007. Paddy production showed the similar trend, having increased between 2004 and 2008 and decreased after 2008. The decrease in the harvested areas and production of paddy in the late 2000s is probably resulted from the increase in the import of Indian rice by FCB after 2008[7].

Harvested areas and production for maize and other cereals have decreasing trend since the mid-2000. This is seemingly driven by the low income elasticities and decreasing demand for these commodities[8].

The harvest areas and production of potato have been decreasing since the mid-2000s[9]. This is probably caused by the yield decreased due to the degrading of seed. Also, the spread of disease such as phythoptara and tuber math and the damages by red aunts have led to the decrease in its

[5] It is important to note that the figures for the harvested areas are not very reliable. It is often the case that the harvesting areas for the minor crops are missing in the raw data. Thus, the harvesting areas for the major crops seem to be overestimated.

[6] The figures for the harvested areas are only reliable for paddy, maize, other cereals and potato, so only the data for harvested areas for these crops are presented here.

[7] This statement is based on the interview with the staff of the Ministry of Agriculture and Forestry.

[8] Agricultural commercialization and diversification in Bhutan, IFPRI, 2010.

[9] There is a significant increase in the production of potato and other vegetables between 2004 and 2005, but it is hard to explain why this happened. Some staffs in the MoAF state the this is probably caused by the problem in data collection.

harvested areas and production[10].

The production of chili has decreased since 2008, and the outbreak of blight disease is probably the main reason for it. The productions of turnip and radish have been in decreasing trend since the mid-200s as consumer's preferences for these vegetables have decreased.

One can also see the significant decrease in production of orange after 2007, and this is likely to be caused by the outbreak of citrus green disease[11]. The orange production picked up after 2009 as the government provide new orange trees to the farmers[12] [13].

Table 4-1 Production of major agricultural crops (Mt)

Year		2004	2005	2006	2007	2008	2009	2010
Cereals	Paddy	54,309	67,858	72,513	71,982	78,659	67,245	71,615
	Maize	84,291	89,959	68,799	84,729	69,248	61,140	57,666
	Other Cereals	10,414	29,535	30,918	30,653	18,353	15,012	14,061
Vegetable	Potato	47,403	53,594	68,048	61,133	52,967	46,161	44,014
	Chili	4,455	10,447	11,606	8,368	7,283	8,887	6,696
	Radish	5,628	12,637	10,218	10,539	5,957	5,672	3,882
	Turnip	4,136	8,470	12,914	15,104	5,075	9,368	2,638
Fruits	Orange	31,904	47,936	82,725	72,319	38,775	44,295	52,624
	Apple	5,915	10,387	10,646	7,077	5,034	6,931	17,366
Others	Mustard	1,767	4,382	3,707	3,385	3,573	1,741	1,332
	Beans	1,370	2,094	4,632	3,946	3,697	1,823	1,443

Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF

Table 4-2 Harvested areas for major agricultural crops (Ha)

Year	2004	2005	2006	2007	2008	2009	2010
Paddy	18,859	25,257	26,426	27,545	20,112	23,953	22,831
Maize	21,805	30,701	30,266	38,854	28,327	28,480	24,898
Other Cereals	9,329	25,421	26,059	27,876	11,794	13,083	9,787
Potato	3,041	8,873	6,752	6,878	3,304	3,160	2,254

Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF

(b) Yields of major crops

Table 4-3 indicates the trend of yield of production for the major agricultural crops, and Fig.4-2 is the graphical representation of it. One can see that the yield of paddy has increased slightly

[10] This statement is based on the interview with the staff of the Ministry of Agriculture and Forestry.

[11] Citrus green is transmitted by a small fly called a psyllid that thrives of the orange trees, and the virus infection will ultimately kills the whole trees. According to the BBC South Asia news on Apr 10th 2009, the disease wiped out 70% of orange orchard in Punakha in that year, while other orange growing regions like Wangduephodrang, Mongar, Zhemgang, Sarpang ar also severely hit.

[12] It is hard to explain the significant increase in production between 2004 and 2005. Some staffs in the MoAF state this is probably caused by the problem in data collection.

[13] The production of apples move up and down between 2004 and 2010 in Table 4-1, and it is hard to interpret this move. One staff in the MoAF states that the figures are not reliable and production of apples seem to be stable in reality during the period.

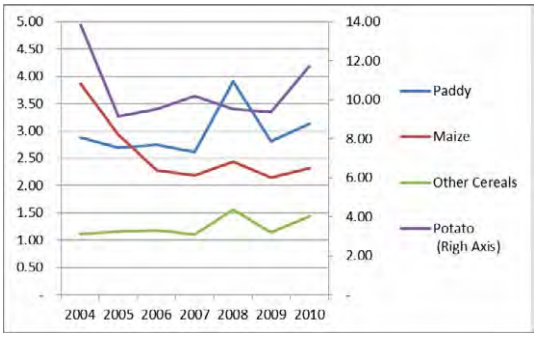
after 2009[14]. This increase is likely to be caused by the introduction of new varieties in these periods[15].

On the other hand, the yield of maize has been decreasing between 2004 and 2010. This is probably caused by the degrading of maize seeds and the spread of diseases such as GLS and TLB since 2005. Also, the yield of potato production has also been decreasing between 2004 and 2009 probably due to the degrading of seeds and the spread of diseases [16].

Table 4-3 Yield of production for the major crops (Mt/Ha)

	Paddy	Maize	Other Cereals	Potato
2004	2.88	3.87	1.12	13.84
2005	2.69	2.93	1.16	9.14
2006	2.74	2.27	1.19	9.53
2007	2.61	2.18	1.10	10.21
2008	3.91	2.44	1.56	9.54
2009	2.81	2.15	1.15	9.38
2010	3.14	2.32	1.44	11.73

Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF



Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF

Fig. 4-2 Yield of production for the major crops (Mt/Ha)

(3) Livestock production

Table 4-4 and 4-5 depict the trends of the livestock holding and the livestock production in Bhutan respectively. The number of pigs and the production of pork have been decreasing between 2005 and 2008. The decrease in pig rearing is stemmed from the growing sentiment of censure for slaughtering animals during these periods[17].

The numbers of cattle holdings have been significant and these numbers have been increasing slightly between 2005 and 2010. The production of beef fluctuates year by year over the same period, and there have not been any increasing or decreasing trend. In any case, the production of beef in Bhutan has not been kept up with the increasing demand for beef consumption, and the gap between them have been filled up with the imports[18].

Table 4-4 Number of livestock holdings

	Pigs	Cattle	Goats	Poultry	Sheep	Yaks
2005	45,174	247,896	20,486	166,073	14,737	44,079
2006	25,423	287,951	21,781	179,323	14,770	52,837
2007	26,132	309,152	27,259	199,052	11,980	51,500
2008	18,759	310,570	33,672	203,009	11,835	39,759
2009	22,154	308,132	38,588	247,693	12,296	45,179
2010	19,711	313,395	43,134	339,481	12,699	40,374

Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF

[14] The figure for the yield of paddy in 2008 is too high, and many staffs in the Ministry of Agriculture and Forestry mention that this figure is unreliable. Thus, this figure is disregarded in the analysis here.
[15] This statement is based on the interview with the staff of the Ministry of Agriculture and Forestry.
[16] It is not clear why it increased in 2010.
[17] This statement is based on the field survey of the survey team.
[18] This statement is based on the interview with the staff of the Ministry of Agriculture and Forestry.

One can notice that the significant increase in the number of chicken holdings and the egg production since 2008. The sudden increase was caused by the active promotion by the government to expand the number of chicken holdings and egg production, as it was faced by the decrease of egg import due to the breakout of bird flu in 2008.

