POTENTIALITY OF LPG MARKET AND SUITABLE ENTRY MODE FOR A FOREIGN COMPANY TO ENTER INTO SUCH MARKET OF BANGLADESH

Amit Barua
Student No. 1009082113

Advance Engineering Management
Department of Industrial and Production Engineering
Bangladesh University of Engineering and Technology
Dhaka, Bangladesh
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By

AMIT BARUA

Student no. 1009082113

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CERTIFICATE OF APPROVAL

The project title "**POTENTIALITY OF LPG MARKET AND SUITABLE ENTRY MODE FOR A FOREIGN COMPANY TO ENTER INTO SUCH MARKET OF BANGLADESH"** submitted by Amit Barua, Student No. 1009082113, Session- October, 2009 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Master of Engineering in Advance Engineering Management on 03 July, 2013.

BOARD OF EXAMINERS

1. Dr. Sultana Parveen — Chairman
   Professor, Dept. of IPE, BUET, Dhaka-1000 — (Supervisor)

2. Dr. Abdullahil Azeem — Member
   Professor, Dept. of IPE, BUET, Dhaka-1000

3. Dr. A.K.M. Kais Bin Zaman — Member
   Associate Professor, Dept. of IPE, BUET, Dhaka-1000

DECLARATION BY CANDIDATE

It is hereby declare that this project report has not submitted anywhere for the award of any degree or diploma.

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Amit Barua

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ABSTRACT

Demand of Liquefied Petroleum Gas (LPG) has been increasing rapidly from industrial to domestic purpose due to unavailability of natural gas, shortage of biomass fuel, high price of petroleum oil and other sources of energy. This project has focused on LPG market mainly for domestic purpose. In this project, present situation of the energy sector, possible alternatives, source, supply chain, present demand and projected demand of LPG has been analyzed. This project has found that availability of LPG is about 0.1 million tons per year and supplied by only 7 companies against a demand of about 0.5 million tons per year. This shortage of 0.4 million tons of LPG reveals a good potentiality and projected future demand of 1 million tons of LPG has made this market more potential. The main purpose of this project is to find out suitable entry mode for a foreign company to enter into LPG market of Bangladesh. This project has given a thorough picture of the competitiveness characteristics of the LPG market and country condition for LPG business in Bangladesh. Market research has been conducted by following Philip Kotler's (2009) market research system. Competiveness in the existing market and home country (Bangladesh) situations have been analyzed by Michael Porter's (1998) Five Forces and National Diamond Model respectively, various entry modes have been taken from Charles WL Hill (2007) . A suitable entry mode for a foreign company has been suggested by analyzing internal, external factors for entry mode of Franklin Root (1998). At end the suitable entry modes have been found considering all internal and external factors those are influential for entry mode decision in Bangladesh. Finally this project suggests that investment entry modes such as joint venture, wholly-own subsidiary are the suitable entry modes for foreign LPG Company. Joint venture entry mode is the best entry mode for Bangladesh.

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ABBREVIATIONS

ADP - Annual Development Program
AIT - Advance Income Tax
BPC - Bangladesh Petroleum Corporation
BBS - Bangladesh Bureau of Statistics
BERC - Bangladesh Energy Regulatory Commission
BAPEX - Bangladesh Petroleum Exploration Company
BPDB -Bangladesh Power Development Board
BLPGL - Bashundhara LP Gas Ltd
BFRI - Bangladesh Forest Research Institute
BOI - Board of investment Bangladesh
CDA - Chittagong Development Athority
CNG - Compressed Natural Gas
DESA - Dhaka Electricity Supply Authority
DESCO - Dhaka Electricity Supply Company
EPZ - Export Processing Zone
ERL - Eastern Refinery Limited
ERC - Energy regulatory Commission
ERB - Rural Electrification Cooperative
FAO- Food and Augricular Organization
FD - Forest Department
FDI - Foreign Direct Investment
FY - Fiscal Year
GoB - Government of Bangladesh
GHG - Green House Gas
GTCL - Gas Transmission Company Ltd.
GMT - Greenwich Mean Time
GTZ- : German Agency for Technical Cooperation
GDP - Gross Domestic Product
HFO - Heavy Furnace Oil
HSD - High Speed Diesel
HDI - Human Development Index
IPP - Independent Power Producer
IOC- International Oil Company
IPP - Independent Power Producer
IPCC - Intergovernmental Panel on Climate Change
ILO - International Labor Organization
ICSID - International Center for Settlement of Investment Disputes
JOCL - Jamuna Oil Company Ltd
IDCOL-Infrastructure Development Company Limited
LPG - Liquefied Petroleum Gas
LNG - Liquefied Natural Gas
LGED - Local Government Engineering Department
MPEMR -Ministry of Energy and Mineral Resources
MPL - Meghna Oil Company Ltd

ABBREVIATIONS (CONTINUED)

MIGA - Multilateral Investment Guarantee Agency
NEP - National Energy Policy of Bangladesh
OPIC - Overseas Private Investment Corporation
PC - Power Cell
PV - Photo Voltaic
PBS - Palli Biddyut Samities
POCL - Padma Oil Company Ltd
PGCB - Power Grid Company of Bangladesh
Petrobangla-Bangladesh Oil, Gas and Minerals Corporation
RHD -Roads and Highways Department
RPP - Rental Power Plants
RMG - Readymade garments
RAJUK - Rajdhani Unnayan Kartipakkha
RPGCL - Rupantarita Pakritik Gas Company Limited
REHAB - Real Estate and Housing Association of Bangladesh
SAOCL- Standard Asiatic Oil Company Limited
SAARC - South Asian Association for Regional Co-operation
TGTDCL - Titas Gas Transmission and Distribution Company Limited
UN - United Nation
USF- Unclassed State Forest
UNDP- United Nations Development Programs
UNEP - United Nations Environmental Program
WB - World Bank
WHO - World Health Organization
WIPO- World Intellectual Property Organization
WZPDCL -West Zone Power Distribution Company Limited

Units

Bbl-British Barrel	MMCF- Million Cubic Feet
BCF -Billion Cubic Feet	MCF- Thousand Cubic Feet
Ckt – Circuit	MTOE - Million ton oil equivalent
Cft-Cubic Feet	MMCFD-Million cubic feet per day
CO_2-Carbon di oxide	Kva- Kilovolt ampere
Ft - Feet	GWh - Gigawatt-hour
°F - Fahrenheit	KV-Kilo Volt
M-Meter	KM - Kilometer
MW-Megawatt	Kwh-Kilowatt-Hour
MT-Metric Ton	Kmph-Kilo mile per Hour
Mph-Mile per Hour	KgOE - Kilogram oil equivalent
Mha- Million hectares	Sq - Square
M/S-Meter per Second	TK-Taka
MWh-Megawatt hour	TCF-Trillion Cubic Feet

Chapter-01
INTRODUCTION

Energy is inevitable element for socioeconomic development of any country. Due to socioeconomic development, population growth, implementation of science and new technology in agriculture and industrialization process the demand for energy is also increasing remarkably in Bangladesh. However, with the increasing demand of energy presently Bangladesh faces a threat and far-reaching challenge to meet demand of energy. Like others countries of the world Bangladesh is also facing acute scarcity of energy. This country has small reservation of fossil fuel and natural gas which are not sufficient to meet the current energy demand. At present, Bangladesh has primary energy supply from both renewable and nonrenewable sources. Use of imported petroleum oil is increasing day by day and annual consumption is approximately 6.7 million metric tons (BPC 2012). Apart from natural gas and petroleum oil, coal is also used as fuel in the brick-fields and at the Boropukuria Thermal Power Plant. In few off grid area solar home systems are using only to generate power. In addition there are some poultry and dairy farms in which bio-gas plants are being installed. Gas is the main source of commercial energy and 75 percent of commercial energy is provided by natural gas (Petrobangla 2010). Due to shortage of natural gas supply power, fertilizer, domestic, commercial, all types of industrial sectors are suffering severely. At present distribution subsidiaries of Petrobangla are supplying 224 million cubic feet of gas a day to the households for cooking to meet a demand of 275 million cubic feet. The introduction of CNG as a substitute for liquid fuel in 2001-02 resulted in substantial increase of natural gas consumption. Gas consumption in the domestic sector also substantially increased due to the increased number of households connected to the gas distribution network. Gas is the main conventional source of cooking fuel besides biomass, kerosene are also remarkably used in urban area. In rural area biomass fuels are main conventional source of cooking fuel, Kerosene is also being used for cooking, lighting and other purposes. Due to anticipated gas shortage Petrobangla is not in a position to commit gas supplies to all types of consumers including new power plants, industries and new household customers. However, the existing gas infrastructure had limited capacity for both gas production and transmission. Government has already decided to discontinue further expansion of natural gas networks for domestic purposes and given priority to supply of natural gas for power, fertilizer and industrial sectors. It is remarkable that Bangladesh is one of the environmentally threatened countries due to lack of forest

which creates scarcity of biomass fuels. Considering present energy crisis, high import bill of petroleum oil, environmental issue Government of Bangladesh has taken policy to encourage cooking fuel switching from pipe line natural gas, kerosene and biomass to comparatively cleaner commercial fuels Liquefied Petroleum Gas (LPG). As an alternative cooking fuel LPG can substitute the piped natural gas, kerosene, fuel woods besides can be important source of energy for medium to small industries. The opportunities that lay in the LPG market of Bangladesh seem endless and the growing demand for LPG is creating a stable market. Presently the use of LPG is not confining not only as cooking fuel, but also for transports and industrial sectors. According to World Energy Outlook, 2010 "Universal modern energy access 445 million people switch to LPG stoves by 2015 and an additional 730 million people switch to LPG by 2030''. That study indicated that upcoming trend in global LPG market is offering the opportunities for LPG business in other countries similarly Bangladesh also significantly influenced by this trend and realizing the value for enlarging the LPG market and widening the way of entrance of new company into this market. Petrobangla chairman Dr Hussain Monsur told to Daily Financial Express "Under the present context there is no alternative to encourage LPG use as gas pressure is falling sharply due to rapid growth of consumers," He also said the present gas pipeline infrastructures is not adequate to supply sufficient gas to the consumers. Country's gas pipeline infrastructure was built at a time when the consumer base was very low, he said. Since then gas pipelines were not expanded to feed the consumers with additional gas. BPC Chairman Abubakar Siddique said "The government has taken steps to increase LPG supply in the country, by raising production capacity at the state-owned firm and asking private ones to raise imports".

