



DETAILED FEASIBILITY REPORT ON HOSPITAL SUPPLIES

Part 1

For

**DEPARTMENT OF INDUSTRIES
MINISTRY OF ECONOMIC AFFAIRS
ROYAL GOVERNMENT OF BHUTAN**

By

**IDRG CONSULTANCY SERVICES
In Association with Sherpa Consultancy
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Executive Summary



EXECUTIVE SUMMARY

Part 1 - Review of hospital supplies scenario and identification of potential projects

1. In the strategic framework of development plans of Bhutan, health has been viewed as an important dimension of human capital besides contributing to Gross National Happiness and well being of the Bhutanese society. Health expenditure, therefore, is deemed to be long term investment, that is expected to provide both tangible and intangible socio-economic returns reflecting the basic principle of according high priority to health care sector. Extending free basic health care has been enshrined as a constitutional obligation. The constitution mandates that Govt. of Bhutan is to “provide free access to basic health services in both modern and traditional medicines” and that it will “Endeavour to provide security in the event of sickness”.
2. Over the last four decades, the health care sector has undergone radical change. Bhutan today has a well-developed decentralized system of health care. The health care network of hospitals, basic health units (BHUs) and out reach clinics (ORCs) deliver free health care to over 90 per cent of nation’s highly dispersed population. Besides a vast majority of population has access to safe water and sanitation facilities.
3. As off now there are 29 hospitals, 176 basic health units (BHUs) and over 514 outreach clinics (ORCs) spread over 201 gewogs providing primary health care services. A total of 2,749 health personnel of different categories serve in different hospitals. Besides the allopathic system, there exists a well established network of indigenous medical facilities under the Institute of Traditional Medical Services that has basically three functions: medical services for outdoor patients; collection and manufacturing of indigenous medicines.
4. In view of the growth in the health care facilities network, increase in the demand for various medicines and non-medicine items and upcoming industrial development of Bhutan, it has been realized that some of the requirements for hospital supplies could be manufactured in the country. This approach would provide higher level of efficiency and sustainability to health care sector as well as help in the industrial development of the country.
5. It has, therefore, been considered desirable to study the entire spectrum of hospital supplies viz. medicine and non-medicine items of supplies, their current level of



demand, future demand projections, frequency of recurrence of the demand, major centres of requirement, present system of supplies, comparative advantages of factor inputs and markets, etc. and then select some viable projects for development in Bhutan. Out of these short-listed projects, some potential projects are to be studied for detailed feasibility so as to facilitate the private sector in making investment decisions for setting up commercial ventures in the field of hospital supplies. It is in the above context that a project has been assigned to IDRG Consultancy Services to carry out detailed feasibility study of Hospital Supplies projects in Bhutan.

6. The public drug supply system in Bhutan accounts for over 90 percent of the expenditure on drugs. It is the responsibility of Drugs Vaccine & Equipment Division, Department of Medical Services to arrange the procurement, ensure its quality and other aspects of management of drugs, non-drug items and equipments and supply them to be hospitals at central, regional & district level .The entire purchase of hospital supplies, including medicines & non-drug items, is made by the Government.
7. There is practically no indigenous production of allopathic medicines & non-drug items required for health care and the entire requirement is being met through imports. The private medical stores also source their supplies through imports. However, there exists a pharmaceutical & research unit for the manufacture of traditional medicines within Institute of Traditional Medicine Services.The Pharmaceutical & Research Unit of ITMS is manufacturing traditional medicines mainly for domestic requirements.
8. The current budget for procurement of hospital supplies is NU 250 million including NU 100 million for procurement of medicines and NU 150 million for non drug items.
9. Hospital supplies, falling under three broad categories viz. consumables, non-consumables and services, were reviewed to identify the potential projects which could be implemented in Bhutan. Keeping in view the limited expansion of hospital infrastructure in future and very limited replacement demand, the non-consumable items were not found to have potential for indigenous production. In the consumables, various medicines, glucose saline, disposable syringes, plastic films and disposable bags, laundry and kitchen services, etc. were reviewed. As the medicines are centrally purchased by the Ministry of Health, the procurement figures of various medicines during last three years were also examined to assess the viability of their indigenous production.
10. Based on the studies of various aspects of hospital supplies, current procurement level, demand estimates and supply chain system, IDRG team finalized a list of 9 potential products in hospital supplies sector. After consideration of various factors, namely current demand levels and future growth projections, availability of local raw materials and skilled manpower, possibilities of export to adjoining markets and possibility of use of environment friendly technology, it was decided in consultation with Ministry of Economic Affairs and other stakeholders that the detailed feasibility studies be carried out for the setting up a drug formulation unit for the manufacture of tablets, capsules and powders & another unit for the manufacture of gauze,



bandage and absorbent cotton in Bhutan. Besides, it was decided that project profiles be prepared on disposable syringes, glucose saline and plastic film and disposable bags for the benefit of prospective entrepreneurs.

11. Detailed feasibility analysis for setting up units for the manufacture of tablets, capsules & powders and gauze, bandages & absorbent cotton has been carried out covering various facets as outlined in the terms of reference. The detailed feasibility analysis for these two groups of products have been given in the part II and part III of the report respectively. The salient features of these feasibility analysis are given in subsequent paras.

Part II - Detailed Feasibility Analysis of Drug Formulation

1. The project envisages the manufacture of drug formulations mainly paracetamol, antacid and iron-folic acid in tablet form, vitamin B complex in capsule form and ORS in powder form. The objective of the project is to carry out the detailed feasibility analysis of drug formulations. Other need-based drug formulations could also be manufactured in tablet or capsule form.

2. Thimphu, Phuentsholing, Punakha, Gelephu, Samdrup and Paro have potential for a drug formulation unit. However, keeping in view that at present almost the entire supplies of drug formulations in Bhutan are procured by the government as well as various other parameters, these locations have been short listed in the order of preference and it is concluded that Thimphu would be the most preferred location for the project followed by Phuentsholing and Punakha.

3. Majority of the drug formulations in Bhutan are procured centrally by Ministry of Health and then distributed to various hospitals in the country. There are medical stores also in the major towns. However, currently their turnover in drug formulations is quite limited. Based on the figures of procurement by Ministry of Health during last 3 years, it is observed that setting up of a formulation unit for the manufacture of tablets and capsules would be viable in Bhutan. The market is likely to further expand with the growth in demand from the government as well as private medical stores who are mostly selling branded drug formulations. As the Government of Bhutan would be the major buyer for the products of the unit, the project need to mainly focus on meeting the various parameters of government supplies viz packaging of tablets in bulk package to cut down the cost and be competitive with the existing sources of supply. The unit also needs to tap the open market through sales of formulations to medical stores. Presently there are no pharmaceutical units in Bhutan and government being the major buyer, there exist bright prospects for the unit to capture substantial market share in the supply of drug formulations.

4. Annual production capacity recommended is given below: -

Pharmaceutical tablets – 1200 lakhs

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Pharmaceutical capsules – 100 lakhs

5. Land and building requirement for the project will be as below:

| | | |
|---------------|---|--------------|
| Plot area | – | 1000 sq. mts |
| Built up area | – | 800 sq mts |

6. The power requirement for the plant is estimated to be around 67.5 KWH.

7. The main machinery for the project are Mechanical sifter, Powder and mass mixer, Multi mill, Granulator, Double cone blender, Tray drier with 48 trays, Peristaltic pumps, Rotary tablet machine, De dusting unit, Coating machine with SS coating pan and Strip packaging machine.

8. The manpower requirement is given below: -

| | | |
|------------------------------------|---|----|
| Manager | – | 1 |
| Manufacturing chemist | – | 1 |
| Production supervisor | – | 2 |
| Office staff & marketing executive | – | 5 |
| Skilled workers | – | 10 |
| Unskilled workers | – | 7 |

9. The total cost for the project is around Nu. 126.03 lacs.

10. The period of project implementation is around of 14 months.

11. The means of finance is given below:

| | | |
|--------|---|----------------------|
| Debt | - | Nu. 88.22 lacs (70%) |
| Equity | - | Nu. 37.81 lacs (30%) |

12. The break-up of cost of the project is as follows: -

| | | |
|--------------------|----------|------------------------|
| Machinery | - | Nu. 45.40 lacs |
| Construction cost | - | Nu. 48.00 lacs |
| Misc. fixed assets | - | Nu. 2.00 lacs |
| Pre-operative exp. | - | Nu. 3.00 lacs |
| Training expenses | - | Nu. 0.45 lacs |
| Interest | - | nu. 11.86 lacs |
| Working capital | - | Nu. 15.32 lacs |
| Total | - | Nu. 126.03 lacs |



13. The annual sales would be around Nu. 186 lacs.

14. The financial analysis results are as under: -

| | |
|----------------------|---------------------------------------|
| IRR – | 36% on equity |
| IRR – | 23% on investment |
| NPV – | Nu. 76.36 lacs (discount rate of 12%) |
| Pay back period – | 3 years 6 months |
| Project break-even – | 62% |

Part 3 – Detailed Feasibility Analysis of Gauze, Bandages and Absorbent Cotton

1. The objective of the project is to carry out the detailed feasibility analysis of gauze, bandages and absorbent cotton. The project envisages the manufacture of gauze, bandages and absorbent cotton mainly to meet the requirements of hospital supplies being procured by the Government of Bhutan.

2. Thimphu, Phuentsholing, Punakha, Gelephu, Samdrup and Paro being the major towns constitute the main markets for gauze, bandage and absorbent cotton and have potential for setting up such a unit. However, keeping in view that all the raw materials viz gauze & bandage cloth and raw ginned cotton, etc which have high weight to volume ratio are required to be imported from India, the location of the unit near to Indian border would be quite logical with a view to reduce the unit cost of transport of raw materials. Further, a central location vis a vis major towns could be advantageous. Based on these considerations and various other factors, these locations have been short listed in the order of preference and it is concluded that Phuentsholing would be most preferred location for the project followed by Thimphu.

3. Gauze, bandages and surgical cotton rolls are mainly procured centrally by Ministry of Health, Government of Bhutan for distribution to various hospitals in the country. Some quantities of bandages and surgical cotton is also imported by the private trade channels and marketed through medical stores in various cities of Bhutan. Based on the figures of government procurement, estimated sales by the medical stores, the size of the market is considered sufficient to absorb the production of a medium scale unit. The market is likely to further expand with the growth in the government procurement and open market demand. As the absorbent cotton finds many other applications besides medical application, the product has a good potential of sales through medical stores in open market. As the government would be the major buyer, the unit has to focus on the products needed by the government hospitals in the initial phase. The unit could also

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explore the possibilities of marketing their produce to neighboring markets in India and other countries.