Table 4-5 Livestock production (Kg)

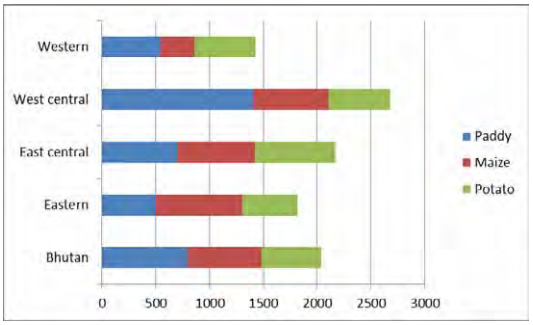
	Pork	Beef	Mutton	Chicken	Milk	Butter	Cheese	Eggs
2006	528,071	582,462	20,299	172,442	21,235,612	1,296,864	6,500,310	5,366,471
2007	525,844	699,476	23,191	179,244	19,796,817	1,335,767	5,612,170	9,520,475
2008	248,470	435,728	33,924	92,600	25,840,010	1,727,070	2,029,509	459,913
2009	332,445	643,551	75,479	155,236	25,655,944	1,265,169	2,691,849	1,026,379
2010	427,369	546,757	78,184	256,590	25,645,010	1,262,455	2,820,023	22,146,090

Source: Calculation by JICA Study Team based on the data provided by PPD, MoAF

(4) Regional characteristics in agricultural production

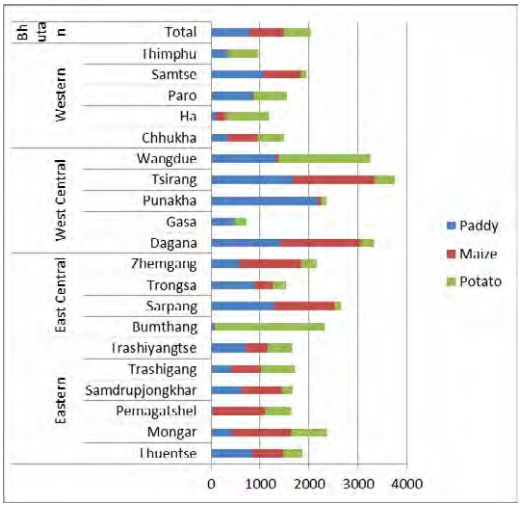
(a) Production per farmer

Fig. 4-3 and 4-4 depict the production per farmer for paddy, maize, and potato (which are three major crops of the country in terms of physical production) for each region and Dzongkhag[19]. Paddy production per farmer is relatively higher for the West Central regions, whereas in the Eastern region, maize is relatively more important crops than other two crops. Significant amount of potato is produced in most of the Dzongkhag, yet it is quite prominent in Wangdue and Bumthang.



Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics 2011

Fig. 4-3 Production (Mt) per farmer for paddy, maize, and potato by region



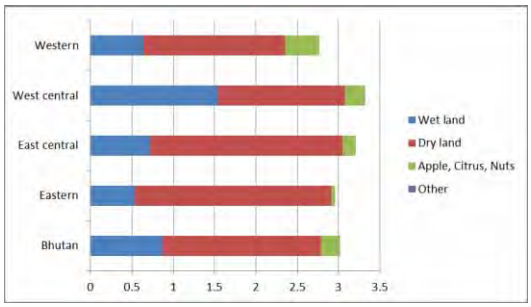
Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics 2011

Fig. 4-4 Production (Mt) per farmer for paddy, maize, and potato by Dzongkhag

[19] The classification of the four regions is based on that of RNR Statistics 2011.

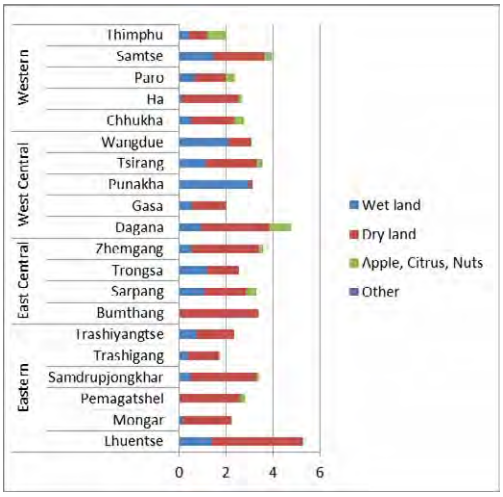
(b) Endowment of crop land

The significant difference in the agricultural production per farmer among Dzongkhag is partly stemmed from the difference in the endowment of crop lands. Fig. 4-5 and 4-6 depict the area of crop land per farmer for each region and Dzongkhag respectively. Fig. 4-5 shows that there is not much regional variation in the endowment of total crop land per capita, but the wet land per capita is relatively higher in the West Central region where rice production per farmer is higher than other regions.



Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics 2011

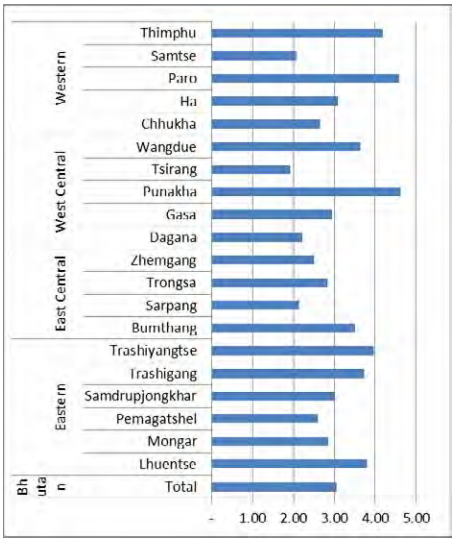
Fig. 4-5 Crop land (ha) per farmer by region



Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics

Fig. 4-6 Crop land (ha) per farmer by Dzongkhag *1*

(c) Productivity[20]



Source: Calculation by JICA Study Team based on the data provided by PPD,MoAF

Fig. 4-7 Production yields (Mt/Ha) for paddy

[20] The productivity of the agricultural production is measure by the yield of production in the analysis of section.

Another important aspect for the regional difference in agricultural production is the difference in productivity. Fig. 4-7 shows the physical yield of paddy for each Dzongkhag.

One can see that the paddy yields for the southern region such as Samtse, Thirang, and Sarpang are relatively low, whereas those of Paro, Punakha, and, Wangdue Thimphu are higher than other areas.

One important factor that determines productivity is the difference in agro-ecological zones. Table 4-6 depicts the basic classification of rice agro-ecological zones, which are mainly identified by the range of altitude. The yield of rice production in the high altitude zone (Warm Temperature) tend to be higher than other region, that of lower altitude zone (Wet Subtropical) tend to be lower than other region, and the yield of other two regions tend to be somewhere between them. Table 4-7 depicts the results of the Commodity Chain Analysis (CCA) survey of the rice production for the different altitude areas. It shows that rice yield is highest in the high altitude area which is almost equivalent to the Warm Temperature Zone, and it is lowest in the low altitude area which is equivalent to the Sub Tropical Zone.

Table 4-6 Rice agro-ecological zones in Bhutan

	Altitude (m)	Averaeg Temprature (C°)	Rainfall (mm)	Dzongkhags
Warm Temprature	1800-2600	13	650-850	Thimphu, Paro, Ha, Lhuentse,Trashigang
Dry Subtropical	1200-1800	17	850-1200	Wandue, Punaka, Trongsa, Trashigang, Mongare, Lhuentse
Humid Subtropical	600-1200	20	1200-1500	Tsirang, Dagana, Chukha, Zhemgang, Pemagatshel, Trashiyangse
Wet Subtropical	<600	24	2500-5500	Sarpang, Samtse, Samdrupjongkhar

Source: Rice in Bhutan, Council for RNR Research of Bhutan (2008)

Table 4-7 Rice productivity for different altitude areas

	Yield (Kg/ha)
High altitude (1600-2600m)	3,215
Medium (700-1500m)	2,943
Low (below 600m)	2,338
Total	2,879

Source: Commodity Chain Analysis, MoAF (2007)

Rice fields in high altitude area (Paro)

Rice fields in medium altitude area (Zhemgang)

Also, it is important to note that the paddy farming in Paro, Punakha, Wangdue, and Thimphu are highly mechanized and utilize more fertilizers and chemicals than other regions. Further, there has been relatively less investment in the southern region, especially on irrigation system. These factors also affect the regional difference in productivity in paddy farming[21].

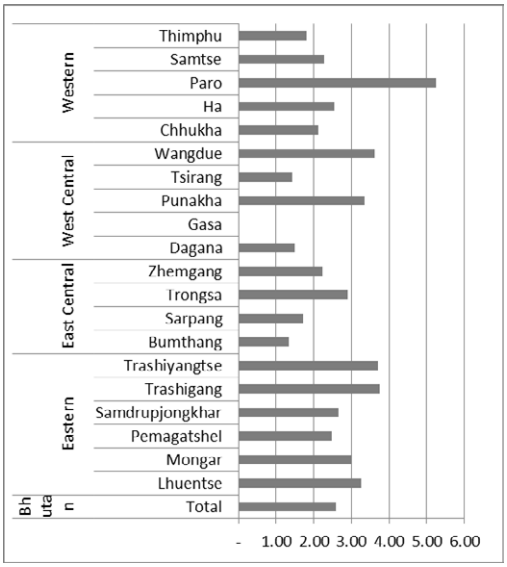
[21] This statement is based on the interview with the officials of the Ministry of Agriculture and Forestry.

Reflecting these regional differences in productivity and the level of availability in infrastructure, investment plans and extension strategies by the MoAF has been organized based on the agro-ecological zones[22].

Fig. 4-8 shows the physical yield of maize for each Dzongkhag. One can see that the yields are relatively higher for the eastern region[23] . This is mainly because that maize has been the major staple food in the Eastern region and the government development and extension efforts for maize have been concentrated in the Eastern region.