The world's business and economy is moving at a faster rate than ever before which affects many industries directly. To be survival in this business world, companies are adopting good strategies and seeks for enter in the new markets. Before entering into a new market, every company make an assessment of the market environment, different conditions and circumstances how that market could react. It is important to know overall market situation remarkably competition among the existing companies of a specific product, the country situation and condition where a company wants to invest. Besides it is important to asses which factors can influence to enter into that country. The success and failure of a company as well as survival for a long time is highly depends on selection of best entry mode. According to Hill (2007) "During the process of internationalization, company has to be

careful in the way of choosing a suitable entry mode because it is one of the most important tasks that firm must accomplish. Indeed, one problem that comes to every company‘s mind when they are expanding to a new market is about which foreign market to enter, when to enter, scale of entry, and of course the choice of entry mode". Moreover, Hill (2007) highlighted that firms must first struggle with the issue of which foreign markets to enter and the timing and the scale of entry. For consideration of which market to enter, company should drive from the assessment of relative long-run growth and profit potential. The decision of entry mode is the most critical decision in international expansion. There are many factors which affect a company's decision of entry modes. Influential factors in entry mode decision can be different in each case. In addition the degree of influence of each factor can vary between countries. This project attempts to explore the potentiality of LPG market and by implementing Michael Porter's (1998) "Five Force" and "Nation Diamond" theory present market situation remarkably competitiveness in the market and country condition have been identified. Considering all the influential internal and external factors of Franklin Roots (1998) finally suitable entry mode for a foreign company is suggested.

1.1 Objectives

Present cooking fuel crisis has created a huge opportunity for LPG and policy of government for LPG reveals that there is good scope for international companies to start LPG business in Bangladesh. The objectives of this project are to find out following:

- Potentiality of LPG market of Bangladesh.
- Present competitive environment of market and country situations for LPG business.
- Factors that can affect entry mode decisions of an internationalized LPG company.
- Suitable entry modes to choose in Bangladesh

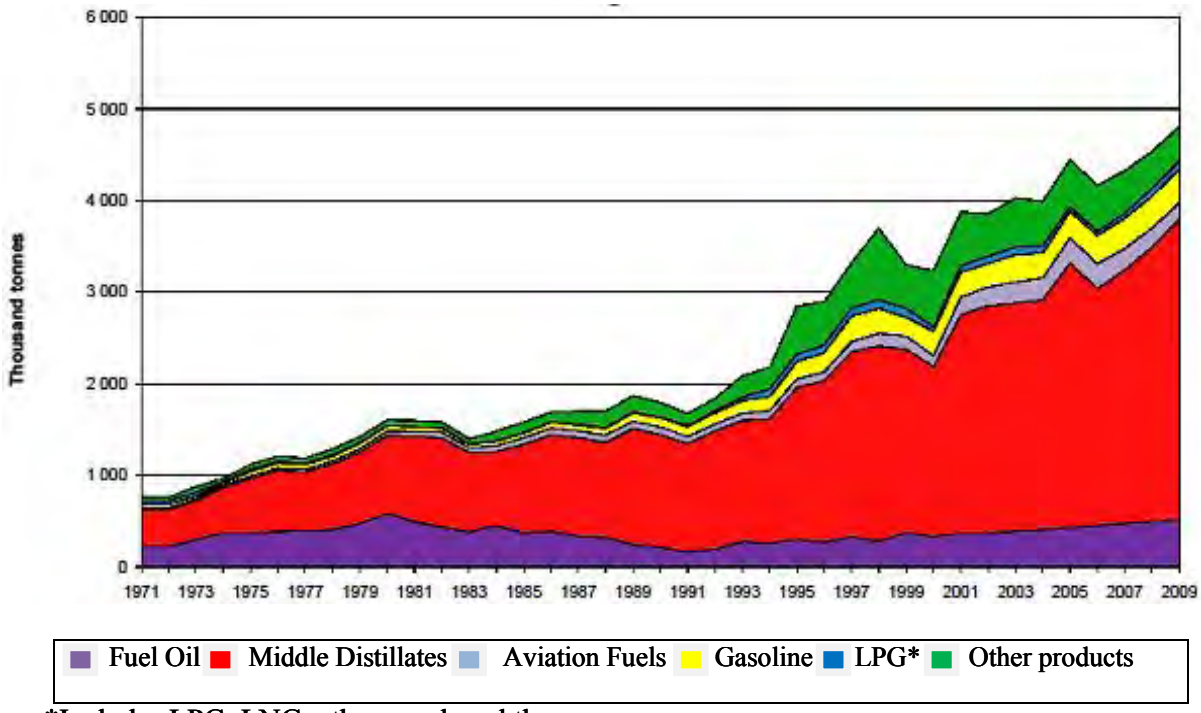
The outcomes of this project work has comprised of suggestions for a foreign company for selecting a suitable entry mode considering all the influential factors that should be taken into account prior to enter the market.

1.2 The Market

Liquefied Petroleum Gas (LPG) has been produced and imported in Bangladesh. LPG is used by urban people in towns and suburbs where there is no piped gas supply besides small portion is being used in light engineering workshops. Recently LPG user is increasing in a geometric rate mainly in town, suburb even in rural area. This is happening due to shortage, low pressure, uncertainty in supply of piped natural gas, shortage along with smoke from

biomass fuel and high price of Kerosene oil. This natural gas shortage makes the country more anxious for domestic and commercial cooking fuel. This country is looking for an alternate fuel to mitigate this cooking fuel crisis. This country consumes about 0.1 million tones of LPG annually. About 90-95% of total LPG is being used for domestics and commercial cooking purpose and rest small portion is being used for light workshops, as autofuel in vehicles. The state-owned LPG bottling company is now supplying 20 percent of the total market demand, while five private companies import the remaining 80 per cent of LPG. The state owned LP Gas Co. Ltd. a subsidiary of Bangladesh Petroleum Corporation provides 20,000 MT/year. While five private firms –Totalgaz, Kleenheat, Bashundhara, Jamuna Spacetech and Linde import 80,000 MT/year. There are various sizes of cylinders are being bottled ranging from 12.5 to 45 kg. The 12.5 Kg cylinder is mainly used for domestic cooking and rest are used for commercial cooking and others purposes. LPG demand in Bangladesh has soared by 66% to around 500,000 MT/year in fiscal 2011-12 compared with 300,000 MT/year in fiscal 2010-11(MPEMR). Government has decided to suspended new gas connections to households from July 2010, which led to a surge in LPG demand across the country. Bangladesh is struggling to meet the growing LPG demand due to production and supply constraints. ". Petrobangla sources said, the country has around 2.0 million domestic gas consumers who consume around 10 per cent of the total gas production and the annual growth rate of this consumption is also 10 per cent. On other sides petroleum products are continuing to penetrate these rural and suburb markets. About 80% of the total imported kerosene is used for residential cooking, lighting mainly in rural and suburb. Others uses include commercial cooking and industrial requirements such as brick firing, irrigation pump, transportation, industrial washing and cleaning. About 39 million tons (BBS 2003) of fuel wood and tree residues were used for residential cooking and some commercial, industrial purpose such as tobacco drying, brick firing .An increase in the supply of LPG could replace the current kerosene and gradually reduce the demand for charcoal, fuel wood and others biomass. BPC has been marketing LPG as the lone company in Bangladesh since independence. With the increasing demand, the government allowed the private sector in the mid-1990s to import and sell LPG in the local market. The energy ministry has already asked the LPG firms to increase their import of LPG to meet the gross mismatch between the demands and supply of piped gas especially in households for cooking and light engineering workshops. The government has already cut import duty on LPG, LPG cylinder and other accessories to reduce LPG price in domestic market and to encourage its use. It has already 'zeroed' the tariff on LPG import from the fiscal year (FY)

2011-12. Import duty on raw materials of LPG cylinder has also been reduced. Anticipating a huge demand of the fuel in the country, multinational and leading local companies has come forward and invested in LPG import, storage and bottling plants during the year 1999 and 2001. Last year government has provided 22 new licenses to private entrepreneurs to build LPG bottling plants to meet the country's growing LPG demand. Anticipating huge demand and possible uses of LPG in industries and transport sector many foreign companies are also express interest to introduce their business in this country.