4. The annual production capacity would be 300 metric tonnes of absorbent cotton and 13.5 lac dozens of bandages of assorted sizes & 1.20 lacs rolls of gauze.

5. Land and building requirement would be as under: -

| | |
|-------------------|--------------|
| Plot area – | 1500 sq. mts |
| Built up area – | 300 sq mts |
| Industrial shed – | 700 sq mts |

6. The power requirement for the plant would be 91 KWH.

7. The main machinery would include the following: -

High pressure kier
MMC revolving flat high production carding machine
Porcupine cleaner
Centrifugal hydro extractor
Wet cotton opener
Vertical opener
Two compartment continuous cotton dryer
Single souter and lap machine
Rolling and winding machine

8. The requirement of manpower would be as under: -

Manager – 1
Manufacturing chemist – 1
Production supervisor – 2
Office staff & marketing executive – 5
Skilled workers – 10
Unskilled workers – 7

9. The Total project cost is around Nu. 176.48 lacs.

10. The Implementation schedule of the project is estimated to be around 8-9 months.

11. The details of means of finance are as under: -

| | |
|----------|-----------------------|
| Debt - | Nu. 123.54 lacs (70%) |
| Equity - | Nu. 52.95 lacs (30%) |



12. The break- up of cost of project is as under: -

| | | |
|--------------------|---|------------------------|
| Machinery | - | Nu. 66.98 lacs |
| Construction cost | - | Nu. 42.50 lacs |
| Misc. fixed assets | - | Nu. 3.00 lacs |
| Pre-operative exp. | - | Nu. 5.00 lacs |
| Training expenses | - | Nu. 0.67 lacs |
| Interest | - | Nu. 14.18 lacs |
| Working capital | - | Nu. 44.16 lacs |
| Total | - | Nu. 176.48 lacs |

13. The annual sales turnover is around Nu. 590 lacs.

14. The financial analysis of the project is given below: -

| | |
|----------------------|--|
| IRR – | 34% on equity |
| IRR – | 22% on investment |
| NPV – | Nu. 100.39 lacs (discount rate of 12%) |
| Pay back period – | 3 years 6 months |
| Project break-even – | 60% |

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Chapter – I

Introduction

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1. Background

1.1 In order to have a realistic study of the developments in various economic and social sectors in Bhutan, make projections and proposals for future and arrive at logical conclusions, it is desirable to understand the basic philosophy & approach to development in successive five-year plans. The approach to development in Bhutan has been shaped by the beliefs and values of faith, the Bhutanese had held for more than thousand years. Firmly rooted in there tradition of Mahayan Buddhism, the approach stresses not the material rewards but individual development, sanctity of life, compassion for others, respect for nature, social harmony and the importance of compromise. The approach to the development therefore has been both to draw on and conserve the rich fund of social and cultural philosophy and to achieve a balance between the spiritual and material aspects of life.

1.2 The philosophy of development in Bhutan was most clearly enunciated by His Majesty King Jigme Singye Wangchuck when he stated that “Gross National Happiness (GNH) is more important than Gross National Product” (GNP). This statement has been the guiding principle of the country’s development efforts for the last two decades. It recognizes that there are many dimensions to development and that economic goals alone are not sufficient. All development efforts must seek to contribute to both the material and spiritual well-being of the persons to enhance Gross National Happiness.

1.3 Gross National Happiness is the overarching development philosophy of Bhutan. With the inception of planned development in 1961, the country opened its doors to the forces of change and modernization. While the country was prepared for changes, it was essential to have a clear-cut perspective on the objectives and the guiding principles for change. It became evident quite early that for a holistic development of the society, it was essential that development must be both social and economic and that it was necessary to give equal importance to the spiritual, emotional and cultural needs on the one hand and the material well-being of society on the other. It was also recognized that at heart of the society is the individual whose welfare and well-being must be provided for by society.

1.4 In the past four decades, Bhutan has undergone a major transformation. The country’s economy is no longer one in the past that was entirely dependent on subsistence production. In the past decades its economy has grown at an annual rate of nearly 7 per cent, more than twice the annual rate of population growth and a rate matched by few other Least Developed Countries (LDC’s). Bhutan cautiously opened its doors to the forces of change and modernization in 1960’s. Prior to this, country possessed very little infrastructure which is today associated with modern State of Bhutan. The key factors to the economic growth of Bhutan have been harnessing of natural resource potential viz hydroelectric power, mineral & forest resources, emphasis on development of infrastructure, promotion of industrialization & indigenous production both for domestic consumption and exports.



1.5 The story of Bhutan's development is one of the broad based progress from the most modest beginning. The per capita GDP of Bhutan in 1961 was estimated to be at US\$ 51, then the lowest in the world. In the year 2000 the per capita GDP stood at US\$551, one of the highest in South East Asia. The Human Development Index (HDI) of 0.510 places Bhutan in the UNDP medium human development category of countries. Bhutan is one of the very few Least Developed Countries placed in this category.

1.6 In the developmental planning of Bhutan like all other social sectors, health sector has been recognized as an important sector for development and contributing to Gross National Happiness. Expenditures on health care facilities have been regarded as long-term investment and health care sector has been accorded high priority. In Bhutan, there exists a constitutional provision for providing free access to basic and services to all its citizens. During last two decades, wide net work of health care facilities has been created all over the country.

2. Justification of the Project

2.1 In view of the growth in the health care facilities network, increase in the demand for various medicines and non-medicine items, upcoming industrial development in Bhutan, it has been realized that some of the requirements for hospital supplied could be manufactured in the country. This approach would provide higher level of efficiency and sustainability to health care services sector as well as help in the industrial development of the country. It has therefore been considered desirable to study the entire spectrum of hospital supplies viz. medicines and non-medicines items of supplies, their current level of demand, future demand projections, frequency of recurrence of the demand, major centers of requirement, present system of supplies, comparative advantages of factor inputs and markets, etc. and then select some viable projects for development in Bhutan. Out of these short-listed projects, some potential projects are to be studied for detailed feasibility so as to facilitate the private sector in making investment decisions for setting up commercial ventures in the field of hospital supplies.

2.2 With the establishment of basic infrastructure, major investment in hydropower, the focus of the government is now on expansion of economic ways through increased investment in business and manufacturing activities. The government is keen to promote industrial units in various product sectors to meet the domestic demand as well as for exports. While the government is keen to pursue private sector led growth, there has been a dearth of project ideas. The private sector entrepreneurs particularly those interested in Small and Medium Enterprises (SMEs) have their inherent limitations in undertaking feasibility studies at their own. With this background, Department of Industry, Ministry of Economic Affairs with the responsibility to promote industrialization has initiated a programme for identification of project ideas and feasibility studies for the benefit of private sector investors. Hospital supplies have been identified as one of the potential sectors for identification of viable projects and detailed feasibility studies for few selected projects.

2.3 It is in the above context that a study has been assigned to M/s IDR Group Consultancy Services. The focus of the study shall be to carry out an intensive



investigation in close consultation with the Ministry of Economic Affairs, Ministry of Health, relevant organization and institutions and other stake holders and prepare a detailed feasibility report for hospital supplies project in Bhutan.

3. Approach to work

3.1 The terms of reference envisage that the study would be conducted in two phases, the first will be the preliminary studies to identify the viable projects in the field of hospital supplies, selection of projects with maximum potential for development and the second would be to carry out detailed feasibility studies for the selected projects. Accordingly, during the study on the project and formulation of feasibility report, following were attempted at:

- Review and examine the current hospital scenario, future policies and programmes.
- Review the available literature, information, and statistics about the requirement of hospital supplies, the policies and prevailing practices for their procurement.
- Assessment of the current demand level for various items of the hospital supplies and make future demand projections.
- Shortlist the items/group of items, which can be taken up for production in Bhutan.
- Select the projects with maximum potential.
- Study the selected project(s) for preparing detailed feasibility report.
- Preparation of detailed feasibility report on Hospital supplies.

4. Methodology

4.1 The methodology comprised of collecting and collating information from government authorities, private business and other stake holders in health care sector about various items of hospital supplies, prevailing practices of supplies, current demand level and future demand projections. The consultants further attempted to:

- Review the data on current and future demand projections of various items of the hospital supplies and prepare a list of items with substantial recurring demand.
- Assess the technical viability of manufacture of these items/group of items.
- Draw upon a list of projects in hospital supplies, which are considered viable.



- Select project(s) with maximum potential in consultation with the Department of Industries, Ministry of Economic Affairs.
- Carry out detailed feasibility studies of the selected project(s) as per terms of reference.
- Submission of the final report.

5. Consultation & Review of Available Information

5.1 The work on the project assigned to IDRG consultancy services was started forth with, on 27th of March 2008. The consultant's team had initial briefing meeting with Chief Industries Officer, Department of Industries, Ministry of Economic Affairs. After the briefing meeting, IDRG team had a series of meetings and discussions with various stakeholders in the health care sector including government authorities, hospitals, private sector business & industrial units.

5.2 The team had a very useful meeting with Director General, Department of Health Services, Ministry of Health, Government of Bhutan. The discussions with Director General provided an insight about the existing health care scenario, problem areas, emerging issues and future plans to improve health care facilities in Bhutan. With a view to collect information regarding modalities for procurement of hospital supplies and also the current level of procurement, meetings were held with Joint Director, Drugs, Vaccine & Equipment Division, Department of Medical Services, Ministry of Health.

5.3 A meeting was also held with the Administrative Officer, National Referral Hospital at Thimphu to ascertain the details of purchases being made by the hospitals directly. Hospitals do not make significant purchases of consumables. Majority of the budget provision is utilized for purchase and maintenance of office equipment and stationery etc. In case of uniforms for nurses and attendant, an annual allowance is paid and the individual arranges for the uniform.

5.4 Traditional medicine system, though not falling within the preview of this project, has been studied by the team since it constitutes an important segment of total health care system in Bhutan. Besides Vision Bhutan 2020 emphasizes about the felt need for effective integration of traditional medicines with the modern system of health care. A meeting was held with Director, Institute of Traditional Medicine System (ITMS). The team had useful discussions with the Director. It was informed that medicine manufacturing unit of ITMS, was being corporatized shortly with a view to improve its working and commercial viability. The team also had a meeting with Head, Pharmaceutical and Research Unit of ITMS. In this unit they have installed modern machines and equipment for production of tablets, capsules and have facilities for strip packaging etc. The issue relating to possibilities for manufacture of allopathic medicines in this unit was also discussed with the Director ITMS and the Head of Pharmaceutical Unit. The response was quite positive. However, the issue needs to be looked into by the new management, which will takeover shortly after corporatization of the pharmaceutical unit.