As for the productivity of maize, it is also important to look at the kinds of varieties

Table 4-8 depicts the CCA survey results of the yields of maize production for the producers who grow improved variety (IV) and those who grow traditional variety (TV). One can see that the average yield of the IV producers is more than twice higher than that of TV producers[24]. Many farmers prefer traditional varieties as the maize of improved variety are too hard to manually mill. Also, the harvest time of the improved variety is about a week later than traditional variety, and improved variety tend to be damaged by wild animals during this one week.



Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics 2011Census 2009and RNR Statistics 2011

Fig. 4-8 Production yields (Mt/Ha) for Maize

Table 4-8 Maize productivity for IV and TV producers

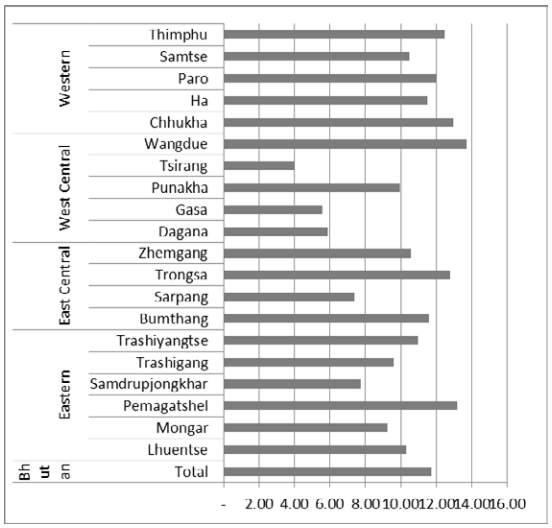
	Yield Kg/ha
IV producers	2,943
TV producers	1,190
Average	2,242

Source: Commodity Chain Analysis, MoAF (2007)

[22] "Investment Plans for Rice, Maize, Citrus, and Potatoes" MoAF (2007)

[23] The production of maize in Paro is very small amount, so it is not representative. Thus, the yield data for Paro is disregarded in the analysis.

[24] However, there is not clear regional characteristics for the cropping pattern of these two varieties, and thus, this factor does not necessarily relate to the regional difference in maize productivity.



Source: Calculation by JICA Study Team based on Census 2009 and RNR Statistics 2011Census 2009 and RNR Statistics 2011

Fig. 4-9 Production yields (Mt/Ha) for potato

Fig. 4-9 shows the physical yield of potato for each Dzongkhag. The productivity of potato production in the Southern region is relatively lower than other areas as farmers face more pest problem in these areas.

(5) Production costs and economic returns

Table 4-9 and 4-10 depict the CCA survey results of the economic returns to the producers of rice, maize, and potato[25]. The returns to family labor per day are highest for the rice production among the three crops and it is lowest for potato production. However, the returns to family labor vary significantly among the producers for the same crop. For example, the returns to family labor per day for production of rice in the low altitude areas is only 69 Nu., which is lower than the wage per day from working outside the farm (daily wage was about 100Nu. at the time of survey in 2006). Yet economic return for the high altitude areas is about eight times as much as that in the low altitude areas.

Table 4-9 Production cost and economic returns for rice(Nu.)

	Rice			
	Average	High Altitude	Mid Altitude	Low altitute
Sales	28,095	38,287	24,738	18,271
Intermediate input	4,381	5,928	4,086	2,277
Value added	23,714	32,359	20,652	15,994
Income	18,464	27,776	16,779	5,544
Hired labor	5,249	4,583	3,873	10,450
Returns to family labor	278	521	190	69
Cost Nu./Ha	11,363	14,847	9,264	10,726

Source: Commodity Chain Analysis, MoAF (2007)

[25] The definitions of some of the items in the tables are as follows.
Sales=Intermediate input + Value added
Value added =Income +Hired labor

Table 4-10 Production cost and economic returns for maize and potato (Nu.)

	Maize			Potato			
	Average	IV Producer	TV Producer	Average	Large Producer	Medium Producer	Small producer
Sales	10,319	11,203	8,994	29,527	83,432	27,360	11,750
Intermediate input	1,845	1,845	1,845	10,632	32,220	9,399	3,923
Value added	8,812	9,925	7,143	18,895	51,212	17,961	7,827
Income	6,343	7,569	4,503	15,101	46,119	13,702	5,042
Hired labor	2,469	2,355	2,640	3,794	5,092	4,259	2,785
Returns to family labor	192	288	48	135	264	138	82
Cost Nu./Kg	6.0	4.0	8.9	5.5	3.9	4.6	7.2

Source: Commodity Chain Analysis, MoAF (2007)

Table 4-11 depicts the economic returns to the producers of chili and citrus, which are collected in the CCA survey. It shows that the returns to family labor per day for the chili production is much higher than other crops, whereas that for citrus production is slightly smaller than that for rice production. There are also some differences in the returns to the family labor in the same crops, depending on the land type or scale of production.

Table 4-11 Economic returns to producers of chili and citrus (Nu.)

	Chili			Citrus				
	Average	Wet land	Dry land	Average	Backyard	Small	Medium	Large
Sales	19,717	28,327	16,302	32,206	6,843	13,614	25,231	87,192
Intermediate input	2,904	4,395	2,313	4,097	721	1,459	3,667	10,802
Value added	16,813	23,932	13,990	28,110	6,122	12,154	21,564	76,395
Income	15,530	21,120	13,313	28,110	6,122	12,154	21,564	76,395
Hired labor	1,280	2,812	672					
Returns to family labor	557	582	547	262	357	306	208	232
Cost Nu./Kg	10	9	11	3	4.2	2.4	3.3	2.2

Source: Commodity Chain Analysis, MoAF (2007)

(6) Infrastructure and inputs for agricultural production

(a) Availability of irrigation

Table 4-12 shows the percentage of the cultivated area equipped for irrigation in the South Asian countries, and one can see that the figure for Bhutan is quite low. According to the RNR Census in 2009, 30.6% of the rural households answered that they face insufficient irrigation problem. During the field survey of the project team in Zhemgang Dzongkhag, some officials claimed that the maintenance of irrigation system in inadequate in many areas of the Dzongkhag. It is because that the Irrigation Law states that the users of the irrigation are supposed to provide labor for the maintenance of their irrigation while the governments are responsible for providing necessary materials, but the labor works needed for the maintenance are quite large as the irrigation channels are relatively long compared to the population and the surrounding topography is quite rocky.

Table 4-12 Percentage of the cultivated area equipped for irrigation (%)

	%	Year
Bhutan	17.86	2007
Bangladesh	59.07	2008
India	39.11	2008
Nepal	47.19	2002
Pakistan	93.94	2008
Sri Lanka	29.23	2006

Source: FAOSTAT

Irrigation facilitiy which is not functioning (Sarpang)

(b) Agricultural machinery and equipment

Measures to promote farm mechanization in Bhutan started in the early 1980's, with the establishment of the Agricultural Machinery Centre (AMC) funded by JICA. With the continued support for this program by the KRII program from Japan, over 2,500 power tillers and associated spare parts are imported and distributed, and resulted in the support for around 6,000 small processing enterprises (oil seeds, rice mills, rice threshers, maize shellers, vegetable and fruit dryers).

AMC research indicates that power tillers can reduce the costs of rice production by approximately 50%, and reduce labor requirements to 1/4 of what is required for cultivation by bullock. Despite these advantages and incentives, only 7.4% of farmers reported using a power tiller for plough and only 3% owned one in 2008, as indicated in Table 4-13 and 4-14. The AMC attributes this low adoption rate of power tillers to a lack of spare parts and repair services, and inadequate farmer training, and thus it has recently set up regional workshops to meet these needs[26].

As indicated in Table 4-14, the percentage of farms that own other machinery and equipment such as tractor, power thresher, rice mill, oil mill are also small in Bhutan. All in all, level of net capital stock on agricultural machinery is quite small in Bhutan when one compares to the other South Asian countries, as indicted in Fig. 4-10.[27]

[26] The agriculture sector in Bhutan- Issues, Institutions and Politics, World Bank, FAO, and MoAF, 2011.

[27] Agricultural Marketing Services Division has recently started to establish One-Stop Shops (OSS) that sell agricultural inputs and rent equipment for cultivation (power tiller, and thresher) and processing (rice/flour mill and oil press). They are operated as commercial enterprises and run by a full time manager, and infrastructure is provided by local government, initially on a rent-free basis.