*Includes LPG, LNG, ethane and naphtha

Figure 1.1: Consumption of oils products in Bangladesh
Source: IEA, Energy Statistics, 2011
(ww.iea.org/Textbase/stats/noncountryresults.asp?nonoecd=Bangladesh)

Chapter-02

LITERATURE REVIEW

International business expansion is a complex process and every company those want to explore new market must be cautious in each step and need to understand. There are many theories from various researchers to conduct assessment of foreign market. To assess and understand internationalization process of business Michael Porter's (1998) "Five Force" and "National Diamond Model" are most popular. These two concepts are regarded as very effective concept to analyze the market and foreign country. Porter (1998) has identified five competitive forces that analyze every industry and every market and these forces determine the intensity of competition and hence the profitability and attractiveness of an industry. Pearce and Robinson (2005) and Johnson and Scholes (2002) mentioned that Porter's model provides an easy and simple approach for industry analyses. This model also provides an opportunity to take important decisions like whether to enter in a particular industry or to leave it. This is also a very simple tool in the hands of strategists to determine the profitability position of a firm. To enter a foreign the company must choose the most appropriate entry mode for that specific market besides market it is important to account the influential factors that can affect entry mode decision. Franklin Roots (1998) internal and external factors are more effective and highly influential to choose an entry mode for a company. There are six common modes of entry having different directive procedure, purposes and definition. Due to the complexity of international expansion lots of studies, analysis and implementation of the above mentioned theories have been conducted by many researchers.

Vaishnav R. (2012) has studied about Porter's (1998) five forces along with the strength, limitations of this theory besides an application of this theory in web design industry has been illustrated. According to Vaishnav "Any company must seek to understand the nature of its competitive environment if it is to be successful in achieving its objectives and in establishing appropriate strategies. If a company fully understands the nature of the Porter's (1998) five forces and particularly appreciates which one is the most important, it will be in a stronger position to defend itself against any threats and to influence the forces with its strategy". Munir et al (2011) has used Porter (1998) five forces to analyze the intensity of competition in telecommunication industry that faced by Pakistan mobiles communication limited.

According to Recklies (2001), "Porter's (1998) Diamond Model determines factors of national advantage and it suggests that the national home base of an organization plays an important role in shaping the extent to which it is likely to achieve advantage on a global scale and this home base provides basic factors, which support or hinder organizations from building advantages in global competition". "Porter (1998) focuses on competition or rivalry is a diversion from traditional economic thinking" has been reported by Stone and Ranchhod (2006). Nenad (2008) has analyzed the competitiveness characteristics of the Macedonian forest industry based on theoretical tool of the Michael Porter's (1998) "National Diamond Model".

Zekiri and Angelova (2011) has carried research to find out reason of companies internalization, factors that affect entry mode decision and appropriate entry mode for a given foreign market. Puljeva and Widen (2007) have showed influence of various theories along with Franklin Root's (1998) internal and external factors to choose an entry mode for foreign country.

Agarwal S and Ramaswami S.N. (1992) have conducted a study about the impact of ownership, location and internalization factor for the choice of foreign country entry. This study showed the independent and joint influence of these factors on the choice of an entry mode. Chanmongkolpanich, S. Panthong (2009) described the internationalization process of Telenor in terms of entry modes and management of control. This research has provided information of internationalization process by showing the case study of Telenor when the company was expanding to Thailand and Charles Hill's (2007) classification of entry mode had been used. M. A. Rahman, F. D. Tantu (2011) carried research to find the most efficient international market entry strategy for companies moving from developed/transition economy to an emerging market and conducted a case study about entry of business in Bangladesh.

2.1 The Competitive Environment and Porter's (1998) five forces

The Porter's (1998) Five Forces model is a simple tool that supports strategic understanding where power lies in a business situation. It also helps to understand both the strength of a firm's current competitive position, and the strength of a position a company is looking to move into. According to Porter (1998, p3) the collective strength of five major forces determines the ultimate profit potential of an industry. Whatever the collective strength is, the mode should be formulated in such way that the company can defend itself against these

forces or influence them in its favor. Knowledge of these contending forces provides the pathway of the right strategic action. All five competitive forces jointly determine the intensity of industry competition and profitability and the strongest force or forces are governing and become crucial from the point of view of mode formulation (Porter 1998, p6). The five forces are given below:

1. Threats of new entrants (Barriers of Entry).
2. Bargaining Power of Buyers.
3. Bargaining Power of Suppliers.
4. Threat of available substitute products or service.
5. Rivalry among existing rivalries.

2.1.1 Threats of new entrants (Barriers of Entry)

New entrants to an industry bring new capacity, the desire to gain market share and often substantial resources. Prices can be bid down or incumbents' costs inflated as a result, reducing profitability. The threat of entry in an industry depends on height of entry barriers that are present and on the reaction entrants can expect from incumbents (Porter 1998, p8). It is important to assess the barriers while entering in a market, because that could create some problem during the entry. Low entry barriers create high competition in the market and vice versa.

There are six major sources of barriers to entry:

2.1.1.1 Economies of Scale

Economies of scale refer to declines in unit costs of a product (or operation or function that goes into producing a product) as the absolute volume per period increases. Economies of scale deter entry by forcing the entrant to come in at large scale and risk strong reaction from existing firms or come in at a small scale and accept a cost disadvantage, both undesirable options (Porter 1998, p7).

2.1.1.2 Product Differentiation

Product differentiation means that established firms have brand identification and customer loyalties, which stem from past advertising, customer service, product differences, or simply being first into the industry. Differentiation creates a barrier to entry by forcing entrants to spend heavily to overcome existing customer loyalties (Porter 1998, p9). If the existing companies have already created a unique brand positioning, then that could be a great barrier for new comers as it will force the new entrant to invest heavily to establish new

brand image over the old ones. In this case, again heavy investment is required to nullify the threat.

2.1.1. 3 Capital Requirements

The need to invest large financial resources in order to compete creates a barrier to entry, particularly if the capital is required for risky or unrecoverable up-front advertising or research and development (R&D). Capital may be necessary not only for production facilities but also for things like customer credit, inventories, or covering start-up losses. Necessity of heavy investment is a big hurdle. Even if capital is available on the capital markets, entry represents a risky use of that capital which should be reflected in risk premiums charged the prospective entrant (Porter 1998, p10).

2.1.1.4 Switching Costs

A barrier to entry is created by the presence of switching costs, that is, one-time costs facing the buyer of switching from one supplier's product to another's. Switching costs may include employee retraining costs, cost of new ancillary equipment, cost and time in testing or qualifying a new source, need for technical help as a result of reliance on seller engineering aid, product redesign, or even psychic costs of severing a relationship. If these switching costs are high, then new entrants must offer a major improvement in cost or performance in order for the buyer to switch from an incumbent (Porter 1998, p10).

Types of switching costs also include exit fees, search costs, learning costs, cognitive effort, emotional costs, equipment costs, installation and start-up costs, financial risk, psychological risk, and social risk.

2.1.1.5 Access to Distribution Channels

A barrier to entry can be created by the new entrant's need to secure distribution for its product. To the extent that logical distribution channels for the product have already been served by established firms, the new firm must persuade the channels to accept its product through price breaks, cooperative advertising allowances, and the like, which reduce profits (Porter, 1998, p10). Existing competitors may have ties with channels based on long relationships, high-quality service, or even exclusive relationships in which the channel is solely identified with a particular manufacturer. Distribution channels can be tied up by existing rivals and also price war among them can impose a pressure on the company to keep the price down (Porter 1998, pp.21-25).

2.1.1.6 Cost Disadvantages Independent of Scale

Established firms may have cost advantages not replicable by potential entrants no matter what their size and attained economies of scale. The most critical advantages are factors such as the following: Proprietary product technology, Favorable access to raw materials, Favorable locations, Government subsidies, Learning experience curve. If costs decline with experience in an industry, and if the experience can be kept proprietary by established firms, then this effect leads to an entry barrier. Newly started firms, with no experience, will have inherently higher costs than established firms and must bear heavy start-up losses from below- or near-cost pricing in order to gain the experience to achieve cost parity with established firms (Porter 1998, p12).

2.1.1.7 Government Policy

The last major source of entry barriers is government policy. Government can limit or even foreclose entry into industries with such controls as licensing requirements and limits on access to raw materials. More subtle government restrictions on entry can stem from controls such as air and water pollution standards and product safety and efficacy regulations (Porter 1998 pp.12-13).

2.1.2 Bargaining Power of Buyers

The company will have to face a threat from the buyer as the buyers in the market can act as a vital force. Large volume buyers are particularly powerful in industries with high fixed costs when the customers are few in number and switching to another company's product are easy for them and then the customers are considered to be powerful. In this situation the company is always under the threat of buyer's specified price and also the possibility of buyer switching to another company. Buyer can be weak if higher switching cost can be ensured (Porter 1998, pp.28 -32). Other factors which can influence bargaining power of buyers are the buyer information availability; products are standardized or undifferentiated, availability of existing substitute products, buyer price sensitivity and degree of dependency upon existing channels of distribution.