5.5 Team head discussions with private medical stores in Thimphu to assess the level of private trade in medicines and non-drug items and also to elicit their views regarding future growth of business in this line. It was observed that sales of medicines and even non-drug items by the private medical stores are very low due to provision of free medical health services including free medicines by the Government. The medical stores mainly depend on the sales of branded drugs, health foods, sanitary items, cosmetics, pet food and other items etc.

5.6 The team also had meetings with Director, National Statistics Bureau, Director, Geology and Mines with a view to have the statistics about health care sector and the prospects of promoting mineral based industries specifically medical grade plaster of paris based on gypsum mineral.

5.7 The team also had a meeting with Joint Director, Department of Revenue and Customs for ascertaining the level of imports of hospital supplies and also the countries of origin.

5.8 IDRG team also had a meeting with Secretary General, Bhutan Chamber of Commerce & Industry (BCCI) to have their perspective on industrial development in Bhutan and the problem areas.

5.9 Subsequent to presentation of inception report, IDRG team had a highly useful meeting with Mr. Sonam Dorji, CPO, PPD, Ministry of Health wherein the existing demand level, potential for growth in demand for various items of hospital supplies including I.V. fluids and the possibilities of drug production in Bhutan were extensively discussed. Mr. Dorji provided the latest figures about the consumption level of I.V. fluids and suggested for considering the study of detailed feasibility analysis of I.V. fluids.

5.10 Practically, there are no industrial units manufacturing items of hospital supplies in Bhutan, However the team had meetings with a number of industrial units at Phuentsholing and Pasakha in the field of wood products, plastic products, industrial gases and health food. The discussions with industrialists provided an insight about the problems being faced by the entrepreneurs as also the suggested remedial measures to accelerate the pace of industrialization in Bhutan.

6. Presentation of Inception Report

6.1 Based on the information from various stakeholders in health care sector, relevant literature and available data, IDRG submitted an inception report on the subject. At a meeting held on 22nd May 2008 in the Ministry of Economic Affairs, wherein all stakeholders were present, IDRG team made a presentation on the findings of the inception report on the detailed feasibility study on hospital supplies in Bhutan. During the presentation, it was suggested that the two main products out of the various items of hospital supplies, be studied for detailed feasibility analysis. IDRG team was advised to select these two items based on the various parameters and considerations relating to market demand, availability of raw materials, technology and skilled manpower, environmental consideration, etc. using matrix model. The comments and observations



made during the meeting and subsequent written observations, if any, by the concerned authorities were also to be incorporated in the final report. Subsequently, IDRG submitted the relevant information to Ministry of Economic Affairs and finalized the following two items of hospital supplies for detailed feasibility analysis:-

- Drug formulation unit for tablets, capsules and powders
- Absorbent cotton, gauze & bandages.

7. Organizations and Institutions Contacted

7.1 Subsequent to the presentation of inception report, IDRG team had another round of meetings with concerned organizations and institutions in order to collect detailed information relating to identified projects and also the details on availability of land and other infrastructure, availability of finances, existing marketing channels, current prices scenario etc. Back in India, the team had extensive discussions and meetings with a large number of industrial units, concerned organizations, knowledgeable persons engaged in the manufacture of similar products, manufacturers of machinery and equipment, manufacturers and suppliers of raw materials in various parts of the country. Quotations and indicative prices of various items of machinery and equipments and raw materials were obtained from the concerned manufacturers through meetings and correspondence.

7.2 The team's endeavor has been to collect maximum possible information and details on health care sector. The list of the organizations visited and all the persons who were kind enough to spare their time for discussions with IDRG team during their visits to Bhutan is given in annexure I.

7.3 The list of industrial units, organizations and institutions visited in India through correspondence and meetings is quite extensive. The relevant names and addresses of the concerned organizations have been given along with the detailed feasibility analysis of the above stated two items of hospital supplies in the list of machines and equipment suppliers and raw material suppliers. The detailed feasibility analysis of drug formulation unit for tablets, capsules & powders and absorbent cotton, gauze & bandages have been covered in the part II and part III of the report respectively.

7.4 The information available during the discussions was further supplemented by published literature and the information available on Internet in public domain. List of documents and articles consulted by the team is given in annexure II:



Chapter - II

Review of Health Care Sector



1. Health Care Sector – The past and emerging scenario

1.1 It is estimated that a Bhutanese born in 1960 could expect to live to the average age of 35 years. Prior to opening its doors to the world in 1961, Bhutan's health infrastructure consisted of four small hospitals and a hand full of dispensaries. There were only two trained doctors in the whole of the country, and two of the hospitals were staffed by untrained compounders.

1.2 Almost everyone was dependent upon the skills of indigenous doctors and their knowledge of the medicinal qualities of the plants collected from the forests. Communicable diseases were widespread, and more than half of all children born died at birth or during infancy. Smallpox epidemics sometimes wiped out whole villages. In some parts of the country, malaria claimed hundreds of lives every year, while in other such diseases as leprosy deformed and ultimately killed many people. Water supplies were largely confined to springs and streams.

1.3 Over the last four decades, the health sector has undergone a radical change. Bhutan today has a well-developed decentralized system of health care. The health care network of hospitals, basic health units (BHUs) and out reach clinics (ORC's) deliver free health care to over 90 per cent of nation's highly dispersed population. Besides a vast majority of population has access to safe water and sanitation facilities. These developments have made it possible to achieve remarkable improvement in the health of Bhutan's population. Bhutan has led South Asia in the use of oral rehydration therapy for preventing deaths from diarrhea and it was the first country in the region to iodine deficiency. Immunization has been extended to 90 per cent of the nation's children and such deadly diseases as polio, neo-natal tetanus and diphtheria have been virtually eliminated, and malaria and leprosy are today also under control. No where does this progress finds more clear expression than in terms of life expectancy. A child born today in Bhutan is expected to live to the age of 66 years which is more then 25 years longer life expectancy than the average life expectancy a few decades ago.

2. Health Care Sector – Policy Framework

2.1 As is well known and appreciated, Gross National Happiness (GNH) is the core theme of developmental philosophy especially in the context of education and health sector. Having accepted that the maximization of Gross National Happiness is the philosophy and objective of the country's development, it was necessary to more clearly identify the main areas, which would most contribute towards furthering this philosophy and objective. Recognizing that a wide range of factors contribute to human well-being and happiness and that it may not be possible to fully and exhaustively define or list everything for the purpose of its development planning, the country has identified four major areas as the main pillars of Gross National Happiness. These are:

- Economic growth and development



- Preservation and promotion of cultural heritage
- Preservation and sustainable use of the environment and
- Good governance.

2.2 It was recognized that economic growth is essential to support and nurture the spiritual and social needs of the community. This has led the country to clearly stipulate that economic growth, while essential, is not an end in itself but is one among many means of achieving holistic development. This has led to the declared objective of viewing development as a continuous process towards a balance between material and non-material needs of individuals and society. Accordingly it was also mandated that at the central focus of planning is the individual whose welfare and well being especially in social sectors like health & education need to be ensured by the Government.

2.3 In the strategic framework of development plans, health has been viewed as an important dimension of human capital besides contributing to Gross National Happiness and well being of the Bhutanese Society. Health expenditures therefore are deemed to be the long-term investments that are expected to provide both tangible and intangible socio-economic returns. The continued reinvestments in health sector are envisaged to help protect other long-term human capital investments from erosion and enhance their impact considerably. Reflecting the basic principle of according high priority to health care sector, extending free basic health care has been enshrined as a constitutional obligation. The Constitution mandates that Govt. of Bhutan is to *“provide free access to basic health services in both modern and traditional medicines”* and that it will *“Endeavour to provide security in the event of sickness ----“*

2.4 The Constitutional commitment to provide free basic healthcare for all Bhutanese population has considerable positive ramifications on the prospects of reducing both income and human poverty in Bhutan. The thinking has been that there is a growing evidence to support the contention that in many countries, health factors are closely linked to labour productivity and that productivity gains are most prominent for those population groups with weakest health and nutritional status which invariably constitute the poorer section of society. As such health investment are regarded to generate greatest productivity benefits for the poor and the low-income groups and these investment also create positive impact on this section of society.

2.5 With the above policy objectives in view, the main strategies for health care sector during ninth plan period have been as under:

- Improving the quality of health services
- Targeting health services to reach the unreached
- Enhancing sustainability of health services
- Strengthening health management, information system & research



- Intensifying reproductive health services and family planning
- Intensifying prevention and control of prevailing health problems and emerging and re-emerging ones.
- Development of human resources and establishment of a system of continuing education
- Strengthening traditional medicines system and its integration in general health services.

2.6 Some of the strategies listed above have a direct bearing on the conduct of this study and it is proposed to deliberate upon these aspects in subsequent chapters.

3. Sustainability of Health Care Services

3.1 Bhutan has a system of free health care to highly dispersed and scattered population. While the state is mandated by constitution to provide free basic health care to its citizens, the issue relating to sustainability of the very high cost of providing free health care has been deliberated in various plan documents as well as in Bhutan Vision 2020. The options to be considered are spelled out as under:

- Introduction of innovative methods of financing the primary and specialized health care such as health trust fund. Bhutan Health Trust Fund (BHTF) has already been established with a projected corpus of US\$24 million.
- Introduction of user fee for medical services for those who are to meet some of the costs of health care, starting in urban areas, with the necessary safeguards designed to ensure that fees are linked to people's ability to pay and that the principle of free health care is not jeopardized.
- Outsourcing of some of the selected medical and diagnostic services.
- Progressively privatize health services so that the growing numbers of people who are able to pay for the full costs of health care no longer receive it free of charge, with the introduction of supporting private health insurance.

3.2 A cautious approach to progressive privatization of medical services, besides addressing the issue of sustainability of the system to provide free medical services to all deserving section of society shall also help in improving the over all quality of medical services. The privatization shall lead to higher demand levels, better and more transparent market conditions for various items of hospitals supplies and shall strengthen the private sector trade and manufacturing enterprises. The strong network of trade and manufacturing units, besides catering to domestic demand could also supply their produce in overseas markets however existence of a reasonable size of domestic market would be a pre-requisite.