Table 4-13 Shares of farmers by type of ploughing (%)

Manual	Bullocks	Bullocks and power tillers	Tractor and power tillers
0.84	89.46	2.28	7.42

Source: RNR Census 2009

Table 4-14 Shares of farmers owning serviceable machinery and equipment (%)

Tractor	Power tiller	Power thresher	Rice mill	Oil mill
0.2	3.2	0.8	5.0	0.5

Source: RNR Census 2009

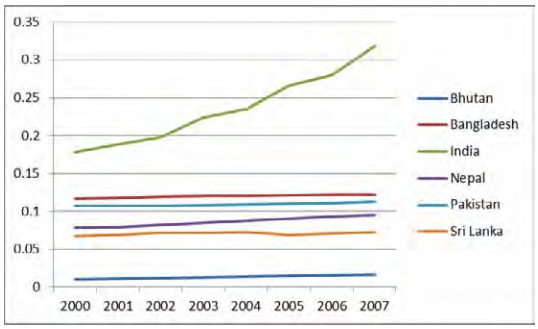


Fig. 4-10 Net capital stock on agricultural machinery and equipment per agricultural land (million US$ per 1000 ha: 2005 constant US$)

Source: FAOSTAT

The power tiller is also major mode of transportation in rural areas

(c) Fertilizer and chemicals

In Bhutan, the National Seed Centre (NSC) is responsible for the procurement and distribution of fertilizer. As indicated in Table 4-15, the total supply of the fertilizers by NSC is very low and declining. According to RNR Census in 2009, 37% of households use chemical fertilizers in 2008, but reported application rates are very low at 4.6 kg N, 0.5 kg P and 0.7 kg K per hectare in 2005[28]. It also indicates imbalanced usage of fertilizers, with the ratio of NPK at 9:1:1.4[29].

Use rates of chemical fertilizer is higher for farmers located closer to road, for larger, more commercially oriented farmers and for those growing potatoes, irrigated rice, spices and other vegetables. Organic fertilizer is the main source of soil nutrients. It is used by more than 65% of households for about 78,000 Mt per year (approximately 0.8 Mt/ha). Its usage is highest for those farmers further from road and with more livestock[30].

With regard to the plant protection chemical, the National Plant Protection Centre (NPPC) is responsible of procuring and distributing pesticides. According to the RNR Census in 2009, only about 16% of farmers use pesticides in 2008. The usage rate is higher for larger, more commercially farmers

[28] The agriculture sector in Bhutan- Issues, Institutions and Politics, World Bank, FAO, and MoAF, 2011.
[29] NPK stands for the three major elements of fertilizer which consist of nitrogenous, phosphate, and kalium.
[30] Agricultural commercialization and diversification in Bhutan, IFPRI, 2010.

close to roads and those growing irrigated rice, potatoes, other vegetables, apples and oranges[31]. As indicated in Table 4-16, the usage of plant protection chemicals is increasing. This growing demand is due to their relatively low cost, ease of transportation and high impact – especially for fruit and vegetable production[32].

Table 4-15 Trends in public agency supply of fertilizers (Mt)

	2005-2006	**2009-2010**	**% Change**
Urea	1,610	1,219	-24%
Suphala	964	838	-13%
SSP	450	411	-8%
MoP	14	9	-33%
Butachlor	264	279	6%

Source: The agriculture sector in Bhutan- Issues, Institutions and Politics, World Bank, FAO, and MoAF, 2011

Table 4-16 Trends in public agency supply of plant chemicals (Kg)

	2005-2006	**2009-2010**	**% Change**
Fungicides	2,515	3,423	36%
Herbicides	809	3,004	271%
Insecticides	2,521	4,875	93%

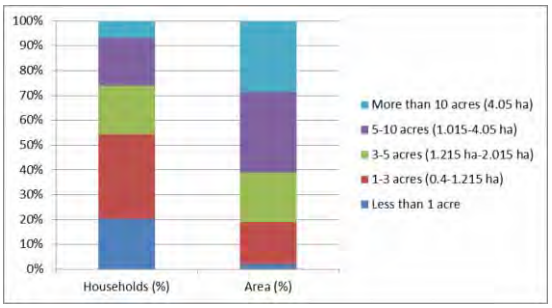
Source: The agriculture sector in Bhutan- Issues, Institutions and Politics, World Bank, FAO, and MoAF, 2011

(d) Landholdings size

According to the RNR Census in 2009, the average area of landholding for the farmers in Bhutan is only 0.67 ha (1.66 acres). As Fig. 4-11 shows, more than 20% of the farmers own less than 1 acre (0.405 ha), and only 6.9% of the farmers own more than 10 acres (4.05 ha) of land. Also, due to the mountainous terrain, the farms are scattered, which make it hard to aggregate farm. The topography of Bhutan and small landholding size makes it difficult to improve productivity by deploying machineries at large scale and exploiting the economies of scale. Further, during the field survey of the projects team, some interviewees claim that the size of land holding has been decreasing, as the lands are inherited equally to all the children of the owner.

There have been some initiatives to promote contract farming in order to aggregate farming lands. Yet these contract farming do not generally work well, due to the problems in management[33].

[31] Agricultural commercialization and diversification in Bhutan, IFPRI, 2010.
[32] The agriculture sector in Bhutan- Issues, Institutions and Politics, World Bank, FAO, and MoAF, 2011.
[33] This statement is based on the interview with the Department of Agricultural Marketing and Cooperatives



Source: The RNR Census 2009

Many farms are located on very hilly terrains.

Fig. 4-11 Percent households and area by land holding size categories (2008)

(e) Other issues that affect agricultural production

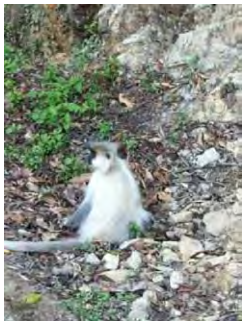
(i) Crop damage by wild animals

According to the RNR Census in 2009, about 55% of the rural households answered that the crop damage by wildlife as a main farming constraint. Table 4-17 shows that the proportions of the losses by the damage of wildlife is quite high for rice and maize production, which are the two main cereal crops in Bhutan.

Table 4-17 Losses of cereal production to wildlife as percentage to the total production (%)

Paddy	Maize	Wheat	Barley
27.39	69.38	2.76	0.47

Source: The RNR Census 2009



Langur by a road in Zhemgang

The major animals that cause damage crops include wild boars, bear, sambhar, monkeys, and birds. In the southern part of the country, damage by elephant and tiger is also considerable.

Forest and Nature Conservation Act ensures the protection of wildlife and thus there are not many effective countermeasures for the damage by wildlife. During the field survey of the project team, many farmers state that the only effective countermeasure is the night guard and making sound to scare wild animals. The areas protected by the electric fence are very small.

(ii) Area of fallow land

According to the RNR Census in 2009, about 23% of total agricultural lands are left fallow

in 2008. As indicated in Table 4-18, the proportion of fallow land is larger for dry land.

Table 4-18 Percentage of land left fallow

Wet land	Dry land	Cash crop land	Total
17.5%	33.5%	16.0%	23.0%

Source: The RNR Census 2009

Table 4-19 shows the percentage of households by reasons for leaving their land fallow. One can see the damage by wildlife being the biggest reason. The agricultural land being located far from the resident, being unproductive, and the lack of irrigation are other major reasons for it.

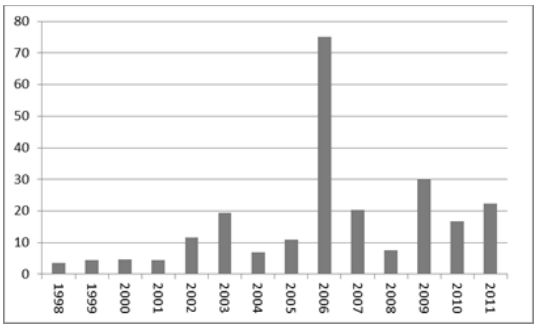
Table 4-19 Percentage of households by reasons for agricultural land fallow

Unproductive land	Lack of irrigation	Wildlife problem	Located far from residents	Land affected by landslides	Land very steep for cultivation	Land very stony
13.73	16.25	33.85	28.59	4.22	5.3	5.78

Source: The RNR Census 2009

(iii)Conversion of wetland to other uses

Conversion of agricultural and lands are occurring each year to accommodate various development activities. Fig. 4-12 indicates areas of wetland converted to other forms of land use. Between 1998 and 2011, about 240 hectares of prime agricultural land have been converted to other forms of land use.



Source: Bhutan Environment Outlook 2008 and Kuensel May 26, 2012

Fig. 4-12 Area of wetland converted to other use (Ha)

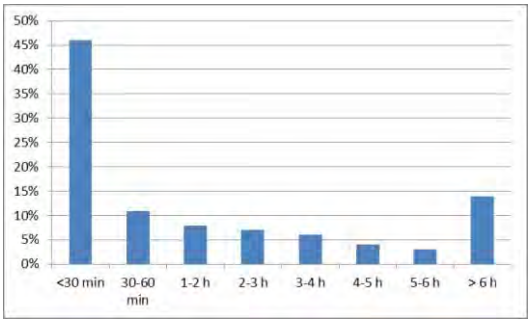
Section 167 of the Land act of Bhutan put priority for wetland protection and utilization, thus, not all the request of the wetland conversion have not been approved. However, the actual implementation of protection is subject to compromises with development particularly urbanization, with loose implementation of the clauses in the act. In 2011, there were totally 177 cases of the wetland conversion requests, and 67 of them were approved.