2.1.3 Bargaining Power of Suppliers

Suppliers can exert bargaining power over participants in an industry by threatening to raise prices or reduce the quality of purchased goods and services. Powerful suppliers can thereby squeeze profitability out of an industry unable to recover cost increases in its own prices (Porter 1998, p25). When the company is supposed to design their product according to

suppliers demand as the suppliers output is unique then the suppliers are considered to be powerful. If number of suppliers is large, then the suppliers become weak as the company have more option. Beside low switching cost can be one more reason for the supplier to be weak the supplier to be weak and vice versa (Porter 1998 pp.28-32). The supplier groups become more powerful when it does not depend heavily on the industry for its revenues

2.1.4 Threats of Available Substitute Products or Service

In case of availability of greater substitutes, the firms are not able to raise the price as that could cause the customers to switch to another product. In this situation, the companies are under pressure of reducing the price as there are possibilities of switching (Porter 1998, p32). The other factor that create tendency to adopt substitute products are buyer propensity to substitute, Relative price performance of substitute, buyer switching costs, Perceived level of product differentiation, Number of substitute products available in the market, Ease of substitution, Information-based products are more prone to substitution, as online product can easily replace material product, substandard product, quality depreciation.

2.1.5 Intensity of Rivalry among Existing Competitors:

Rivalry among existing competitors takes the familiar form of jockeying for position-using tactics like price competition, advertising battles, product introductions and increased customer service or warranties. Rivalry occurs because one or more competitors either feels the pressure or sees the opportunity to improve position. In most industries, competitive moves by one firm have noticeable effects on its competitors and thus may incite retaliation or efforts to counter the move; that is, firms are mutually dependent. This pattern of action and reaction may or may not leave the initiating firm and the industry as a whole better off (Porter 1998, p17). When a large number of existing rivals with equal power while the industry growth is slow, then this can be considered as high level of competitive pressure (Porter 1998, p33). This is only one of several forces that determine industry attractiveness. Intense rivalry is the result of a number of interacting structural factors they are: Numerous or Equally Balanced Competitors, Slow Industry Growth, High Fixed or Storage Costs, Capacity Augmented in Large Increments, Lack of Differentiation or Switching Costs, Diverse Competitors, High Strategic Stakes, High Exit Barriers (Porter 1998, p18).

Realizing the nature of each of these forces an organization can take necessary insights to enable them to formulate the appropriate modes and to be successful in their market. The nature of competition in a market is strongly affected by Porter's (1998) five forces. The

stronger the power of buyers and suppliers the stronger the threats of entry and substitution, the more intense competition is likely to be within the industry. However, these five factors are not the only ones that determine how firms in an industry will react and directed. According to this model organizations would be expected to compete less fiercely, and make higher profits, than in fragmented ones even in concentrated industries.

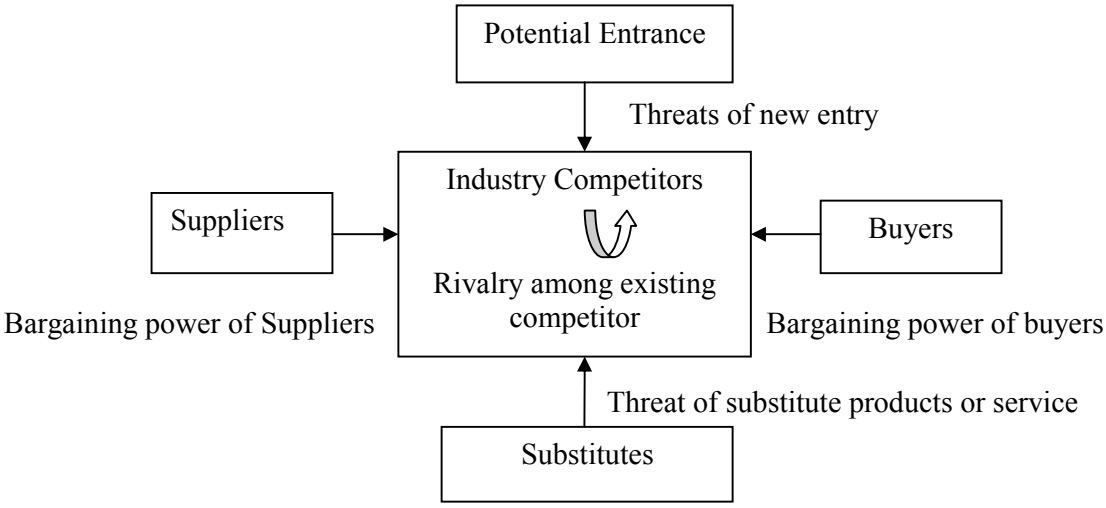


Figure 2.1: Porter's Five Forces
(Source: Michael E. Porter, Competitive Strategy, 1998, p.4)

2.2 Home country situation and Porter's (1998) National Diamond Model

Besides potential market the target country play a vital role to take decision of business. The country where the business will be started should fulfill some basic requirements. These requirements are vary with types of business and views. According to Porter (1998, p166), there are four major factors or determinants of national or home-base that create the national environment in which companies can get advantage in particular industries. Each factors of the diamond or the diamond as whole effects the requirements of international success. The determinants are namely: Factors condition, Demand condition, Related and supporting industries and finally firm's structure, mode and rivalry.

2.2.1 Factor Conditions

These refer to the 'factors of production' that go into making a product or service. In this category of factors who affected competitiveness are included: a) basic factors- inherited by the nation as a physical (geographic location, natural resources, water quality and climate) and human resources (quantity, skills and costs of workforce) and b) advanced factors – which are created and contribute to achieve higher level of competitive advantage

(knowledge resources, infrastructure, available capital). Competitive advantage from the factors depends on how efficiently and effectively they are deployed. Factor condition advantages at a national level can translate into general competitive advantages for national firms in international markets. Local disadvantages in factors of production force innovation. Adverse conditions such as labor shortages or scarce raw materials force firms to develop new methods and this innovation often leads to a national comparative advantage.

2.2.2 Demand Conditions

According to Porter (1998), demand conditions in a country are also perceived as a source of competitive advantage for a country and demand as a factor explaining trade is not new. The nature of the domestic customers can become a source of competitive advantage. A more demanding local market leads to national advantage. If the local market for a product is larger and more demanding at home than in foreign markets, local firms potentially put more emphasis on improvements than foreign companies. Dealing with sophisticated and demanding customers at home helps train a company to be effective overseas and this will potentially increase the global competitiveness of local exporting companies. According to Porter, 1998 "The industry needs to respond the sophisticated home demand by rapid improvement of product and offering the superior product quality, features and service''.

2.2.3 Related and Supporting Industries

According to Porter (1998), it is the external economies of related and support industry clusters, such as networks of specialized input providers, institutions and the spill-over effects of local rivalry, that become the true source of competitive advantage. Existence of developed network of subcontractors and suppliers in a given region or country, makes it possible to offer more complex products and after sale service systems and turn out primary products with a higher value-added. When local supporting industries and suppliers are competitive, home country companies will potentially get more cost efficient and receive more innovative parts and products. This will potentially lead to greater competitiveness for national firms.

2.2.4 Firm Strategy, Industry Structure and Rivalry

According to Porter (1998) the main emphasis of firm strategy, structure and rivalry is that the strategy and structures of firms depend heavily on the national environment and that there are systematic differences in business sectors in different countries that determine the

way in which firms compete in each country and ultimately their competitive advantage. Besides structure and management systems of firms in different countries can potentially affect competitiveness. If rivalry in the domestic market is very fierce, companies may build up capabilities that can act as competitive advantages on a global scale. Home markets with less rivalry may therefore be counterproductive and act as a barrier in the generating of global competitive advantages such as innovation and development.

Porter offer two additional areas from which companies can draw competitive advantages:

2.2.5 Chance

Porter (1998) defines chance events as the ones that have little to do with circumstances in a nation and are largely outside of the control of firms. Chance events could be significant shifts in exchange rates, world financial markets, unexpected demand growth in local or international , wars or decisions taken by foreign governments. Chance plays its role by altering the four main conditions in the diamond model.

2.2.6 The role of Government:

According to Porter (1998), the role of government in the diamond model as described is to act as a catalyst and challenger; it is to encourage or even push companies to raise their aspirations and move to higher levels of competitive performance. Porter asserts that the government can have a role in all determinants of national competitiveness, but that the role can be negative as well as positive and that its role will always be partial – not sufficient in itself to make a national industry competitive. In the modern economics government has several roles: a) to achieve macroeconomic and political stability; b) to improve the quality of general inputs and institutions, such as roads, schools and telecommunications; c) to incentives and rules of the game that stimulate productivity innovation; d) to foster and reinforce the cluster formation process; and e) to establish a positive, distinctive and challenging long-term economic vision and action program which mobilizes government, business and citizens. There are many policies that can influence each of the determinants in different ways, but on the other hand, some policies implemented without consideration of their outcome and impact can have opposite and undermining effects on the national advantage. From the Porter's (1998) National Diamond model it has been found that positive conditions of skilled labor, communication infrastructure and local raw material source determine the factors condition of the country. Proper utilization of these factors can bring success for the company. There should be some positive demand in market for the

product and customer's expectation about the product should be assessed. A company cannot just start a business in a country. The presence or absence of internationally competitive supplier industries or other related industries is necessary (Porter 1998, pp.172 - 178). Circumstances of nations affect the management style and organizational structure of the company. According to Porter (1998, p178) "No one managerial system is universally appropriate". This determinant also influences the nature of rivalry of the company within the country. One other influential factor that affects the industry within the country to grow is government policies. Sometimes government determines the nature of business competition or state intervention in the industry. Countries that have heavy interferences in private business are generally been least successful. Porter (1998) suggests that, to be a successful country, the nation should move to investment driven economy followed by innovation driven economy from a factors driven economy. Lack of natural resources can stimulate to a high level of innovation in the words of Porter (1998).