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Chapter - III

Health Care Infrastructure

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1. Strategies & Programmes

1.1 Considerable progress has been achieved in Bhutan in furthering the health status of the population during the planned phase of development over last four decades. These notable improvements have kept the country well on track to meet all of the MDG health targets and have also been responsible for the significant scaling up of the human development indicators for Bhutan. The main thrust of the health programmes over the Ninth Plan period was on the provision of primary health care services. This was supplemented by efforts to develop further the secondary and tertiary health services and manage communicable and non-communicable diseases through a strategy of prevention and control. Due attention was also given to the relevant integration of traditional health services with modern health services.

1.2 Since the time when the Health Care Facilities were first established in Bhutan in the year 1962, there have been continuous efforts for improving the modern medical facilities. The Ministry of Health has now a wide spread network of Health Facilities, covering around 90% of the total population. Institutional health facilities were earlier concentrated in the urban centers, but today the emphasis has shifted to the rural areas where the majority of the population live, Health Care is delivered in a totally integrated system through an organized structure placed at the National, Regional and Dzongkhag Hospitals serving as Referral centers followed by the Basic Health Units (BHUs) at the Community Level. Basic Health Units (BHUs) serve remote areas staffed by well-trained paramedical personnel who are equipped to treat minor ailments, and advise on preventive measures to avoid the spread of communicable diseases. Extended Health Centers. (Outreach Clinic) and Mobile Health Units support these BHUs.

1.3 There are also a number of special health programs in Bhutan administered by the Ministry of Health. These cover:

- Child Health and Immunization program
- Reproductive Health Program
- Acute Respiratory Infection (ARI) Program
- National Control of Diarrheal Disease program (NCDDP)
- National STD/AIDS Control Program
- Rural Water Supply & Sanitation program (RWSS)
- Village Health Workers Program (VHW)
- National Leprosy Program
- National Malaria Control Program (NMCP) and



- Mental Health Program

2. Health Care Network

2.1 During the planned phase of development, concerted efforts have been made to build adequate infrastructure for extending medical facilities to Bhutanese population including those in remote areas. The health care services in Bhutan are provided through a four-tiered network consisting of:

- National Referral Hospitals
- Regional Referral Hospitals
- District Hospitals
- Basic Health Units (BHUs) and Out Reach Clinics (ORCs)

2.2 As off now there are 29 hospitals, 176 basic health units (BHUs) and over 514 outreach clinics (ORCs) spread over 201 gewogs providing primary health care services. A total of 2,749 health personnel of different categories serve in different hospitals. Besides the allopathic system, there exists a well-established network of indigenous medical facilities under the Institute of Traditional Medical Services that has basically three functions; medical services for outdoor patients; collection and manufacturing of indigenous medicines.



2.3 The table-1 below depicts the number and type of health care facilities, medical personnel and certain indicators with regard to availability of these facilities to Bhutanese people.



Table: 1

Summary of the Health Facilities and Personnel, Bhutan 2001 to 2006

| Facilities | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Number of Hospitals | 29 | 29 | 29 | 29 | 29 | 29 |
| Number of basic health units | 168 | 166 | 172 | 176 | 176 | 176 |
| Number of dispensaries / outreach clinic | 461 | 455 | 440 | 476 | 485 | 514 |
| Number of indigenous hospitals | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of indigenous dispensaries | 19 | 19 | 19 | 21 | 21 | 21 |
| Number of doctors* | 114 | 122 | 140 | 144 | 145 | 150 |
| Persons per doctor* | 7476 | 5872 | 5245 | 5227 | 4379 | 4312 |
| Number of Hospital beds | 1023 | 1023 | 1093 | 1113 | 1078 | 1133 |
| Persons per hospital bed | 683 | 700 | 672 | 672 | 589 | 570.9 |
| Doctors per 10,000 persons | 1.3 | 1.7 | 1.9 | 1.9 | 2.3 | 2.3 |
| Hospitals bed per 10,000 persons | 15 | 14 | 15 | 15 | 17 | 17.5 |
| Population covered by health care (%) | 90 | 90 | 90 | 90 | 90 | 90 |
| Population access to safe drinking water (%) | 68 | n.a. | 71 | n.a | 84 | 81.4 |
| Women attended by trained personnel during child birth (%) | n.a. | 24 | 46.7 | 53.6 | 52.3 | 57.1 |
| | | | | | | |

Source: Department of Health, Ministry of Health, Thimphu

3. Human Resource for Health Care Sector

3.1 Along with the expansion of health-care infrastructure, human resource for health sector have also been built steadily over the years. The country, however still faces the shortage of medical personnel with only one doctor per 4300 population in 2006. Developing medical doctors is still very difficult, as Bhutan does not have any medical college. Candidates are sent to Bangladesh, India, Myanmar, and Sri Lanka for studying MBBS courses.

3.2 Other categories of middle level human resource have been developed within the country at Royal Institute of Health Services (RIHS) and Institute of Traditional Medicine



Services (ITMS), the table-2 below indicates the availability of health personnel by category in Bhutan during 2001 to 2006.

Table: 2
Health personnel by category, Bhutan 2001 to 2006

| Health personnel | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--|------|------|-------|-------|-------|-------|
| Doctors | 114 | 122 | 140 | 135 | 145 | 150 |
| District Health Supervisory Officer (DHSO) | 23 | 27 | 24 | 23 | 22 | 22 |
| Health Assistants | 163 | 173 | 144 | 201 | 171 | 229 |
| Basic Health workers | 176 | 175 | 172 | 171 | 210 | 173 |
| Sister and nurses | 569 | 500 | 501 | 510 | 524 | 548 |
| B.Sc Nurses | n.a. | 5 | 8 | 12 | 14 | 39 |
| General Nurse Midwife/Staff Nurses (GNM) | n.a. | 174 | 173 | 183 | 202 | 200 |
| Auxiliary nurse Midwife (ANM) | n.a. | 145 | 144 | 140 | 134 | 134 |
| Assistant Nurses | n.a. | 176 | 176 | 175 | 174 | 174 |
| Other technicians | 259 | 252 | 29 | 368 | 438 | 420 |
| Indigenous physicians | 31 | 32 | 29 | 31 | 30 | 30 |
| Indigenous compounders/ Menpas | 23 | 23 | 26 | 26 | 36 | 42 |
| Malaria workers | 59 | 66 | 47 | 47 | 48 | 48 |
| Village Health workers (VHW) | n.a. | n.a. | 1,097 | 1,201 | 1,200 | 1,087 |

Source: Ministry of Health, Thimphu

4. Safe Drinking Water and Sanitation Facilities

4.1 In addition to strengthening of physical infrastructure for health care facilities, development of human resources in terms of medical personnel and conduct of special health care programmes, the government has accorded high priority to ensure the supply of safe water, extension of sanitary & garbage disposal facilities to Bhutanese population. These measures to a very large extent are regarded as important factors for prevention & control of a number of disease and ailment. The table-3 depicts the availability of sanitation facilities by type in Bhutan in 2006.



Table: 3

Water and sanitation facility type by Dzongkhag, Bhutan, 2006

| Percentage Coverage | | | | | |
|---------------------|----------|------------|---------------------|------------------|-----------------------|
| Dzongkhag | Sanitary | Safe water | Drainage & footpath | Vegetable garden | Garbage disposal bins |
| Bumthang | 97.1 | 98.5 | 90.2 | 96.3 | 92.0 |
| Chhukha | 98.5 | 81.0 | 76.8 | 40.9 | 42.9 |
| Dagana | 84.9 | 55.3 | 34.4 | 80.3 | 88.5 |
| Gasa | 81.5 | 42.3 | 18.0 | 62.1 | 79.8 |
| Ha | 93.3 | 92.1 | 57.0 | 58.6 | 91.1 |
| Lhuentse | 88.8 | 87.1 | 71.0 | 87.9 | 68.7 |
| Monggar | 91.1 | 78.4 | 43.7 | 72.6 | 64.1 |
| Paro | 95.7 | 84.0 | 78.6 | 92.9 | 90.5 |
| Pemagatshel | 92.9 | 88.9 | 45.7 | 88.7 | 51.8 |
| Punakha | 92.4 | 81.7 | 23.7 | 90.6 | 82.0 |
| Samdrupjongkhar | 94.6 | 88.9 | 39.2 | 61.2 | 79.5 |
| Samtse | 89.1 | 68.7 | 36.6 | 76.1 | 62.8 |
| Sarpang | 91.2 | 85.6 | 49.3 | 62.2 | 74.3 |
| Thimphu | 87.0 | 78.4 | 54.5 | 68.6 | 35.8 |
| Trashigang | 91.6 | 87.8 | 42.8 | 84.6 | 63.0 |
| Trashiyangtse | 86.8 | 87.1 | 52.8 | 86.9 | 57.4 |
| Trongsa | 87.4 | 93.8 | 70.7 | 78.5 | 66.2 |
| Tsirang | 84.4 | 75.3 | 43.9 | 82.3 | 70.8 |
| Wangduephodrang | 96.5 | 86.9 | 63.4 | 84.0 | 86.5 |
| Zhemgang | 75.3 | 67.7 | 47.2 | 70.2 | 51.1 |
| Total % coverage | 90.2 | 81.4 | 51.9 | 76.2 | 69.9 |

Source: Ministry of Health, Thimphu

5. Private Sector in Health Sector

5.1 There are no private hospitals, nursing homes or clinic in Bhutan. The doctors who superannuate from government hospital are also not permitted to conduct private practice. It was observed during the discussions that some of these retired doctors are stated to have started their private practices across the border in India.

5.2 There are a number of private medical store in Bhutan who deal in medicines, non-drug health items, health foods etc.



In Thimphu, there are 14 such chemist shops operating under the license issued by Drug Regulatory Authority (DRA), Royal Government of Bhutan. As the medicines and need based non-drug items for health care are supplied free by the hospitals to both indoor and outdoor patients, business prospect of the private medical shops are quite limited.

5.3 It was observed that only those customers which have a strong preference for branded medicines or those who do not want to go to hospital dispensaries to collect the medicines or in the event of emergency requirements and the tourist make purchases of medicines from private medical stores.

6. Health Care Infrastructure - Future Expansion

6.1 With a view to meet the growing needs of the health care sector both in terms of quality and quantum, the following plans for creating additional infrastructure are being implemented.