As the land conversion of wetlands has been increasing in Thimphu and Paro, the MoAF plans to set up the wetland which will be protected where the conversion to other uses will not be approved.

(iv) Remoteness

Fig. 4-13 depicts the distribution of agricultural households by distance to a motorable road. Whereas 47% of agricultural households have access to the road within 30 minutes walks distances,

there are sizable numbers of households (13% of all agricultural households) who have to walk more than 6 hours to get to the motorable road. As discussed earlier, the usage of fertilizer and chemicals are lower for households who are located further to roads, which implies the lower productivity for the farms located remote from roads. In fact, a study shows that the yield of rice production declines as the distances to roads increases. There is also a strong negative relation between the rate of commercialization of farms and their distances to roads[34].



Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Fig. 4-13 Distribution of households by distance to a motorable road, 2000

Many villages are accessible only by trail

Collective work of weeding at a maize farm (Zhemgang)

(v) Labor shortage

There is a significantly high labor dependence on farming, especially for transplantation, harvesting, and weeding. According to the CCA survey, labor input is 200 person days per ha for rice cultivation. Also, farm labor is scarce and expensive. Based on the field survey of the project team, the wage of farm labor is Nu. 150-200 per day, whereas it is about Nu. 100 in India. Scarcity of labor stems from a small population and the migration of the population in the rural areas, as mentioned in Chapter 3.

[34] Agricultural commercialization and diversification in Bhutan, IFPRI, 2010.

4-2 Storage and processing

(1) Rice

(a) Storage

Loss of output during storage due to rats and pests is estimated to be 15% of total output of rice[36].

(b) Rice milling

Most of the rice milling is done by the Indian made machines which are very crude, and thus the grain breakage is quite common. The use of old milling machines resulted in lower head rice recovery rate with 50%, whereas that with best-in class milling machines is 65-70%[37]. Yet, as the residuals of the rice after milling are important source for the livestock feed, the improvement of recovery rate may negatively affect the livestock sector.

Indian made milling machine at a farmer's house in Paro

Wooden container for rice at a farmer's house in Paro

(2) Maize

(a) Storage

In most of the cases, farmers store maize in their houses typically hanging under the ceiling. These traditional storage systems are susceptible to rats and pests. The National Post Harvest Center (NPHC) is currently implementing Post harvest management program focusing on reducing food loss at the post-harvest stages. NPHC has so far constructed more than 100 improved maize stores in Zhemgang, Mongar, Tashiyangtse, Trashigang, Pemagatshel, and Samdrup Jongkhar.

[36] Diagnostic-RNR Sector" by Royal Government of Bhutan

[37] "Diagnostic-RNR Sector" by Royal Government of Bhutan.

Maize hanged in the ceiling (Zhemgang)

Improved storage for maize storage constructed by NPHC (Zhemgang)

(b) Processing

Maize is consumed as a staple food in the form of *Kharang*[39] or boiled cobs, mainly in the eastern regions in Bhutan. It is also consumed as snack in the form of *Tengma*[40], or brewed into *Ara*[41]. Table 4-20 shows how much of the maize produced for home consumption is processed into these items.

These maize products are mostly consumed at home.

Table 4-20 Proportion of different maize products processed

	(Mt)	% of Home consumption
Total Home consumption	**35,316**	**100%**
Green cobs[38]	706	2%
Tengma	3,532	10%
Kharang	25,054	71%
Ara	6,023	17%

Source: Commodity Chain Analysis, MoAF (2007)

Maize being processed

Maize being fermented to produce *Ara*

[38] Green cobs refer to roasted or boiled cobs.
[39] *Kharang* is pounded maize or grits, which are often mixed with rice and cooked together.
[40] *Tengma* is a pounded maize, or corn flake, which is consumed as a snack.
[41] *Ara* is a traditional alcoholic beverage in Bhutan, which is mainly made from maize, and are indispensable for religious and traditional chores.

(3) Potato

(a) Storage

Potatoes are stored for a maximum period of 4-5 months for seed purpose, home consumption, and for sales. Most of the farmers stored potato in their houses mainly on the ground floor. NPHC has also been promoting to set up the improved storage for potato seeds and has constructed 79 of it in Trashigang, Pemagatshel and Mongar so far.

There is a seasonal trend in the prices of the potato, which reaches the peak in October and November due to the high demand of seed potato in India in this period. Local potato begin to arrive at the market in as early as June every year, but the lack of large scale storage prevents the farmers from selling these early harvest potatoes in the higher price season.

(b) Processing

Small quantities of homemade potato chips are sold in the local markets.

(4) Dairy Products

(a) Storage

There is virtually no cold storage for dairy products and it thus limits the dairy farmers to market their milk.

(b)Processing

There are a couple of dairy processing firms such as Drukyul, Zimdra, and Wanchuktaba in Bhutan. However, Drukyul and Zimdra import raw milk from India to produce packed milks.

(5) Met Product

(a) Storage

There is virtually no cold storage for meats which are produced in Bhutan.

(b)Processing

As depicted in Section 4-4, even though slaughtering animal is avoided publicly due to a religious reason, slaughtering animals are conducted in most of the villages and the meats are distributed mainly to the households in the same or neighboring villages.

There are no formal meat processing firms in Bhutan.

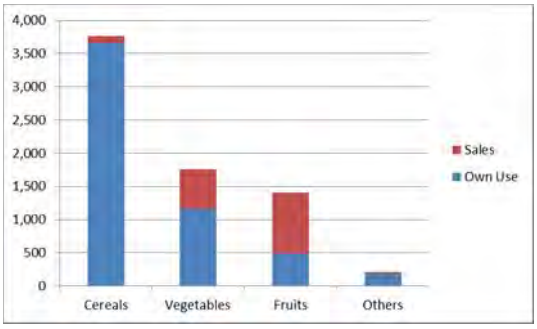
4-3 Marketing and supply chain

(1) Commercialization rate

(a) Crop Sector

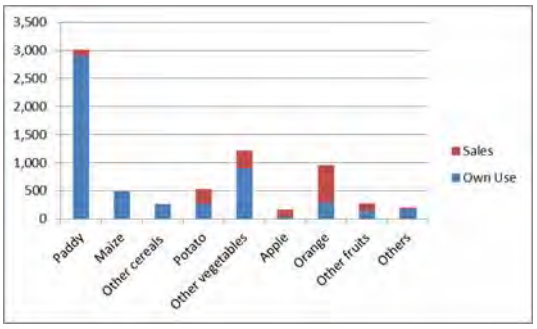
Secion4-1 mainly examined the production stages in the agriculture sector in Bhutan. This section in turn looks at the marketing stages of the commodity chains. Fig. 4-14 and 4-15 depict the different commercialization rates by crop category and crops. The value of production of cereals is most significant of all crop categories. However, cereals are mostly produced for home consumption, and only 2.8% of the total productions of cereals are sold. Most of the cereals in the markets seem to

be thus the imported ones. The rates of commercialization for vegetables and fruits are much more significant, and they are 34% and 65% respectively.



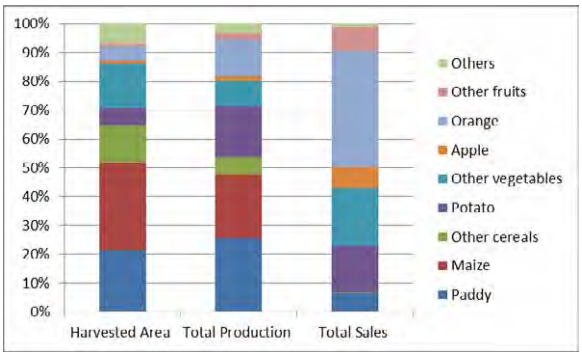
Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Fig. 4-14 Sales and own use of different types of crop categories 2008 (Million Nu.)



Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Fig. 4-15 Sales and own use of different types of crops 2008 (Million Nu.)



Source: Agricultural commercialization and diversification in Bhutan, IFPRI (2010)

Fig. 4-16 Crop composition of harvested area, total physical production, and total sales, 2008

Fig.4-16 shows the relative importance of different crops in harvested area, production and sales in Bhutan. One can see the significant differences among crops over these categories. Cereals constitute about 65% of total harvested areas and 54% of total production, but it makes up mere 6% to total sales values. On the other hand, vegetables and fruits play dominant roles in terms of the amount of sales. Vegetables constitute 36% of total sales values, whereas its shares of harvested areas and total production are 22% and 27% respectively. Fruits constitute 55% of total sales values, whereas its shares of harvested areas and total production are 7% and 15% respectively.

(b) Livestock sector

Table 4-21 shows the status of production and sales for each livestock commodity. It indicates that that large proportion of rural households produce dairy products (milk, butter, cheese) and egg (more than 30% for all of these commodities). Also, that the proportion of rural households that sell the dairy products and egg is significant (more than 10% for all of these commodities), and the amount of cash earnings from selling these commodities is quite large. This implies that the dairy products and egg are important source of cash incomes for the rural households.