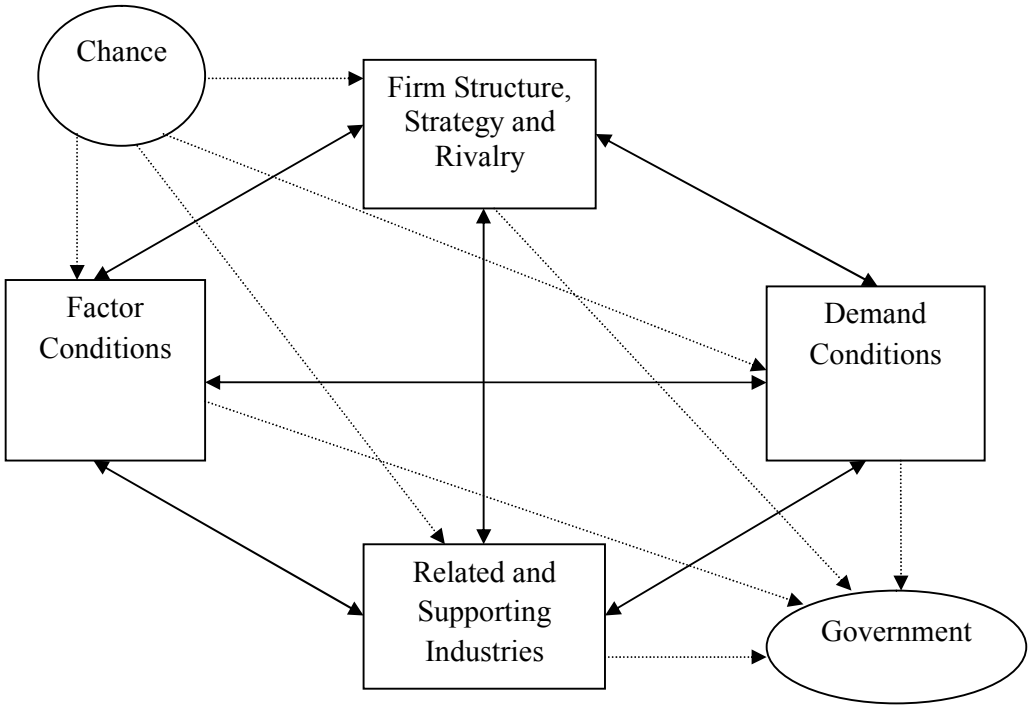


Figure 2.2: The National Diamond Model
(Source: Michel E. Porter, The Competitive Advantage of Nations, 1998, p. 172)

2.3 Definition of Entry Mode

According to Root (1998), an international market entry mode is to create the possibility by arranging company's products, technology, human skills, management or other resources to enter into a foreign country. He regards that entry mode help companies to determine goals,

resources and policy in order to channel their international activities toward a sustainable international expansion.

2.4 Entry Mode Literature

When a firm is going to explore a foreign market, the company faces problem to choose the best entry mode. There are many entry modes describe by various authors. Based on various points of view many authors classified the entry modes in a lot of ways. Franklin Root (1998) has classified the entry mode on the basis of exporting, contractual and investment. Most of the authors explain six essentially different entry modes, generally named as exporting, turnkey projects, licensing, franchising, joint venture and setting up a wholly-owned subsidiary in the host country. On basis of the suitability of this project only remarkable entry modes were chosen. These various modes have sub classification also. All of these entry modes cover the classification of Root (1998). All of the entry modes have their advantages for the firm to explore as well as disadvantages. The choice of entry mode is very important and has to choose carefully because it directly affects on success and failure of the firm foreign expansion.

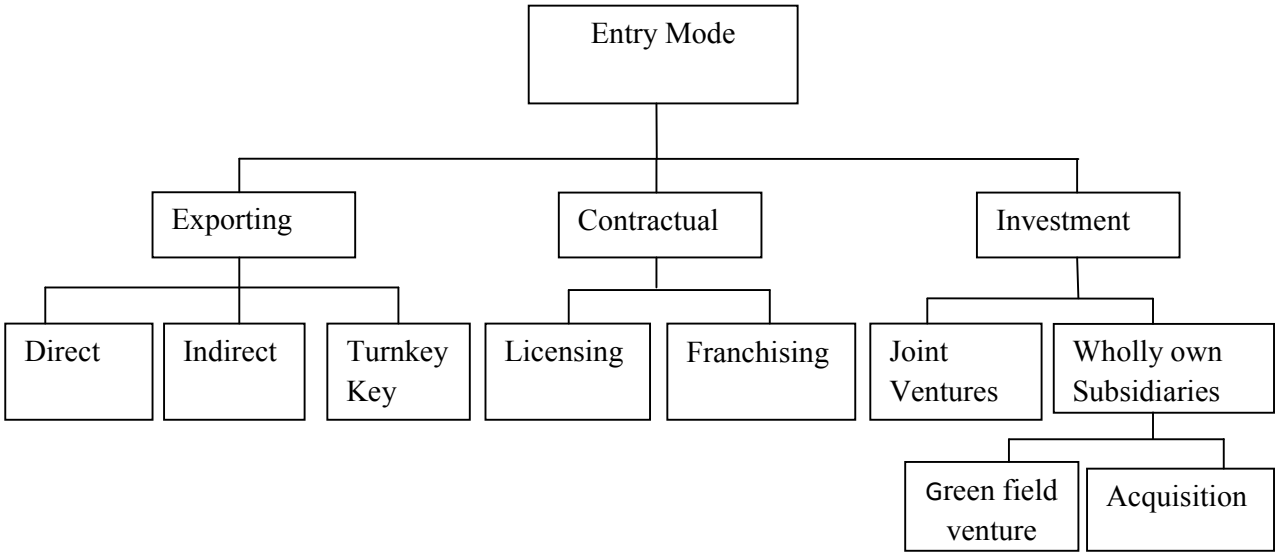


Figure 2.3: Various Entry Modes
(Source: Charles WL Hill, International Business-competing in the global market, 2007)

2.4.1 Exporting

When a manufacturing firm decides to global expansion, it will usually choose to export its products to other countries as the first step and which later switch to another mode for capturing a large portion of total market share. It is the only market-entry technique that

offers the lowest level of risk. Exporting technique can be direct or indirect. In indirect exporting products are carried abroad by others, hold least market control. The firm is not engaging in international marketing and no special activity is carried on within the firm; the sale is handled like domestic sales. In direct exporting, the firm becomes directly involved in marketing its products in foreign markets, because the firm itself performs the export task (rather than delegating it to others). If it is very expensive for establishing manufacturing plant or factory in the host country this exporting can bring a great benefit. The advantages are: avoid the costs of establishing the manufacturing plants and factory in the host country; it the best way to realize the experience curves of a new market and location economies as experimental basis. The disadvantages are: the exporting mode will not be suitable; exporting usually needs high transport costs but setting up manufacturing plant abroad takes lower cost than exporting, tariff barriers make exporting uneconomical and also risky problems with local marketing agents; "When a firm delegates its marketing, sales and service in each country where it does business to another company, the problem will appear" (Hill 2007, p.488). According to Terpstra V. and Sarathy R. (2001) 'Indirect export can open up new markets without requiring special expertise or investment. Both the international know-how and the sales achieved by these indirect approaches are generally limited. In this approach, the commitment to international markets is very weak**'.**

2.4.2 The Turnkey Project (Exporting Entry Mode)

The turnkey project is about exporting process of technology and knowledge to other countries. Hill (2007, p.488) demonstrates that "Turnkey projects, the contractor agree to handle every detail of the project for a foreign client, including the training of operating personal. At completion of the contract, the foreign client is handled the "key" to a plant that is ready for full operation". One of the major advantages of turnkey projects is the possibility for a company to establish a plant and earn profits in a foreign country especially in which foreign direct investment opportunities are limited and lack of expertise in a specific area exists. It is important when the host country client has valuable information than can be used by the firm handling the project. Firms who choose turnkey project will take less risk than FDI but they will leave their competitive advantage because technical knowhow is a competitive advantage for the firm; whereas exporting the know-how the firm undertakes a huge risk of losing this asset to competitors and it will not be their competitive advantage anymore (Hill 2007). This mode is common for complex and expensive production technology industries such as chemical, petroleum, metal refining industries.

2.4.3 Licensing (Contractual Entry Mode)

"A licensing agreement is an arrangement where a licensor grants the rights to intangible property to another entity for a specified period, and in return, the licensor receives a royalty fee from the licensee" (Hill 2007, p.489). The intangible property includes patent, inventions, formulas, processes, design, copyright and trademarks. In return, the licensee will: Produce the licensor's products, Market these products in his assigned territory, Pay the licensor royalties related to the sales volume of the products. It is a primary stage for a firm which plans to enter a foreign market and it is considered to be most favorable for small or medium-sized companies (Root 1998). It has advantage that licensor firm does not have to bear the development costs and risks of establishing the operation directly in a foreign market thus the firm can decrease its expansion costs via licensing. If a firm wants to enter an unfamiliar or political, economic volatile foreign market, or if this foreign country has some entry barriers, or even if this firm wants to process some intangible property, but does not want to develop this by itself. Another is firm will benefit when the investment in host country is limited. Like Turnkey process by selling the know-how the firm undertakes a huge risk of losing this asset to competitors because the licensee will receive the main technology and make full use of it ultimately licensor will lose competitive advantage (Terpstra V. and Sarathy R. 2001). However, firm cannot realize the true experience in the host country because they cannot put tight control in manufacturing, marketing and mode.