- Renovation and modernization of the existing hospital in Thimphu
- Setting up of new modern hospital Gelephu.
- Renovation and modernization in existing hospital in Thimphu
- Corporatization of traditional medicine production unit of ITMS. The creation of corporation - **Menzong Sorig Pharmaceuticals Corporation** has been approved. The new management of the corporation would takeover by July 2008 and the Managing Director would be appointed shortly.



Chapter - IV

Financial Resources & Procurement Policies for Hospital Supplies



1. Financial Resources for Health Care Sector

1.1 In Bhutan Medical Facilities are extended to entire population free of cost. The Royal Government of Bhutan provides finances to allopathic and indigenous medicines with the exception of a small number of private pharmacies, diagnostic facilities and traditional healers.

1.2 Private financing of health care is currently very limited in Bhutan. The Ministry of Health has taken a cautious approach to introduction of user fee. The user fee for public services amount to less than 1% of the current health care expenditures. The Household Income & Expenditure Survey 2001 undertaken by National Statistics Bureau (NSB) included household expenditure on all kinds of health care viz traditional, user fees, OTC drugs, treatment abroad. The survey revealed that private expenditure on health care was quite limited. According to the survey data the average household expenditure on health care was 13 NU per month and the 69 % of the household sample had no health expenditure at all.

1.3 The financing of health care expenditures in Bhutan is through the following five sources:

- Government of Bhutan
- International Aid
- Military
- Private Firms
- House Hold

1.4 The Government of Bhutan provides the major contribution in financing the health care services. The public financing of the health care sector is through a National Health Service financed by the Royal Government of Bhutan (RGOB) through the revenue & grants. The Government and other donor financing of health services flow through the national budget and Aid Co-ordination Division. Funds are then released the health department at the centre and the *Dzongkhags*. In past the international aid contributed a substantial share in the total financing of health care services however its contribution as of now has come down to 10-15 percent only.

1.5 The table-4 below depicts the budgetary outlay for the Ministry of Health during the 2002 – 2007, the ninth plan period. The table also indicates the percentage of health sector outlay in the total budget allocations including central, autonomous institutions, Dzongkhags and Gewogs.



Table: 4

Ninth Plan Budgetary Outlay 2002-2007

Nu. in Millions

| Organization/ Ministry | Capital | Recurring | Total | Percentage of Total Budget Outlay |
|------------------------|---------|-----------|---------|-----------------------------------|
| Ministry of Health | 1703.41 | 2802.43 | 4505.84 | 6.4 |

Source: Statistical Year Book of Bhutan – 2007

1.6 According to information available, the capital outlay for health sector for both central and Dzongkhag during 10th plan period is likely to be NU 6972.88 million. In view of the coverage of more & more people under the health care programme and also with improvement in the quality of health services there has been a steady growth in expenditures on health in last few years. The table-5 indicates the capital and recurring budgetary expenditures (actuals) during last three years viz 2003 – 2006.

Table: 5

Budgetary Expenditures for Health Sector

Nu. In Million

| Year | Capital Expenditure | Recurring Expenditure | Total |
|---------|---------------------|-----------------------|---------|
| 2003-04 | 255.8 | 431.8 | 687.6 |
| 2004-05 | 321.84 | 470.9 | 792.74 |
| 2005-06 | 687.33 | 560.8 | 1248.13 |

Source: Statistical Year Book of Bhutan – 2007

1.7 With a view to ensure the long-term sustainability to the programme of free health care by the state and specially in the context of procurement of essential drugs & vaccines, a trust fund **Bhutan Health Trust Fund** (BHTP) has been established. The health fund with a corpus target of US\$ 24 million has already accumulated US\$ 10 million and is already operational.

2. Procurement Policies

2.1 The public drug supply system in Bhutan accounts for over 90 percent of the expenditure on drugs. It is the responsibility of *Drugs Vaccine & Equipment Division*, Department of Medical Services to arrange the procurement, ensure its quality and other



aspect of management of drugs, non-drug items and equipments and supply them to the hospitals at central, regional & district level.

2.2 There is practically no indigenous production of allopathic medicines & non-drug items required for health care and the entire requirement is being met through imports. The private medical stores also source their supplies through imports. However there exists a production unit (Pharmaceutical & Research Unit) for the manufacture of traditional medicines within Institute of Traditional Medicine Services (ITMS). The Pharmaceutical & Research Unit of ITMS is manufacturing traditional medicines mainly for domestic requirements.

2.3 In the context of the study, the salient features of the procurement policy and procedures for supply of modern medicines and non-drug items to hospitals and BHUs are as under:

- The entire purchases of hospital supplies including of medicine & non-drug items is made by the government.
- Majority of purchases are made at central level by Drugs, Vaccine & Equipment Division, Department of Medical Services
- In Pursuance of the policy of decentralization, procurement of certain items viz textile products for house keeping & uniforms / clothings, disinfectants, garbage disposal bags, stationery items etc. have been decentralized and there purchases are made directly by hospitals or at Dzongkhags level.
- The current budget for procurement of hospital supplies is Nu. 250 million and the break up for medicines & non drug items is as under:
 - o Current budget for medicine supplies - NU 100 million
 - o Current budget for non drug items – NU 150 million
- The average annual growth rate in procurement level of hospital supplies is around 10% at central level. However the actual growth rate in procurement level for the country would be slightly higher since over a period of time part of the purchases have since been decentralized.
- As there are no indigenous manufacturers the entire requirement of hospitals is met through imports.
- According to Bhutan trade statistics the total imports for various items falling under chapter 30 relating to medicines and non-drug items are around Nu.157.6 million from India.
- In case of drug & non-drug items, the purchases are made as per IP/ BP/ USP Standards. The purchases in case of medicine are mostly for generic formulations.



- Branded medicines are being imported mainly by private medical stores to cater to the requirements of the people who have a strong preference for buying branded medicines.
- The purchases of medicines and non-drug items are made on Global Tender basis.
- The Department of Medical Services finalizes a list of approved suppliers based on technical bids for various items of supplies. These approved vendors are eligible for participation in the purchase tenders.
- The purchases are made on L-1 basis with strict compliance of financial regulation and procedures.
- Foreign Direct Investment (FDI) in medical sector is restricted.

3. Procurement of Hospital Related Services

3.1 Beside medicines & non drug items a number of service facilities viz drug testing, operation & maintenance of diagnostics & other equipments, laundry, kitchen etc. are required for smooth functioning of the hospitals and extension of quality medical facilities. The position in this regard is as under:

- There is no drug-testing laboratory in Bhutan. The drug testing services at present are being outsourced from India & Thailand.
- A Drug Testing Laboratory is planned to be set up shortly
- In all hospitals the facilities of kitchen and laundry have been created. In the new super specialty hospital being set up at Thimphu, the provision of such facilities exist. The laundry & kitchen are run by the hospital
- There are a number of costly equipments Viz CT Scan, MRI specially in super specialty hospitals.
- The operational training for diagnostic & other equipments and annual maintenance is arranged through contract arrangement with the suppliers. There exist no local agency for rendering such services.



Chapter - V

Demand Assessment of Hospital Supplies



1. Hospital Supplies – Non Consumables & Consumables

1.1 In general, the hospital supplies can be classified in to three broad categories viz non-recurring, recurring or consumables and services. The details of items falling under these three categories are as under.

2. Non Consumable Requirements

2.1 These items are required at the time of setting up of hospitals or during expansion of existing facilities and are non-consumables. Their demand is one time and the replacement demand is generated after a long period say 7-10 years. Some of the main items covered under this category include the following:-

- Hospital beds & bed side tables/ trays
- Stretcher Trolley
- Wheel Chairs
- Diagnostic Equipments
- Operation Tables
- Surgical Instruments
- Sterilizers
- Walkers
- Water softening plant
- Mini boiler
- Incinerator
- Bed cushions, hospital sheets & hot water bottles
- Office & other furniture items

2.2 As there is no scope for setting up hospitals and nursing homes in private sector and the very limited number of new hospital projects in Govt. Sector there are hardly any possibilities for setting up of indigenous manufacturing facilities for these items. The replacement demand is also of very low magnitude not justifying setting up of a local production or even assembly unit specifically for hospital supplies. However, a general metal fabrication unit for steel and aluminium fabrication mainly catering to open market requirements could undertake some repair & maintenance work of hospital furniture as also meet the replacement demand to a certain extent of simple items.

3. Consumable Requirements

3.1 A wide range of medicines & non-drug items are required as consumables by the hospitals. In the context of medical facilities in Bhutan, these items are required both for out door patients as well as those who are admitted in the hospitals, since all medicines and non drug items prescribed by the doctor are provided by the hospital free of cost to all the patients. Besides a number of consumable products are required by hospitals for



house keeping, sanitation purposes and office work. An illustrative list of consumable items is as under:

- Medicines viz tablets, Capsules, Injectables, Syrups, Ointments etc.
- Disposable syringes
- Glucose saline
- Surgical cotton
- Gauge, Bandages & Surgical pads
- Medical grade POP/ POP Bandages
- Surgical gloves
- Medical grade oxygen
- Miscellaneous products Viz Phenyl, Liquid soap, Savlon, Hydrogen Peroxide
- Medicated/ Non medicated tapes
- Intravenous sets
- Bed sheets, Pillow covers & Towels
- Doctor's apron and Face masks
- Nurses and Attendant's uniforms
- Patient's gowns
- Blankets
- Diagnostic reagent & Kits
- Clinical thermometers
- First aid box
- BP instrument
- Waste disposal bags
- Stationery items

3.2 As mentioned earlier, majority of these items are procured centrally, specially medicine and other critical non-drugs items. However items like textile products for house keeping, uniforms, waste disposal bags, stationery items are being procured directly by the hospitals. It was observed during discussions at the main hospital in Thimphu that for nurses uniforms, the hospital makes a payment of allowance of Rs.3000 per annum and the individuals are required to arrange for the uniform either through buying it readymade or getting it stitched.

4. Hospital Supplies: - Current Level of Procurement

4.1 Non Consumable items:

4.1.1 Keeping in view, very limited replacement demand and not much expansion of hospital infrastructure envisaged in future, the prospect for promoting indigenous production for non consumable items for hospital supplies do not appear to be quite promising. Further, as there are no plans for setting up private hospitals or clinics, the demand level for non consumable items required for setting up new hospitals or expansion of existing facilities, is likely to remain almost stagnant, not warranting setting up of indigenous production facilities.