On the other hand, the proportion of households that produce and sell meat products are quite limited, and the amount of cash earnings from selling meats is also small.

Table 4-21 Production and sales in the livestock sector

	Percent households producing	Quantity produced (Mt)	Percent household selling	Quantity sold (Mt)	Amount earned (Millions Nu.)	Commercialization Rate (quantity produced/quantity sold
Pork	4.46	244.70	2.59	144.70	11.03	59%
Beef	3.67	419.50	2.57	178.50	13.26	43%
Mutton	1.72	34.10	0.24	6.40	0.81	19%
Chicken	4.29	92.60	0.11	44.70	4.79	48%
Fish	0.46	16.50	0.17	7.80	0.81	47%
Milk	49.72	24,940.30	10.55	2,086.00	40.67	8%
Butter	44.51	1,648.10	18.52	927.20	121.57	56%
Cheese	36.25	1,935.20	16.25	1,164.40	74.35	60%
Egg	31.41	450.76	17.18	258.04	33.50	57%

Source: The RNR Census 2009

(2) Marketing channels

(a) Rice

Table 4-22 and 4-23 show the flow of the rice through different channels, which are resulted from the CCA survey. The survey results indicated that only 15% of the domestically produced rice is marketed, while the other 85% is consumed at home.[43] Among the rice sold to the markets, most of them are directed to rural markets. The CCA survey finds that there are no associations or cooperatives that faciliatate marketing of rice, but individual farmers bring rice to the markets by public transport.

The miller is also involved in the marketing of rice. Millers are usually paid in kinds as milling charge, and the rice collected in this manner is sold at the mill site or in the local markets.

[43] The ratios of commercialization of commodities which are resulted from the CCA survey are higher than that from the RNR Census 2009. This is probably due to that fact that remote areas are under-represented in the survey. As mentioned earlier, if the data of the CCA Survey and RNR Census are different, those of RNR Census should be considered to reflect more accurate picture.

Table 4-22 Distribution of rice to total production

	(Mt)	% of Production
Total production	**33,055**	**100%**
Home consumed	27,967	85%
Quantity sold	5,088	15%

Source: Commodity Chain Analysis, MoAF (2007)

Table 4-23 Market flow of rice

	(Mt)	% of Sales	% of Production
Quantity sold	**5,088**	**100%**	**15%**
On farm	409	8%	1%
Rural market	4,480	88%	14%
Export market	100	2%	0%

Source: Commodity Chain Analysis, MoAF (2007)

Paro rice on sale at a market of Thimphu

Another important marketing channel for rice is that of imported rice (mainly from India), and urban retailer who imports rice and supply to urban and rural poulaces play an important role. According to the CCA survey in 2006, there were about 1000 retailers and they import about 28,000 MT of milled rice annually, which was about 80% of the total import. Most of the rice they import are of low or medium quality. The FCB also import rice from India, and accoring to the CCA survey in 2006, the average annual quantity it imports is 7,000 Mt.

(b) Maize

Table 4-24 and 4-25 show the flow of maize through different channels. The results of the CCA survey indicates that only 6% of the total maize produced domestically is marketed. The most of the maketed maize are sold on farm or at the local markets. Yet very small amount is sold through the auction yards of Food Corporation of Bhutan (FCB).

Table 4-24 Distribution of maize to total production

	(Mt)	% of Production
Total production	**44,190**	**100%**
Seed	1,508	3%
Home consumption	35,316	80%
Gift/Feed	4,830	11%
Quantity sold	2,537	6%

Source: Commodity Chain Analysis, MoAF (2007)

Table 4-25 Market flow of maize

	(Mt)	% of Sales	% of Production
Quantity sold	**2,537**	**100%**	**6**
On farm	1,825	72%	4%
Local market	161	6%	0%
FOB	207	8%	0%
Other agent	344	14%	1%

Source: Commodity Chain Analysis, MoAF (2007)

(c) Potato

Table 4-26 and 4-27 depict the flow of potato through different channels. About 5% of the total production is used for home consumption and 72% is sold. Of the total quantity of sold, significant amount is sold through the FCB auction yards in Samdrup Jongkhar, Phuntsholing and others are sold at the local or urban markets. The CCA survey finds that most of the potate farmers prefer to sell at the auction yards becasuse they can sell it in bulk and also they can trip together with other farmers to the auction yard with their annual shopping. Most of the buyers at the auction yards are Indian traders from neighering border areas.

There are also some potatoes which are sold through the local traders and vegetable venders who sell at the weekend markets or to grocery stores.

Table 4-26 Distribution of potato to total prodution

	(Mt)	% of Production
Total production	**54,683**	**100%**
Seed	8,458	15%
Home consumption	2,700	5%
Gift/Feed	1,209	2%
Quantity sold	39,581	72%

Source: Commodity Chain Analysis, MoAF (2007)

Table 4-27 Market flow of potato

	(Mt)	% of Sales	% of Production
Quantity sold	**39,581**	**100%**	**7 %**
Local market	2,694	7%	5%
Urban market	6,363	6%	12%
Auction market	30,524	77%	56%

Source: Commodity Chain Analysis, MoAF (2007)

(d) Dairy products

The milk and the dairy product of Amul, which is the distributior in India, appear to have a significant proportion of share in the milk and dairy markets in Bhutan. Most of the dairy products produced in Bhutan are sold at the local level mainly to the neighbors or at the local markets.

Dairy products and eggs sold at a market in Thimphu

(e) Meat products

There are several urban wholesellers for meat products who import meat from India. Most of the meat products produced in Bhutan are sold at the local level mainly to the neighbors or at the local markets.

4-4 Food Market and Situation of Nutritional Improvement

(1) Present Situation of Nutrition

According to the National Nutrition, Infant & Young Child Feeding Survey of 2008, the prevalence ratio of wasting (acute malnutrition) has increased from 4.1% to 4.6% between 1988 and 2008. On the other hand, the prevalence ratio of stunting[44], which indicates chronic malnutrition, has decreased from 56% to 37% between these years. The prevalence of underweight had also decreased during this period.

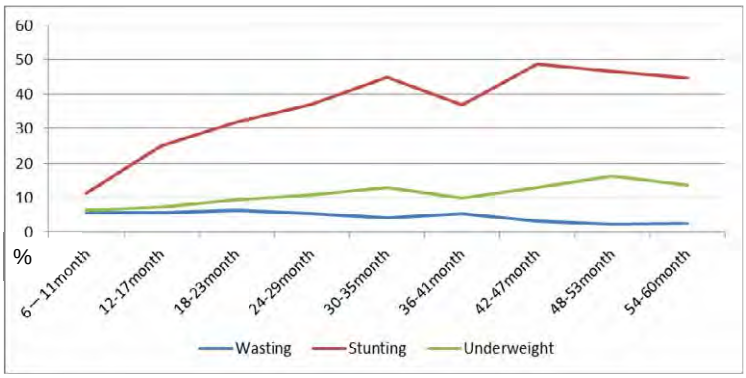
Table 4-28 National Prevalence of Malnutrition

	1988 NCHS	1999 NCHS	2008 NCHS	2008 WHO
Wasting	4.1%	2.6%	4.6%	4.6%
Stunting	56.1%	40.0%	30.2%	37.0%
Underweight	37.9%	18.7%	15.2%	11.1%

Source: National Nutrition, Infant & Young Child Feeding Survey(2008)

It is important to note that, however, the prevalence of stunting and underweight tend to increase as infants get old, as shown in the figure below. The survey notes that chronic exposure to insufficient dietary intake, poor feeding practices, and frequent illness appear to lead the children to be stunted or underweight.

This survey revealed that among food items consumed by children, meat, milk and eggs did not feature high in the frequency of food items, while rice, potatoes, butter and chili featured high on the frequency list. Then it speculated that such dietary pattern in children might be one of the reasons why they have a high stunting prevalence.

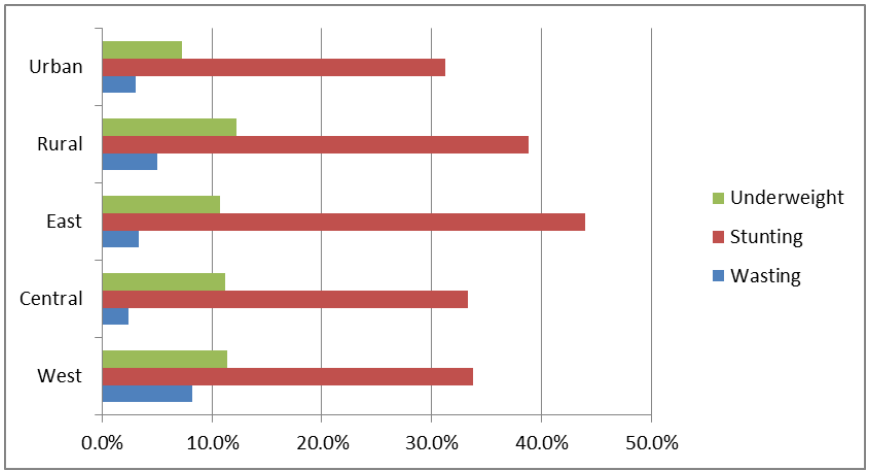


Source: National Nutrition, Infant & Young Child Feeding Survey(2008)

Fig.4-17 Prevalence of Malnutrition within different age groups（2008）

[44] It is an indicator of the cumulative deficient growth associated with chronic insufficient dietary intake, frequent infections and poor feeding practices over a long period of time.