2.4.4 Franchising (Contractual Entry Mode)

There is quite similarity of franchising to licensing, but the period of franchising is longer than licensing. Licensing is similar to except that the franchising organization tends to be more directly involved in the development and control of the marketing programmers. Another difference from the licensing mode of entry is that the franchisee must obey certain rules given by franchiser while they run the business, and franchiser will get the loyalty payment by the percentage of franchisee's revenues in return. Hill (2007, p.490) mentioned that franchising is basically a specialized form of licensing in which the franchiser not only sells intangible property, but also assists the franchisee to run the business in an ongoing basis. The primary advantage of franchising is that the franchise firm doesn't have to bear the development costs and risks associated with entering a new foreign new market, just like in the entry mode of licensing thus it can reduce many costs. Another is that it is suitable for service firm because it can build global awareness quickly and

reduce cost and risk. Thus by the low costs and risks, the firm could explore the market in an efficient way. On the other hand it is not easy to control the service‘s quality because of the geographic distance between the foreign franchisee and franchisor which can make the poor quality and difficulty for checking (Hill 2007). If the franchisee does not strictly obey the rules of the franchisor, it could lead to a worldwide collapse of the international firm.

2.4.5 Joint ventures (Investment Entry Mode)

Joint venture is the establishment of a firm that is jointly owned by two or more independent firms. Actually, establishing a joint venture with a foreign firm has been a long popular mode for entering a new market (Hill 2007). Foreign joint ventures have much in common with licensing. The major difference is that in joint ventures, the international firm has an equity position and a management voice in the foreign firm. A partnership between host- and home-country firms is formed, usually resulting in the creation of a third firm. It is a method that both sides hold relatively the same percentage of shares in the venture. The joint venture’s operation is separate from both companies and often the same role is shared by both managerial teams. This type of agreement gives the international firm better control over operations and also access to local market knowledge. The international firm has access to the network of relationships of the franchisee. It is less exposed to the risk expropriation thanks to the partnership with the local firm. This type of agreement is very popular in international management. Its popularity stems from the fact that it permits the avoidance of control problems of the other types of foreign market entry modes. In addition, the presence of the local firm facilitates the integration of the international firm in a foreign environment (Terpstra, V. and Sarathy, R. 2001). A joint venture has a lot of advantages. Firstly, both of the firms share the costs as well as the benefits. Both sides share the risk as well. By investing into and joining a local firm, the international firm could successfully explore the foreign market with their assisting jointed firm. The international firm could thereby gain market knowledge from the local firm. Especially considering the political and economic issues in the international market today, it is an overwhelmingly popular way to enter foreign markets. The local firm might have a way to influence the local government, which will smooth the market entry for its joint partner. The disadvantage is obvious in that the firm might have major conflicts with its partner. The partners might disagree over investment, marketing or other policies. One might want to reinvest and the other to declare more dividends (Kotler 2009, p.596). Regarding the shareholding of the firms, it is often difficult to maintain a balanced relationship. Once one firm’s expansion mode is in conflict

with the other party, it will by all means bargain about the relative share ownership in order to have more control of the firm. Thus the partner with stronger bargaining power will continue to lead an unsteady joint venture. However; when firms share their core competitive knowledge with local partner, it will not be core competitive knowledge anymore and one more problem is when the goal of the firm changes, it could become problem between local company and the firm (Hill 2007).

2.4.6 Wholly owned Subsidiaries (Investment entry Mode)

The ultimate form of foreign involvement is to direct ownership of foreign based assembly or manufacturing facilities (Kotler 2009, p.596). The entry mode of wholly-owned subsidiaries means the firm owns 100 percent of the overseas entity. There are two major ways to establish foreign wholly-owned subsidiaries. First one is green field venture that means the firm will enter the new international market by establishing a completely new operation and legal entity. The second method is acquisition; whereby the firm acquires another firm in that international market in order to directly enter. The other firm could be an established and well-built firm in that particular industry. Thus the firm could gain a lot of advantages and promote its own products by using the acquisition mode. Here is how one firm uses local relationships to advantage in its overseas plants (Hill 2007). If the foreign market appears large enough, foreign production facilities offer distinct advantages: First, the firm secures cost economies in the form of cheaper labor or raw materials, foreign-government investment incentives, and freight savings. Second, the firm strengthens its image in the host country because it creates jobs. Third, the firm develops a deeper relationship with government, customers, local suppliers, and distributors, enabling it to adapt its products better to the local environment. Fourth, the firm retains full control over its investment and therefore can develop manufacturing and marketing policies that serve its long-term international objectives. Fifth, the firm assures itself access to the market in case the host country starts insisting that locally purchased goods have domestic content. (Kotler 2009, p.596). Establishing wholly-owned subsidiary the firm could have tight control, because the firm has 100 percentage of ownership. Then it is easy to understand that the firm could make its own strategic plan and control the subsidiaries in its own way. Especially, compared with other entry modes, the firm does not need to bear the risk to lose its competitive advantages and know-how by selling these to another party. Therefore, the firm has more power of control and less risk. Furthermore, as for multinational firms, many of them are eager to explore foreign markets in order to go up the experience curve and

understand the local economics. Last but not least, the firm could have 100 percent of profits in its wholly-owned subsidiaries. The disadvantages of wholly-owned subsidiaries are clear too. As long as the firm chooses wholly-owned subsidiaries, the cost is definitely high. Because of full ownership, the firm cannot get any assistance from other party. While bearing the full cost of the investment in the foreign country, the firm still needs to bear the entire risk. The risk lies in the uncertain foreign market, the unfamiliar political and economic environment or the culture gap. To do business in a new culture, especially by choosing the entry mode of wholly-owned subsidiaries by acquisition, could raise a lot of problems. The variety and diversity of the foreign business practice or country culture could be a significant issue for the firm to deal with. The main advances and disadvantages of various entry modes are given in table 2.1:

Table 2.1: Advances and disadvantages of various Entry modes

Entry mode	Advantages	Disadvantages
Exporting	-Ability to realize location and experience-curve economies -Avoids the cost of establishing manufacturing operations in the host country - Low risk	-High transport costs -Unpredictability of trade barriers -Problems with local marketing agents
Turn Key	No risks, experience gather	Lose of technical knowhow
Licensing	-Low costs of development of foreign markets and risk - Quick growth possible	-Difficult to realize location and experience curve economies & to engage in global strategic coordination - Difficult to have control over technology
Franchising	-Low costs of development of foreign markets and risk - Quick growth possible	- Difficult to engage in global strategic coordination - Difficult to control quality
Joint Venture	- Access to local partner's knowledge - Shared development cost and risk - Easier political acceptability - Facilitate the transfer of complementary skills	-Difficult to engage in global strategic coordination and to realize location and experience-curve economies -Risk of giving away technological know-how and market access to alliance partner for a small return
Wholly-owned subsidiaries	- Protection of technology - Ability to engage in global strategic coordination and to realize location and experience curve economies	-High costs and risks -Divergent corporate cultures and Priorities

Source: Charles WL Hill, International Business-competing in the global market, 2007, p.499

2.5 Franklin Root's (1998) Factors Influencing the Choice of Entry Mode

There are many factors that can influence for the selection of a company's entry mode in foreign market. In the initial stage if a company makes a wrong selection of entry modes for its internalization process, this mistakes can brings a threat for its future market entries, position, survival and expansions. According to Root (1998) "Selecting the right entry mode is an important decision, which demands a lot of resources and thorough planning. When selecting entry mode a wide range of factors must be taken into consideration before making the final decision when choosing an entry mode". There are many factors explain by various authors that can influence to choose an entry mode. In this project theory of Root's (1998) has been chosen to analyze influential factors of entry mode in new markets. This project mainly focused on the internal and the external factors because these factors can explain most of the factors described by various authors from different views. It is also seems that these internal and external factors are more influential in entry mode decision for a company that want to enter in a foreign market. It has been stated before that Root (1998) classified the entry mode on basis of exporting, contractual and investment.

2.6 Theory of Root (1998)

Root (1998) develops a model of factors that affect entry mode decision. He states that the choice of entry mode for a product or target country is the result of several (often conflicting) forces. He divides influential factors affecting entry mode decision into two groups: external and internal factors. In addition to this Root (1998) states there is difference in the internal and external factors when companies choose a market entry mode. The difference is that external factors can seldom be affected by company management decisions and are external to the company and may be regarded as parameters of the entry mode decision. There is no single external factor is likely to have a decisive influence on the entry mode for companies in general, these factors only encourage or discourage a particular entry mode. In the final decision of market entry mode, there is supposed to be a balance between different factors that are in conflict with each other, and in the end a balance between risk and control must be established.