4.1.2. The demand for these items would continue to be met through imports as their local production is not considered economically viable. It is relevant to mention here that prima - facie, there are no specific advantages in terms of availability of cheaper raw materials, skilled manpower or competitive advantages associated with export which could make the production of these items viable in Bhutan. The data regarding the current level of procurement for these items not being relevant to the objectives of the study has not been compiled.

4.2 Consumable Items:

4.2.1 A wide range of products both medicines and non drug items are required as consumables in hospitals and basic health units. Majority of these items are procured centrally by Department of Medical Services and then supplied to hospitals while other items are procured directly by hospitals.

4.2.2. The list of consumable items required by hospitals particularly medicines is quite exhaustive and the demand level keeps on changing depending on the requirements and health programmes conducting by the Government. However, certain items are consistently required in large quantities and constitute major portion of hospitals supplies in terms of consumables. Some of these items being procured centrally include the following:-

- Medicines mainly tablets
- Glucose saline
- Disposable syringes
- Surgical cotton, gauge & bandages
- Surgical gloves

4.2.3 The data relating to the procurement of the above five items both in terms of quantity & value as available from Drugs, Vaccine & Equipment Division, Department of Medical Health Services is given below in the table 6 -10, item wise:

Table: 6

Procurement Level of Medicines (Tablets & Powders)

| Item | 2005-06 | | | 2006-07 | | | 2007-08 | | |
|-----------------------|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|
| | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount |
| Antacid | 0.11 | 8824000 | 970640.00 | 0.13 | 12897000 | 1631470.50 | 0.13 | 15127000 | 1895413.10 |
| Iron Folic Acid tab | 0.10 | 7212000 | 696513.20 | 0.10 | 10000000 | 969600.00 | 0.09 | 12000000 | 1130112.00 |
| Paracetamol 500mg tab | 0.09 | 11107000 | 1028036.15 | 0.13 | 17273000 | 2323218.50 | 0.11 | 13821000 | 1513399.50 |
| ORS | 0.00 | 0 | 0.00 | 1.93 | 879700 | 1693422.50 | 2.30 | 664700 | 1528810.00 |
| Chlorine powder | 13.00 | 7223 | 93899.00 | 12.30 | 16995 | 209038.50 | 14.60 | 9565 | 139649.00 |
| TOTAL | | | 2789088.35 | | | 6826750 | | | 6207384 |

Source; Drugs, Vaccine and Equipment Division, Ministry of Health, Thimpu



Table: 7

Procurement Level of Glucose – Saline

| Item | 2005-06 | | | 2006-07 | | | 2007-08 | | |
|---|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|
| | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount |
| Dextrose 10% inj., (500ml) | 9.45 | 20950 | 197977.50 | 9.25 | 36168 | 334554.00 | 11.22 | 5275 | 59185.50 |
| Dextrose 25% inj., (25ml) | 10.14 | 2000 | 20280.00 | 10.140 | 4925 | 49939.50 | 15.00 | 8450 | 126750.00 |
| Dextrose 5% inj., (500ml) | 8.58 | 31250 | 268125.00 | 8.500 | 53328 | 453288.00 | 9.60 | 22125 | 212400.00 |
| Dextrose 5% sodium chloride 0.45% inj (500ml) | 8.58 | 2850 | 24453.00 | 9.93 | 8000 | 79440.00 | 9.16 | 0 | 0.00 |
| Dextrose 5% sodium chloride 0.9% inj (500ml) | 8.58 | 29600 | 253968.00 | 8.420 | 39216 | 330198.72 | 9.60 | 23950 | 229920.00 |
| TOTAL | | | 764803.5 | | | 1247420.22 | | | 628255.5 |

Source; Drugs, Vaccine and Equipment Division, Ministry of Health, Thimphu



Table: 8

Procurement Level of Disposable Syringes

| Item | 2005-06 | | | 2006-07 | | | 2007-08 | | |
|---------------------------------------|-----------|----------------|--------------|-----------|----------------|--------------|-----------|----------------|--------------|
| | Unit Rate | Quantity (No.) | Total Amount | Unit Rate | Quantity (No.) | Total Amount | Unit Rate | Quantity (No.) | Total Amount |
| Syringe 2ml with needle (disposable) | 1.24 | 338000 | 420521.01 | 1.20 | 669100 | 805328.76 | 0.84 | 41500 | 33486.35 |
| Syringe 5ml with needle (disposable) | 1.49 | 584000 | 872399.64 | 1.41 | 314300 | 443163.00 | 0.93 | 495800 | 460399.88 |
| Syringe 10ml with needle (disposable) | 1.82 | 140400 | 255670.51 | 1.79 | 276000 | 492660.00 | 1.38 | 205000 | 282633.50 |
| Syringe 20ml disposable | 0.00 | 0 | 0.00 | 2.95 | 13300 | 39196.43 | 2.68 | 22000 | 58878.60 |
| Syringe 50ml disposable | 13.20 | 3060 | 40398.12 | 3.40 | 18300 | 62220.00 | 5.99 | 5550 | 33244.50 |
| TOTAL | | | 1588989.28 | | | 1842568.19 | | | 868642.83 |

Source; Drugs, Vaccine and Equipment Division, Ministry of Health, Thimphu



Table: 9

Procurement Level of Surgical Cotton, Gauge, Bandages & Tapes

| Item | Unit | 2005-06 | | | 2006-07 | | | 2007-08 | | |
|----------------------------|------|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|
| | | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount |
| Surgical Cotton | Roll | 35.4 | 22156 | 784322.40 | 32.4 | 26556 | 860414.40 | 34.62 | 26850 | 929547.00 |
| Bandage 2.5cm | Doz | 3.75 | 7500 | 28125.00 | 3.75 | 5592 | 20970.00 | 3.75 | 4539 | 17021.25 |
| Bandage 5cm | Doz | 7.15 | 18978 | 135692.70 | 7.15 | 13884 | 99270.60 | 7.15 | 18978 | 135692.70 |
| Bandage 10cm | Doz | 14.6 | 28000 | 408800.00 | 14.65 | 19837 | 290612.05 | 14.6 | 26839 | 391849.40 |
| Bandage 15cm | Doz | 21.5 | 25000 | 537500.00 | 21.55 | 17324 | 373332.20 | 21.5 | 19726 | 424109.00 |
| Gauge | Than | 37.85 | 35143 | 1330162.55 | 37.95 | 32558 | 1235576.10 | 37.85 | 37289 | 1411388.65 |
| Medicated tape (Micropore) | Roll | 38.25 | 4491 | 171780.75 | 40.5 | 4302 | 174231.00 | 38.25 | 4364 | 166923.00 |
| TOTAL | | | | 3396383.4 | | | 3054406.35 | | | 3476531 |

Source; Drugs, Vaccine and Equipment Division, Ministry of Health, Thimphu

Table: 10

Procurement Level of Surgical Gloves

| Item | Unit | 2005-06 | | | 2006-07 | | | 2007-08 | | |
|-----------------------------|------|-----------|----------|--------------|-----------|----------|--------------|-----------|----------|--------------|
| | | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount | Unit Rate | Quantity | Total Amount |
| Surgical Gloves non sterile | Pair | 4.4 | 284276 | 1250814.40 | 4.7 | 620245 | 2915151.50 | 6 | 388846 | 2333076.00 |
| Surgical Gloves Sterile | Pair | 6.4 | 274355 | 1755872.00 | 7.45 | 655436 | 4882998.20 | 7.25 | 518591 | 3759784.75 |
| TOTAL | | | | 3006686.4 | | | 7798149.7 | | | 6092860.75 |

Source; Drugs, Vaccine and Equipment Division, Ministry of Health, Thimphu



4.2.4 The figures in the above table (6-10) indicate that even in case of these five items the procurement level is of quite low magnitude when compared to average minimum economically viable size of a modern manufacturing unit however through creation of production facilities for a group of similar products & with provision of export where ever possible, the possibilities of setting up SME's in these product areas need to be carefully considered.

4.3 Services

4.3.1 As mentioned earlier, the hospitals have facility of laundry & kitchen and these are being run by the hospitals. It is desirable to explore the possibilities of promoting a local agency having collaborative arrangement with overseas suppliers of equipments to cater to the operational & maintenance requirement of hospitals and other similar institutions. Besides there are no other potential areas where in private sector service enterprises could be set up in health care sector.

5. Hospital Supplies - Import Statistics

5.1 The team has also endeavored to compile the statistics relating to import of consumable items of hospital supplies during 2004-06 with a view to assess the current demand level since entire demand is being met through imports. Most of the consumable items discussed earlier are classified under chapter 30 of BTC. The main countries of import include India, Bangladesh, Belgium, Denmark, and Germany. The total imports during 2006 of pharmaceutical products falling under chapter of BTC is around Nu.170 million out of which the imports from the India alone are of the order of Nu.157 million. Though the item wise break up of imports is not available due to adoption of trade classification system in imports figures still the following data could be arrived at in the context of imports of pharmaceutical from India.



Table: 11

Import of Pharmaceutical from India – 2006

| Sno. | BTC Classification | Item | Value of Imports (Nu. In million) |
|------|--------------------|------------------------------------|-----------------------------------|
| 1 | 30.03 | Medicaments containing antibiotics | 95.0 |
| 2 | 30.03 | Medicaments others | 5.5 |
| 3 | 30.04 | Medicaments containing antibiotics | 17.0 |
| 4 | 30.04 | Medicaments others | 3.2 |
| 5 | 3.05 | Wadding gauze & bandage | 6.0 |

Source: Bhutan Trade Statistics -2006

5.2 Considering that the medicament classified under “medicament others” of BTC classification 30.03 and 30.04 mainly comprise of analgesics and vitamin tablets, their total import is estimate around NU 8.7 million. Similarly, the import of gauge and bandages is around NU 6 million. Since most of these products are being procured centrally the figures relating to their procurement by Department of Health Services and those for import are fairly in agreement with in accepted parameters.



Chapter – VI

Identification of Potential Projects



1. Issues and Approach

1.1 Once the different items of requirement and their quantum have been identified along with growth projections for future demand, it is desirable to assess the techno-economic viability for manufacture in Bhutan before finalizing the recommendations. The items suggested to be taken up for production in the initial phase necessarily should be:

- Based on simple technology.
- The items requiring single operation manufacturing process and where the machine suppliers would be able to help in technological aspects and operation of their machines need to be preferred. To illustrate, the leading manufacturers of plastic processing machines provide on site technical and operational training for the production of plastic conversion products. Similarly in case of steel/ aluminium/ fabrications items the main operations are cutting, bending, welding and assembly which are quite simple technologies. For such fabrication based products critical components like wheel assembly, ball bearing etc. could be imported.