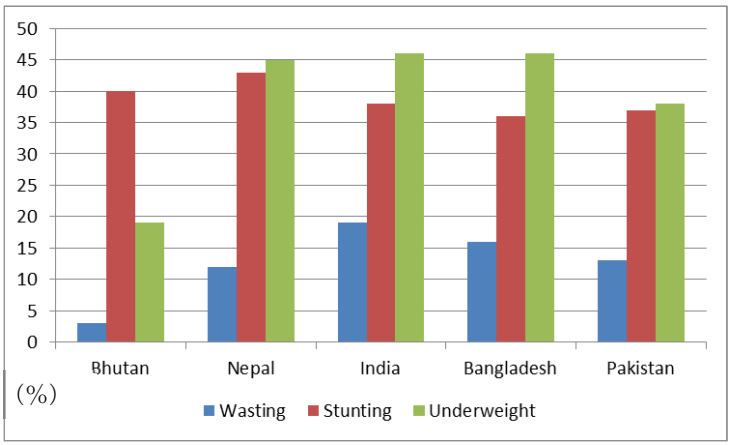
The prevalence ratio is higher for the residents in the rural areas than the urban areas. The prevalence ratio of stunting is quite high in the Eastern part of Bhutan.



Source: National Nutrition, Infant & Young Child Feeding Survey(2008)

Fig.4-18　Distribution of Malnutrition by Area（2008）

Fig.4-19 shows the prevalence of malnutrition (total of middle and severe levels) in the South Asian countries. The prevalence of wasting and underweight in Bhutan is lower than other countries. However, the prevalence of stunting in Bhutan is relatively high among those countries.



Source: UNICEF the state of the world's children 2009,　Moderate & Severe under 5 age 2000-2007

Fig.4-19　Comparisons of Malnutrition with Neighboring Countries

Table 4-29　Comparisons of Health Data with Neighboring Countries

	Bhutan	Nepal	India	Bangladesh	Pakistan	Year
Life Expectancy	66.9	68.4	65.1	68.6	65.2	2010
Mortality rate, neonata (%)l	2.6	2.8	3.2	2.7	4.1	2010
Mortality rate, under−5 (%)	5.6	4.9	6.2	4.7	8.6	2010
Maternal Death (%)	0.6	1.2	0.7	0.9	1.1	2008

Source: World Development Indicators

With regard to nutritional supports for children, WFP has been providing the school feeding program for about 35,000 students of the primary and lower secondary schools. Ministry of Education also provides stipend of Nu.700 per one student for three meals to the middle and higher secondary schools. According to the sample survey in 2009, the current school food basket is lacking fat, calcium, iron, vitamin A, riboflavin and Vitamin B1 and B2. The survey indicates that one of reasons is deficiencies of vegetable, meat and egg in their menus.

Table 4-30 Results of the Food Basket Survey

	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Iodine (μg)
Supplied by ration	2559	57.8	30	160	12.7	438
Required	2420	56.6	46.1	500	26	150
Achievement	106%	102%	65%	32%	49%	292%
	Vitamina A (μg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)	
Supplied by ration	290	1.7	0.71	34	80	
Required	550	1	1.6	16	30	
Achievement	53%	170%	44%	213%	267%	

Source: Review of Nutrition Aspects of Food Basket in Middle and Higher Secondary Schools in Bhutan,WFP MOE (2009)

Talbe 4-31 An Example of One-day Menu

Ugyen Dorji Higher Secondary School (from accessible area)

Day	Breakfast	Lunch	Tea	Dinner
Monday	Fried Rice with Suja	Rice, Emadatsi and Dal	Black Tea	Rice, Potato Curry with Dal

Source: Review of Nutrition Aspects of Food Basket in Middle and Higher Secondary Schools in Bhutan, WFP MOE (2009)

While malnutrition especially among young children is recognized, the cases of over-nutrition related deceases such as hyper tension, diabetes, and alcohol-induced liver disease are increasing as shown in the table below. Any research has not yet been done to prove the relation between dietary patterns and deceases. However, the general food habit that leans to rice, potato, chili, salt and oil with less of vegetable and source of protein might possibly cause health problems.

Table 4-32 Cases of Non-communicable Diseases between 2004 and 2010

	2004	2005	2006	2007	2008	2009	2010
Diabetes	634	944	1,470	1,732	2,541	2,605	3,275
Hypertension	14,195	16,570	20,501	19,347	20,347	21,177	23,853
Alcohol Liver Diseases	1,147	1,217	1,531	1,471	1,329	1,602	1,943

Source: Annual Health Bulletin (MOH)

BOX. Food Culture

The common menu is constituted mainly by rice with side dishes such as ema-datshi, kewa-datshi and dall. The varieties of seasoning is limited only to oil, salt, and chili. According to the qualitative survey of twenty four hour recall of actual food intake from approx.2,000 mothers, the most commonly consumed item in their household is rice followed by chili, cheese, potato and spinach.

Table 4-33 Most Commonly Consumed Food Items of Adult

%

Rice	Chili	Cheese	Potato	Spinach	Condiments	Tea
24.3	18.9	10.5	7.4	6.5	4.9	4.3
Kharang	Radish	Tomato	Beef	Beans	Fish	Barley
4.0	2.8	2.4	2.4	1.7	1.3	1.1

Source: National Nutrition, Infant & Young Child Feeding Survey, MOH (2008)

Lunch for a Guest in Village
（Estimated weight of 500gm）

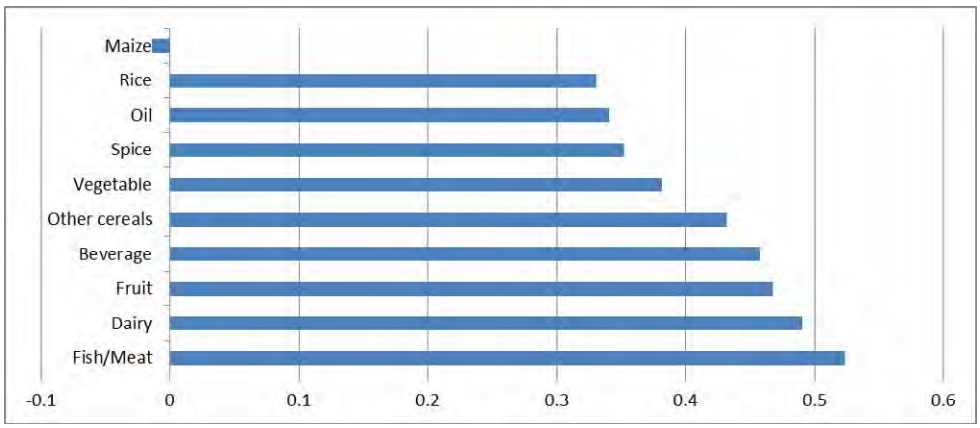
Edible Forest Product（Fern）

Rice is often mixed with Kharang, which is made from the crushed maize, in the maize producing areas. In such areas, people used to take flour of maize although it is now mainly utilized for cattle feed. The field survey of the study team found that maize consumption was decreasing, and at the same time rice consumption was increasing. Variety of vegetables also has been increased compared to the past years, even though the varieties of vegetable consumed now are still quite limited.

(2) Consumers' Demands

The income elasticity of main food items are shown in the figure below. One can see that fish/meat has the highest income elasticity, followed by dairy product. Income elasticity of maize is minus, indicating that demand is not expected to increase with the rise of income[45].