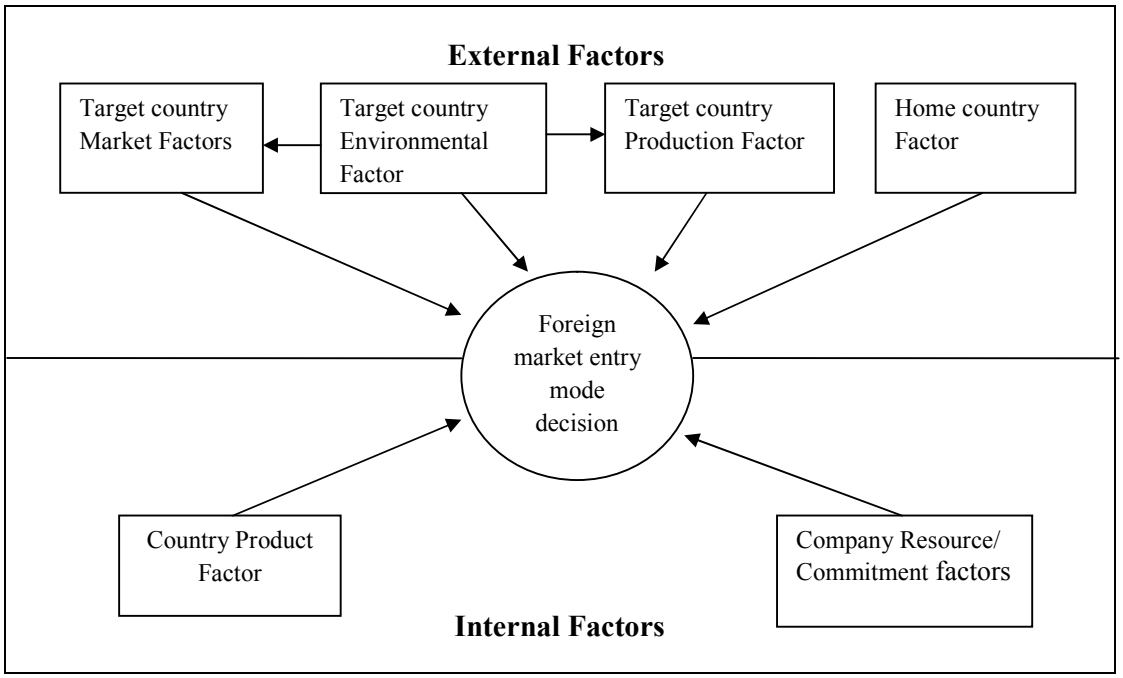


Figure 2.4: Influential factors in the entry mode decision
(Source: Franklin R. Root, Entry Strategies for international markets, 1998, p.9)

2.6.1 External Factors

Root (1998) has determines four influential external factors affecting entry mode choice. They are: Target country market factors, target country production factors, target country environment factors and home country factors.

2.6.1.1 Target Country Market Factors

Root (1998) argues that the present and projected size of target country market influences entry mode choice. In small markets companies use entry modes with low breakeven sale volumes such as indirect distributor exporting, licensing and contracts. In a market with high potential sales the company uses entry modes with high breakeven sales volume (branch/ subsidiary exporting and equity investment in local production). Root (1998) mentioned competitive structure of the market is an important aspect in considering the target country factors. Markets can range from atomistic (many non dominant competitors) to oligopolistic (a few dominant competitors) to monopolistic (a single firm). When competitive structure tends towards monopoly, entry modes are high resource commitments to compete against competitors. Otherwise, if the competitive structure of the market tends towards perfect competition, entry modes are often low resource commitments such as exporting. According to Root (1998) "An atomistic market is usually more favorable to export entry than an oligopolistic or monopolistic market, which often requires entry

via equity investment in production to enable the company to compete against the power of dominant firms. In target countries where competition is judged too strong for export and equity modes, a company may turn to licensing or other contractual modes.

2.6.1.2 Target Country Production Factors

The quality, quantity and cost of resources in the foreign country, as well as the quality and cost of economic infrastructure (transportation, communications and port facilities) influence the choice of entry mode. When the costs of production are low in the target country, local production is favored. On the other hand, if production costs are high in the foreign country, the company tends to export.

2.6.1.3 Target Country Environmental Factors

Country Environment Factors such as political, economic and socio-cultural dimensions of the foreign country can influence the choice of entry mode. Government policies and regulations can be main decisive in choosing the entry mode. Restrictive import policies (high tariffs, tight quotas and other barriers) discourage an export entry mode in favor for other modes. Geographical distance is another important factor within country environment factors. When there is a great distance between the home and foreign country there is possibility of high transportation cost and this high costs can make it impossible for some export goods to compete against local goods in the target country thereby discouraging export entry modes and favoring another entry mode such as a wholly-owned subsidiary. The economy of the target country can also influence the decision of entry mode. For instance, in centrally planned socialist economies, equity entry modes are not possible, and therefore companies only rely on non-equity entry modes such as exporting, licensing or other contractual modes. Other important factors are the size of economy (gross national product), absolute level of performance (gross national product per capita), and relative importance of its economic sectors (percentage of gross national product devoted to the particular sector). Finally, another relevant factor is cultural distance; the firms often prefer to enter those foreign countries that are culturally closest to the home country.

2.6.1.4 Home Country Factors:

If the home country has a big market, it enables a company to grow to a large size in the home market before going abroad. The competitive structure also influences the choice of entry mode. Relative production costs of the home country versus the foreign country influence entry mode decisions. If there is a high production cost in the home country, the

company will chose foreign market entry modes such as local production, licensing, contract manufacture and investment. Another home country factor is the policy of the home government toward exporting and foreign investment by domestic firms. Finally, geographic distance is an influencing factor in that a large distance will favor local presence in a foreign country.

Table 2.2: External factors influencing the Entry Mode Decision

	Indirect and agent/distributor exporting	Licensing	Branch/ subsidiary exporting	Equity investment /production	Service contract
External Factors (Foreign Country)					
Low sales potential	X	X			
High sales potential			X	X	
Atomistic competition	X		X		
Oligopolistic competition				X	
Poor marketing infrastructure			X		
Good marketing infrastructure	X				
Low production cost				X	
High production cost	X		X		
Restrictive import policies		X		X	X
Liberal import policies	X		X		
Liberal Investment policies				X	
Restrictive investment policies	X	X	X		X
Small geographical distance	X		X		
Great geographical distance		X		X	X
Dynamic economy				X	
Stagnant economy	X	X			X
Restrictive exchange controls	X	X			X
Liberal exchange controls				X	
Exchange rate depreciation				X	
Exchange rate appreciation	X		X		
Small cultural distance			X	X	

	Indirect and agent/distributor exporting	Licensing	Branch/ subsidiary exporting	Equity investment /production	Service contract
Great cultural distance	X	X			X
Low political risk			X	X	
High political risk	X	X			X
External factors (Home country)					
Large market				X	
Small market	X		X		
Atomistic competition	X		X		
Oligopolistic competition				X	
Low production cost	X		X		
High production cost		X		X	X
Strong export promotion	X		X		
Restrictions on investment abroad	X	X			X

Source: Franklin R. Root, Entry Strategies for international markets, 1998, p.16

2.6.2 Internal Factors

Root (1998) explains two internal factors which affect the choice of entry mode: product factors and resource commitment factors. These two factors are described briefly below:

2.6.2.1 Product Factors

Root (1998) states that highly differentiated products with distinct advantages over competitive products give sellers a significant degree of pricing discretion. These products can absorb high unit transportation costs and high import duties and still remain competitive in a foreign target country. In contrast weakly differentiated products must compete on a price basis in a target market, which may be possible only through some form of local production. Hence high product differentiation favors export entry, while low differentiation pushes a company toward local production and choosing an entry mode such as contract manufacture or equity investment. Furthermore, if a company's product is a service, such as engineering, advertising, computer services, tourism, management consulting, banking or retailing then the company must find a way to perform the service in the foreign target country, because services cannot be produced in one country for export to another. Local service production can be arranged by training local companies to provide the service (as in franchising), by setting up branches and subsidiaries (as an advertising agency or branch

bank) or by directly selling the service under contract with the foreign customer (as in technical agreements and construction contracts). Technologically intensive products give companies an option to license technology in the foreign target county rather than use alternative entry modes. Products that require considerable adaptation to be marketed abroad favor entry modes that bring a company into close proximity with the foreign market (branch/ subsidiary exporting) or into local production.

***2.6.2.2 Resource Commitment Factors**:*

Root (1998) also states that the more abundant a company's resources in management, capital, technology, production skills and marketing skills, the more numerous are their entry mode options. Conversely, a company with limited resources is constrained to use entry modes that call for only a small resource commitment. Hence company size is frequently a critical factor in the choice of an entry mode. Resources must be joined with a willingness to commit to foreign market development. A high degree of commitment means that managers will select the entry mode for a target country from a wider range of alternative modes than managers with low commitment. Therefore, a high-commitment company, regardless of its size, is more likely to choose equity entry modes.

Table 2.3: Internal factors influencing the Entry Mode Decision

	Indirect and agent/distributor exporting	Licensing	Branch/ subsidiary exporting	Equity investment /production	Service contract
Internal Factors(Home Country):					
Differentiated product	X		X		
Standard products				X	
Service- intensive products			X	X	
Service products		X		X	X
Technology intensive products		X			
Low product adaptation	X				
High product adaptation		X	X	X	
Limited resources	X	X			
Substantial resources			X	X	
Low commitment	X	X			X
High commitment			X	X	

Source: Franklin R. Root, Entry Strategies for international markets, 1998, p.16

Chapter-03
METHODOLOGY

There are a lot of method use for marketing research among those there are two main methods which resolve a research problem efficiently: quantitative and qualitative methods. The choice of method depends on the researcher and the research problem.