1.2 Keeping in view, the quite limited requirements of various items of hospitals supplies and that too spread over a vast area where hospitals and BHU are situated and absence of open market demand, the economic viability of each item of requirement has to be seriously studied. Before deciding in favour of a product, it is extremely important to confirm that the demand level is much higher than the minimum economically viable size of the unit for that item. In the initial phase, the unit needs to be viable based on part demand as it may not be able to get the orders for entire requirements. Moreover, the products having a direct bearing on human health, the concerned authorities may like to replace the existing system of supply by indigenous products in a phased manner only and this would further bring down the available demand level for a local unit. They also need to compete with the existing suppliers both in terms of quality and the price.

1.3 In the circumstances, the best option would be to study the feasibility for a group of products involving similar technology in order to set up viable indigenous production units. In the context of hospitals supplies, the illustrative group of products could be as under:

- Simple drug formulations viz tablets, powders, capsules, syrups etc.
- Surgical cotton, gauge, bandages, medicated tapes
- Readymade garments, bed sheets, pillow covers and others textiles products for use in hospitals.
- Aluminium and steel fabrication products.

1.4 Besides catering to the requirement of hospitals, the industrial units also need to explore the possibility of meeting the general market demand for their products with a view to improve their viability. For example, a unit set up for manufacturing nurse's dress, doctor's coat and patient gowns for hospitals could also take up the production of school uniforms and other readymade garments for open market. Similarly unit



manufacturing disinfectants and soaps for hospitals could also supply these items in open market. The same approach need to be adopted for assessing the viability of service sector units.

1.5 A unit primarily set up for undertaking dry cleaning and laundry services for hospitals could also serve to the needs of army & the para-military forces. However since the laundry and kitchen facilities already exist in hospitals, the possibilities of operating these facilities on public – private partnership basis need to be explored. A local agency in collaboration with equipment & machinery manufacturers abroad could be set up for providing operation & maintenance service for diagnostic and other equipments in hospitals. Such a local agency could also provide the services for instruments and equipment in educational institutions and other scientific and technical laboratories.

1.6 A cluster approach for developing similar product based units could also be adopted for accelerating the pace of industrialization in Bhutan. Cluster for production of steel and aluminium fabrication products, plastic products cluster, readymade garments cluster could be the possible examples. In these clusters, products and operations could be divided among the units along with a provision for capital-intensive common facility services. This would help in bringing down the production cost, improve quality and also help in better access to the market. The cluster approach would also enable to develop cost effective pollution control mechanism through setting up of Common Effluent Treatment Plants (CETP's) wherever needed. It is important to mention that world over, specially in case of SMEs, cluster approach is considered to be the most effective for promoting industrialization and this need to be kept in view while developing industrial units in Bhutan also.

1.7 In today's world when the markets have become global and outsourcing has become the order of the day, the brand has become an important factor for influencing the customer's preference and access to the new markets. In Bhutan also in the general market, the brand is an important factor for acceptance of a product. In case of hospitals supplies and medicines, the brand becomes of paramount importance as the risk involved are much higher in the usage of the products. One of the suggested approach to ensure the credibility and reliability aspects in certain products, could be the production of accepted brand through franchising arrangements with the Indian / other foreign companies supplying this product in Bhutan. Such an arrangement, besides ensuring quality, performance and credibility of the product is also likely to facilitate the easy availability of finances, speedy implementation of the project and access to overseas markets.

1.8 As regards medicines and other consumable hospitals supplies, the current expenditure on their purchase is around NU 100 million with an average growth of 10%. The private business in this area is of very low magnitude say NU 7 -10 million. In such a scenario when over 90% of hospital supplies are being procured centrally by the government, the development of indigenous manufacturers to meet the demand could be an ideal proposition in normal perspective. However, firstly the demand quantum is quite low, and secondly there is practically no possibility of open market sales. The indigenous producer has to depend entirely on a single customer i.e., Government of Bhutan which in general parlance of market is never recommended. The option could



be to take up the production of a range of products in which part of the products could be supplied to government and the remaining in open market. Possibility of export also needs to be seriously explored for making the units viable.

1.9 Quantum of requirement being low, near absence of open market sales, cost advantages associated with indigenous production viz-cheaper raw materials, skilled manpower being limited, the situation warrants special efforts on the part of promotion agencies for promoting indigenous manufacturing units. Presently SMEs get 5 - 10 per cent price preference and certain tax exemption. It may be desirable to provide much higher level of incentives as well as market interventions with a view to off-set the pre-operative and developmental cost in the initial period say for 5 – 10 years. In the specific case of hospital supplies, in certain items where in the indigenous manufacturers are able to meet quality standards, the provision of exclusive purchase by the government from local units could be considered. However such an approach could be adopted, to begin with, for non-critical items in a phased manner that is through award of an order for part supply of the total demand.

2. Hospital Supplies - Viable Projects for Development

2.1 Based on the demand level for various items of hospital supplies, analysis of market scenario as discussed in preceding paragraphs, IDRG team has identified the following projects for development in private sector / public private partnership in Bhutan:-

- Drug formulation unit – Tablets, powders, capsules, syrups, ointments etc.
- Surgical cotton, gauge, bandage, surgical pads & medicated tapes
- Disposable syringes & Intravenous sets
- Glucose & Saline
- Textile items viz bed sheets, aprons, coats, nurses uniform
- Metal fabrication unit – aluminium & steel fabrication
- Miscellaneous chemical products viz phenyl, liquid soap, savlon, hydrogen peroxide etc.
- Plastic film & waste disposals bags
- Laundry, dry cleaning & kitchen



3. Selection of projects for detailed feasibility analysis

3.1 Based on the studies of various aspects of hospital supplies, the current procurement level, demand estimates and supply chain system, IDRG team submitted an inception report on hospital supplies in Bhutan. A presentation was made on the findings of the inception report in a meeting held on 22nd May 2008 in the Ministry of Economic Affairs wherein all stakeholders were present. During the presentation, IDRG team presented the details of 9 identified products as listed in para 2 above and suggested that the first two items be considered for detailed feasibility analysis. It was decided that based on the various parameters viz. current demand level, potential for growth in demands, existing manufacturing facilities in Bhutan, availability of raw materials, technology and machines, possibilities for adaptation of manufacturing technology as also the parameters discussed above relating to issues and approach for selection of projects, IDRG team would make a selection of two viable projects for detailed feasibility study, using matrix model. It was also decided that project profiles for three potential items of hospital supplies may also be included in the report.

3.2 Based on the discussions during presentation and subsequent interaction with stakeholders, the critical parameters were identified and the project ranked accordingly. While ranking the projects, the aspect relating to possibility of developing a cluster of similar products has also been kept in view. The table No. 12 shows the ranking of the various projects.



Table –12

Hospital Supplies – Ranking of Project based on various parameters

| S. No. | Item | Existing Demand Level | Future growth prospects | Availability of Local raw material | Adaptability of Technology | Availability of skilled manpower | Employment potential | Saving in Transportation cost | Advantage due to insufficient of domestic production | Export possibility | Environment friendly process | Total |
|--------|---|-----------------------|-------------------------|------------------------------------|----------------------------|----------------------------------|----------------------|-------------------------------|--|--------------------|------------------------------|-------|
| 1 | Drug formulation unit- Tablets, powders, capsules | 8 | 7 | 5 | 7 | 8 | 8 | 6 | 9 | 8 | 8 | 74 |
| 2 | Absorbent cotton, gauge and bandages | 8 | 8 | 7 | 7 | 6 | 8 | 7 | 7 | 6 | 7 | 71 |
| 3 | IV fluids - Glucose & saline | 8 | 7 | 5 | 5 | 5 | 7 | 6 | 8 | 6 | 6 | 63 |
| 4 | Plastic film & waste disposals bags | 7 | 7 | 5 | 6 | 6 | 7 | 6 | 4 | 4 | 6 | 58 |
| 5 | Disposable syringes & Intravenous sets | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 7 | 9 | 9 | 57 |
| 6 | Misc. chemical products viz. phenyl, liquid soap, savlon hydrogen peroxide etc. | 7 | 7 | 5 | 5 | 4 | 7 | 6 | 3 | 4 | 5 | 53 |
| 7 | Textile items viz. bed sheets, aprons, coats, nurses uniform | 5 | 3 | 5 | 6 | 6 | 8 | 4 | 4 | 3 | 5 | 49 |
| 8 | Metal fabrication unit – aluminum & steel fabrication | 4 | 4 | 3 | 3 | 4 | 6 | 4 | 3 | 3 | 5 | 39 |
| 9 | Laundry, dry cleaning & kitchen. | Service Sector | | | | | | | | | | |

3.3 As would be seen from the matrix model presented in table No. 12, hospital supplies at sl. no 1 & 2 were identified to be the most viable projects. It was agreed that M/s IDRG Consultancy Services should prepare two detailed feasibility reports on the projects thus

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selected. In addition to this, three project profiles shall also be prepared for the benefit of entrepreneurs. Accordingly, in hospital supplies sector detailed feasibility analysis has been carried out for the following two projects: -

- Drug formulation unit- Tablets, capsules and powders
- Absorbent cotton, gauze and bandages

The detailed feasibility analysis on Drug formulation unit – tablets, capsules & powders and absorbent cotton, gauze and bandages have been presented in part II and part III of the report respectively.

3.4 In addition to this the project profiles on following three items have also been included in the report.

- Disposable syringes & Intravenous sets
- IV fluids – glucose saline
- Plastic film & waste disposal bags

The project profiles on above said three products are given in annexure III of this report.