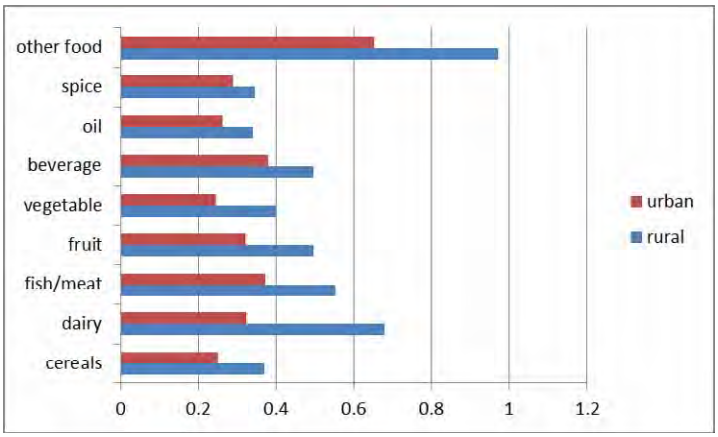
[45] This is based on IFPRI (2010)



Source: An analysis of household food demand in Bhutan IFPRI (2010)

Fig.4-20 Income Elasticity of Main Food Items

The income elasticities for the food items are higher for the residents in the rural areas than the urban areas, as shown in the figure below. One can see the significant differences in the income elasticities between urban and rural areas for the consumption of dairy products, fish/meat and vegetable

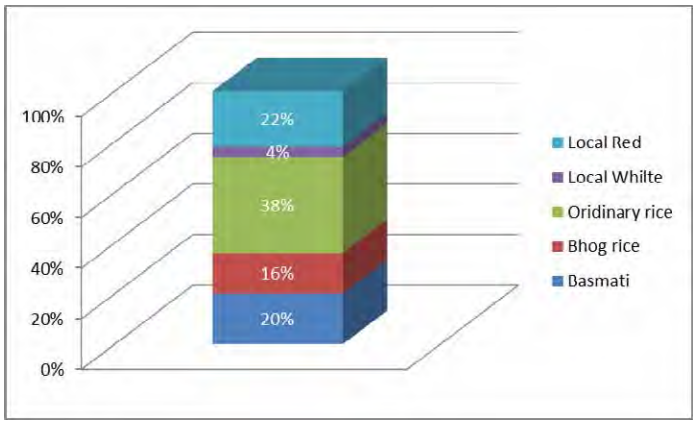


Source: An analysis of household food demand in Bhutan IFPRI (2010)

Fig.4-21 Income Elasticity by Area

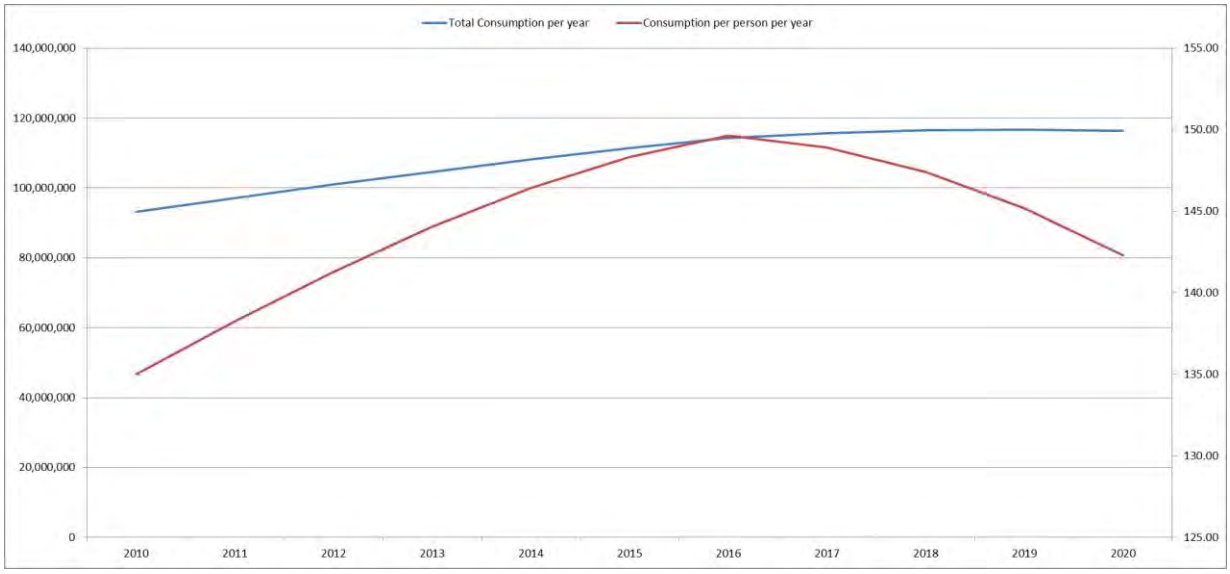
According to the "Rice Commodity Chain Analysis" by FAO of 2006, 74% of total rice consumed in the urban areas is imported from India, 22% of it is Bhutanese red rice, and 4% of it is Bhutanese white rice. According to the study team, it was observed that rice has a higher preference than maize. They also showed their preference of Bhutanese rice over Indian rice[46].

[46] However, during the field survey in Trashigang Dzongkhag, there are some farmers who showed their preference to maize over rice. The reasons are: they are accustomed to taking maize since childhood; they feel maize is more nutritious than rice; and they concern a safety of Indian rice.



Source: Rice Commodity Chain Analysis 2006

Fig.4-22 Distribution of Varieties of Rice Consumed in the Urban Areas



Source: calculated based on RNR statistics Left: Total Consumption (KG), Right: Consumption per person (KG)

Fig. 4-23 An Estimate of Rice Consumption up to 2020

Fig. 4-23 shows the estimated trends of total rice consumption volume and its per capita consumption volume until 2020. The estimation is based on the actual consumption volumes in 2010 (where its total consumption was 90,171Mt and per capita consumption was 135kg). The per capita rice consumption is estimated to reach at the peak in 2016 with 149 Kg., and become 142Kg in 2020. The total rice consumption in 2020 is estimated to reach 116,355Mt.

Precondition for the estimate of rice consumption

Preconditions are set as follows based on 2010 as the base year.

- ✧ Per head rice consumption in 2010: 135kg/yr (Bhutan RNR Statistics 2011)
- ✧ Ceiling of annual rice consumption per head : 150kg/yr (Volume determined during the period of national isolation of Japan, that was used during Edo shogunate era for more than 300 years ago)

✧ Growth rate of annual rice consumption per head:

- Initial year (2010-2011) growth rate: 2.4% (GDP Growth Rate (8%/yr) x Income elasticity of rice (0.3: "An analysis of household food demand in Bhutan")
- Subsequent years: Assumed the initial year growth rate steps down gradually until calculated per head consumption reaches to the ceiling.
- After per head consumption reached the ceiling, it reduces applying step-down ratio at 2.3%/year, which indicates Japan's per head consumption reduction rate during 1962 – 1982.

(3) Social Custom in Consumptions

The following social practices in rural communities should be remarked in that they can underpin food security at micro-level.

Social Practice	Contents	Place Observed
Exchanged Labor in Production	Farmers often exchange agricultural labor with neighbors, so-called "Lay-me System". This is one of the mutual assistance practices, where exchange of money does not take place.	All over the nation
Custom of Barter Trade	Some farmers have continued their practice of bartering their products. For example, the study team found that several farmers in Khaling Gewog of Trashigang Dzongkhag barter maize for dairy products such as cheese and butter with a specific group of people who migrate from the north area every year.	Khaling (Trashigang) Trong (Zhemgang) Paro
Chance of Off-Farm Income	Farmers have chances to gain off-farm incomes through agricultural labor, construction labor, handcraft of traditional clothes and so on. According to the field survey in Khaling of Trashigang, many farmers mentioned that compared five years ago, the number of time to engage in such activities has been on increase with growing amounts of income. A several farmers earn Nu.10,000-Nu.30,000 annually by construction work.	All over the nation Khaling (Trashigang) Trong (Zhemgang)
Food for Nursing Mothers and Infants	According to the field survey of the study team, many farmers recognized that food items which contain protein and vitamin should be recommended	Khaling (Trashigang) Paro

Social Practice	Contents	Place Observed
	for nursing mothers. Vice versa chili, pork and alcohol should be avoided.	
Utilization of Meat	Slaughtering animal is avoided publicly due to a religious reason. However, people do not show a resistance to eating meat processed by a third party. Those who engage in slaughtering usually are from lower class of society, and then they can get specific parts of processed meat as a honorarium. The part of meat given to slaughter person differs by area (in case of Sarpang Dzongkhak, 5-10kgs of breast meat is given)	All over the nation
Borrowing rice and maize	Borrowing rice and maize with neighbors is quite very common, and it mostly takes place without interest payment of handling fees. This practice constitutes a part of food security in the time of food shortage during July and September. However, it is reported that there are some farmers who are suffering from the accumulated debts which have been piled up over generations[47]. For example, a farmer in Khaling Gewog borrowed maize from a neighbor because landslide washed away his whole maize field. And then he repaid the debt by providing agricultural labor in two years. Like his case, debtors who hardly repay by a general mode of repayment, are supposed to engage in labor for their creditors[48].	Khaling (Trashigang)
Food Provision in a Festival	Festivals such as “Lochoe” and “Rimdo” function as a system to redistribute rice and alcohol from the rich to the poor households. This is typical in the festival called “Lochoe”, where every household in the village is given food. These traditional festivals compose a part of food security at a local level.	Chuzagang (Sarpang)

[47] Food and Human Security “Safety Net at grass root level with a view of transaction forms” Akiko ueda,2010
[48] A creditor in Khaling Gewog said that mostly a half of debtors repay by a provision of labor.