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Annexures

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Annexure II

List of references

1. Bhutan 2020 – A Vision for peace, prosperity and happiness
2. Ninth plan main document (2002-07)
3. Draft 10th Plan document – available on Internet
4. Statistical yearbook of Bhutan 2007
5. Bhutan Trade Statistics 2006, 2005 & 2004
6. Bhutan Private Sector Survey 2002
7. Innovative Ideas for Industrial Development in Bhutan
8. Bhutan Business Directory
9. Health Care Sector and Health Supplies Related Information as available on Internet
10. Technical books and literature relevant to identified projects.
11. Relevant specifications by Bureau of Indian Standards (BIS).
12. Technical literature on various technologies and machines and raw materials available from raw materials and machine manufacturers.
13. Articles write-ups, photographs, maps, etc. on the identified projects as available in public domain on internet



Project Profiles

1. DISPOSABLE SYRINGES

INTRODUCTION

Disposable syringes are made of plastic material and are used in the field of medical and veterinary science. Due to their availability in sterilized condition, ready to use, and cost effectiveness, disposable syringes are fast replacing the age-old glass syringes. Moreover, the horror of AIDS worldwide has almost dispensed with the reuse of syringes and the demand of disposable syringe has increased phenomenally. Disposable syringes are mostly injection moulded from polypropylene. Syringes are available in size of 1 ml, 2ml, 5 ml, and 10 ml, in a variety of designs and consist of either two or three components construction. The number and size of injection moulding machines required depend upon syringe construction, number of mould cavities, annual production. Disposable syringe has a wide market potential. The age-old glass syringes are very fast becoming obsolete. In the eastern region of the country, there is no unit manufacturing this product. Some of the units manufacturing this product are in other parts of the country.

- Steryware, Faridabad
- Cadilac
- Dispovan, Faridabad
- Cadilac hospital product, Ahmadabad
- Surgiplus, Ahmadabad
- Transplastic Pondicherry
- Disposable mediate, Chennai
- Suru Chemicals, Mumbai
- Albert David, M.P.
- Manoj Surgical Indore

Some of these units are 100% export oriented units. In view of the fast expanding market the prospects of disposable syringe are very bright.



PROCESS OF MANUFACTURE

Production of disposable syringe requires special injection moulding machines and special moulds. M/s Klockner Windsor has introduced Ferromatic Injection Moulding machine for this purpose. Raw material required is polypropylene. It is fed into the injection-molding machine and moulded in chilled condition to get better clarity. The moulded syringes are then assembled with the needle in automatic assembly machine. The whole assembly is then sterilized in sterilization plant using ethylene oxide. The completed syringe is then blister packed in automatic packing machine.

PRODUCTION CAPACITY (PER MONTH)

2 ml size – 4,80,000

5 ml size – 4,80,000

MACHINERY AND EQUIPMENT

- 1 Zigma Injection Moulding Machine
- 2 Sterilization Plant (Ethylene Oxide)
- 3 Blister packing Machine
- 4 Automatic Packing machine
- 5 Scrap Grinding Machine
- 6 Weighing Scale
- 7 Air compressor
- 8 Water pump
- 9 Chilling Plant
- 10 Testing Equipment
- 11 Electrification and Installation
- 12 Firefighting equipment
- 13 Set of Mould for 2 ml (16 cavities for barrel, 24 cavity for plunger)
- 14 Set of Moulds for 5 ml syringe (16 cavity for barrel, 16 cavity for plunger)



TOTAL CAPITAL INVESTMENT

| | |
|--------------------|---------------|
| 1. Fixed Capital | Nu.88,00,000 |
| 2. Working capital | Nu. 20,49,000 |

Total **Nu. 1,08,49,000**

TURNOVER (PER YEAR) **Nu. 138.24 LAKHS**

NET PROFIT (PER YEAR) **22.48%**

RATE OF RETURN - **28.64%**



2. IV FLUIDS – GLUCOSE SALINE

INTRODUCTION

Dextrose and Sodium Chloride injections are the sterile solution of dextrose and Sodium Chloride in water for injection. Dextrose and Sodium chloride injection may be employed to provide dextrose as a nutrient in a medium that does not hydrate the tissues. 5% Dextrose and 0.9% Sodium Chloride is used as isotonic solution. It is a clear colourless or faintly straw-coloured solution. There is a continuously rising pattern in the demand of Dextrose and Sodium Chloride injection in the country. Dextrose and Sodium Chloride injection contribute about 3-4% of the total pharmaceuticals sale all over the country. Growth rate of this product is 15% to 20% per year.

PROCESS OF MANUFACTURE

In general initially concentrated solution of the active constituent is prepared with is further diluted with water for injection. The S.S. tanks are rinsed with some water for injection and 450 liters of sterile water is added to each of the two stainless steel solution tank. The temperature is brought upto 90-100 degree centigrade and then Sodium Chloride is added. After dissolution the filtered solution are collected in a 1500 liter Stainless steel stirred tank and the volume make upto 1000 liter by addition of boiling water for injection.

The solution is further cooled and then passed through a filter composed of cotton wool and then passed through a filter composed of a alternate layer of filter papers. Further, solution is allowed to collect in a final storage tank. It is transferred to suitable glass bottles of 540 ml. capacity. The bottle is sealed and sterilized in a steam autoclave. The product is labeled appropriately and packed in suitable cartons, which may be stored in a cool and clear place prior to dispatch. The strength is stated on the label as the percentage w/v of Sodium Chloride or dextrose. Following conditions are maintained in each batch of production:

- The distilled water used in the process should be sterile either by keeping it at 80° C or by spreading ultra violet light at room temperature.
- No storage of water should be exceeding 24 hrs.
- All the processing equipments are sterilized by steam followed by ringing with de-ionised water.
- All the exit value of the vessels should be designed so that no contamination will pass with solution.

Similarly, dextrose and combination of dextrose and sodium chloride solutions are prepared and packed in bottles.



QUALITY SPECIFICATION

Dextrose injection is a sterile of dextrose in water for injection. It contains 95% - 100% of the labeled amount of dextrose. All entrepreneurs who want to set up this industry should have a drug-manufacturing license, which is issued by the State Drug Controller. It should be manufactured as per Indian Pharmacopoeia.

PRODUCTION CAPACITY (PER YEAR)

- | | |
|-----------------------------------|-------------------|
| • 1. Dextrose Solution 5% w/v | 5,33,000 bottles |
| • 2. Dextrose and sodium Chloride | 5,33,000 bottles |
| • 3. Normal Saline Solution | 2,66,000 bottles |
| • 4. Value | Nu. 1,19,88,000/- |

LAND & BUILDING

- | | | |
|----------------|---|----------------|
| • Total Area | - | 700 sq. meters |
| • Covered area | - | 500 sq. meters |

MACHINERY AND EQUIPMENTS

- | | |
|----|---|
| 1 | Distilled water plant cap. 300 lit. /hr |
| 2 | Distilled water SS storage tank |
| 3 | SS Storage tank |
| 4 | Stirrer for above |
| 5 | ¼" centrifugal pump filled with 2 hp motor & Trolley |
| 6 | 8' dia / 6 plates filter press with pump |
| 7 | SS filter holder with membrane |
| 8 | ¾" centrifugal pump fitted with |
| 9 | Sterile filling vessel suitable for IV fluids |
| 10 | Semi automatic four heads brushing with Galvanized tank and 12 rinsing jets complete |
| 11 | MS Fabricated salt chain convey with Ring Chain track with ½ hp drive with starter |
| 12 | Hand operated cap. Sealing M/c |
| 13 | Horizontal rectangular pressure steam sterilizer double jacketed type size 600 mm x 1500 mm |



| | |
|----|--------------------------|
| 14 | Steamer oil fired boiler |
| 15 | Air conditioner |
| 16 | Air compressor |
| 17 | Furnace oil tank |
| 18 | Chimney |
| 19 | Demineraliser |

RAW MATERIAL

- Dextrose Anhydrous
- Sodium Chloride
- Saline Bottles
- Rubber plugs
- Aluminum Caps
- Corrugated Boxes
- Aluminum Belt & Hangers
- Labels

CAPITAL INVESTMENT

| | | |
|------------------------------|---|----------------------|
| Total fixed capital | - | Nu. 52,40,700 |
| Working capital for 3 months | - | Nu. 20,33,400 |
| Total | - | Nu. 72,74,100 |

TURNOVER (PER ANNUM) - **Nu. 1,19,88,000/-**

RETURN OF SALE - **20.16%**

BREAK EVEN POINT - **45.33%**



3. POLYETHYLENE FILM, BAGS AND WASTE DISPOSAL BAGS

INTRODUCTION

Polyethylene film is a well-known packing material. Polyethylene film is transparent, flexible, nontoxic, chemically inert and impermeable to moisture. Hence, it is used as a packing material in food packing, textile and wide range of other products. This scheme envisages the production of polyethylene tubular film from polyethylene granules by extrusion blowing process. This film can be marketed in the form of bags and rolls both printed and coloured as well as in the form of waste disposal bags. The demand for coloured and printed polyethylene film and bags is quite established. Packing material made of polyethylene is becoming increasingly, popular and is replacing the conventional packing material. Black polythene bags are extensively used as waste disposal bags in household, offices and hospitals. Usually the disposal bags are made from polythene film of higher thickness, so that it can with stand the load.

PRODUCTION TARGETS (PER ANNUM)

| | | |
|----------|---|-----------------|
| Quantity | - | 120 M.T. |
| Value | - | Nu. 1,56,00,000 |

PROCESS OF MANUFACTURE

The manufacturing process consists in forcing down molten polyethylene granules through the annual opening in the die. The tube is then made and expanded by internal air pressure and sizes by sizing ring and cooled by air. To minimize thickness variation it is important to cool the circumference of the bubble uniformly at the same rate. The bubble is then drawn through a pair of nib rolls to the winding unit. The sizing rings are interchangeable and can be replaced easily for any required size of the film.

LAND AND BUILDING

| | | |
|--------------|---|---------------|
| Land area | - | 1000 sq. met. |
| Covered area | - | 500 sq met. |

MACHINERY & EQUIPMENT

1. Film extrusion blowing plant:
 - 65 mm Extruder with 10 HP Motor reduction gear.
 - Die-head, cross head & spindle
 - Vertical, take up equipment fitted with pair of nib, roller 43" with



- variable speed.
- Motorized Blower & Air compressor.
 - Water Pump.
2. Automatic bag making machine.
 3. Flexmatic corona discharge unit.
 4. Two Colour flexo printing machine
 5. Testing equipment
 6. Dies & Other fixtures

RAW MATERIALS

1. Polyethylene - 125 MT (LDPE)
2. Plastic colour, master batches, printing ink.

TOTAL CAPITAL INVESTMENT

| | | |
|---------------------------------|---|----------------------|
| 1. Fixed Capital | - | Nu. 30,00,000 |
| 2. Working Capital for 3 months | - | Nu. 25,00,000 |
| Total | - | Nu. 55,00,000 |

ANNUAL SALES TURN OVER - Nu. 1,56,00,000

| | |
|------------------------------|-------|
| Profit on sale | 7.10% |
| Return on capital investment | 23.5% |

BREAK EVEN POINT 51.5%