3.1 Qualitative Research

Qualitative research techniques are relatively un-structured measurement approaches that permit a range of possible responses (Kotler 2009, p.93). Qualitative research is a method of inquiry employed in many different academic disciplines, traditionally in the social sciences, but also in market research and further contexts. The qualitative method investigates the why and how of decision making, not just what, where, when. Hence, smaller but focused samples are more often needed than large samples. In the conventional view, qualitative methods produce information only on the particular cases studied, and any more general conclusions are only propositions (informed assertions). Qualitative research is also used in international market research to formulate and define a problem more clearly and to determine relevant questions to be examined in subsequent research. In this project, data and information were collected through qualitative method

3.2 Marketing Research Process

Marketing managers often commission formal marketing studies of specific problems and opportunities. They may request a market survey, a product-preference test, a sales forecast by region, or an advertising evaluation. He also stated that effective marketing research follows the six steps they are as follows:

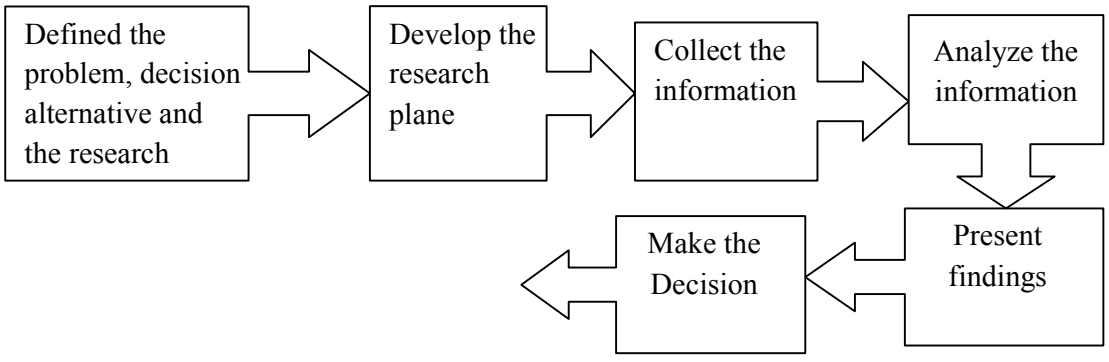


Figure 3.1: The market Research process
(Source: Philip Kotler, Marketing Management, 2000, p.103)

According to Philip Kotler (2009) "We define marketing research as follows: Marketing research is the systematic design, collection, analysis, and reporting of data and findings relevant to a specific marketing situation facing the company". The first step of marketing research is to define any problem or set research objective and question. The second stage of marketing research calls for developing the most efficient plan for gathering the needed information. It is a link between the collected empirical data, its research questions or objective and the conclusions generated by a study. Designing a research plan calls for decisions on the data sources, research approaches, research instruments, sampling plan, and contact methods . The data collection phase of marketing research is generally the most expensive and the most prone to error. The next-to-last step in the marketing research process is to extract findings from the collected data. As the last step, the researcher presents the findings to the relevant parties. The researcher should present major findings that are relevant to the major marketing decisions facing management. The researcher tabulates the data and develops frequency distributions. Depending on the findings managers decide to use it, discard it or carry out more research.

According to Kotler (2009) there are five main research approaches:

3.2.1 Observational research

Researcher can gather Fresh data by observing the relevant actors and settings, unobtrusively observing as they shop or they consume products (Kotler 2009, p.89).

3.2.2 Ethnographic Research

It is particular observational research approach that uses concepts and tools from anthropology and other social science discipline to provide deep understanding of how people live and work. The goal is too immense the researcher into consumer's lives to uncover unarticulated desires that might not surface in any other form of research. Ethnographic research is not limited just to consumer companies in developed markets. Ethnographic research can be particularly useful in developing market, especially far flung rural areas, where companies do not know consumers as well (Kotler 2009, p.90).

3.2.3 Focus-group research

A focus group is a gathering of six to ten people who are invited to spend a few hours with a skilled moderator to discuss a product, service, organization, or other marketing entity. The moderator needs to be objective, knowledgeable on the issue, and skilled in group dynamics. The meeting is typically held in pleasant surroundings and refreshments are

served .The moderator usually starts with a broad question and then helps the group move through various aspects of the entity being discussed, encouraging free and easy. The key role of the moderator is to keep the discussion focused on the relevant theme while allowing deep feelings and thoughts to emerge through the group dynamics. The discussion, recorded through note taking or on audiotape or videotape, is subsequently studied to understand consumer beliefs, attitudes, and behavior. Focus-group research is a useful exploratory step (Kotler 2009, p.90).

3.2.4 Survey research

Surveys are best suited for descriptive research. Companies undertake surveys to learn about people's knowledge, beliefs, preferences, and satisfaction, and to measure these magnitudes in the general population. It requires development of a survey instruments, usually a questionnaire which the respondents are asked to fill up (Kotler 2009, p.92)

3.2.5 Behavioral data

Customers leave traces of their purchasing behavior in store scanning data, catalog purchase records and customer databases. Much can be learned by analyzing this data. Customers' actual purchases reflect revealed preferences and often are more reliable than statements they offer to market researchers. People often report preferences for popular brands and yet the data show them actually buying other brands. For example, grocery shopping data show that high-income people do not necessarily buy the more expensive brands, contrary to what they might state in interviews; and many low-income people buy some expensive brands. (Kotler 2009, p.93)

3.2.6 Experimental research

The most scientifically valid research is experimental research. The purpose of experimental research is to capture cause-and-effect relationships by eliminating competing explanations of the observed findings. To the extent that the design and execution of the experiment eliminate alternative hypotheses that might explain the results, the research and marketing managers can have confidence in the conclusions. It calls for selecting matched groups of subjects; subjecting them to different treatments, controlling extraneous variables, and checking whether observed response differences are statistically significant. To the extent that extraneous factors are eliminated or controlled, the observed effects can be related to the variations in the treatments (Kotler 2009, p92).

3.3 Research Instruments

There are several instruments that can be used to carry out qualitative and quantitative methods. The most remarkable are discussed here:

3.3.1 Interviews

Personal interview is the most versatile method. The interviewer can ask questions and record additional observations (Kotler 2009, p97). It is also the most reliable research instrument in order to obtain information for this project. Furthermore, there is possibility to get new and unknown information that would be impossible to get through other sources such as books or annual reports. For this project a lot of interviews found that were conducted by various journalists from various news papers and published in national and international news papers and magazines. The information that was found from those news papers covered most of research question of this project and gave huge support.

3.3.2 Mail interview

The mail questionnaire is the best way to reach people who would not give personal interviews or whose responses might be biased or distorted by the interviewer.

3.3.3 Text and Documentary research

Journals, reports, videos and other research sources provide this documents and text. Documentary research also has some advantages and limitations in research. The main advantage is that there are many sources which one can use to obtain information. The documentary research can also provide different perspectives from a number of different people. However, this research tool has some limitations such as the data might be unreliable. In addition, relevant information for a specific company is often difficult to find. This project is based in these types of data collection method because it was considered that documentary sources could provide relevant information. This form of research offers a variety of means to obtain information such as journals, document files, reports, books and so on. In addition, documentary research enables to complement the scarce information available with any interviews.

3.3.4 Information sources on the Internet

At the present there are huge resources available on the internet for many types of investigations and research. Among the numerous available sources for research are catalogues of important libraries, databases, ejournals, newspapers and companies website. In addition, it is possible to read completed versions of textual materials in virtual libraries

and e-journals. To conduct this project a lot of information used that found from internet sources. Furthermore, the reliability of internet sources was always considered in this project.

3.4 Collection of Data

As qualitative methodology has applied and the chosen focus is in multi-cases. To find the objectives of this project the following data has been collected. This model depicts the research approach and this process flow was followed in this project.

3.4.1 Secondary Data

Phillip Kotler (2009) defined secondary data are data that was collected for other purposes and already exists somewhere. Researchers usually start their investigation by examining secondary data to see whether the problem can be partly or wholly solved without collecting costly primary data. Considering research conducting time it is impossible to take help from secondary data as primary data collections are time consuming and costly. It is also observed that some research questions can be answered only by secondary data but it cannot ignore the dearth of credence of those data because those may be collected for a different purpose and can be biased. Some reliable secondary data sources such as web page, magazine, report and hand books of Bangladesh Bureau Statistics (BBS), Bangladesh Power Development Board (BPDB), Bangladesh Petroleum Corporation (BPC), Eastern Refinery Limited (ERL), Bangladesh Energy Regulatory Commission (BERC), Board of investment Bangladesh (BOI), the current market players of LPG business. Few very reliable organizational and research based company web pages were also used. A lot of information has been collected from published online articles regarding Bangladesh LPG market and Internet version of Local news paper.

3.4.2 Primary Data

Primary data are data gathered for a specific purpose or for a specific research project. Researchers usually start their investigation by examining secondary data to see whether their problem can be partly or wholly solved without collecting costly primary data. When the needed data do not exist or are dated, inaccurate, incomplete, or unreliable, the researcher will have to collect primary data (Kotler 2009, p.89). There are both advantages and disadvantages to primary research. The advantages are 1).Addresses specific research issues as the researcher controls the search design to fit their needs 2). Great control; not only does primary research enable the marketer to focus on specific subjects; it also enables

the researcher to have a higher control over how the information is collected. Taking this into account, the researcher can decide on such requirements as size of project, time frame and goal.

Most of marketing research projects comprises of some primary-data collection similarly few primary data were collected for this project. After collection of all the secondary data, it seems that some primary information from the company and concern person would be beneficial to support the secondary data in order to reach a desirable result of the research.

3.5 Analysis information

To start business a company always tried to know where, what type the target market is and also the target country how suitable for them? For entry decision the competitive environment such as both country and market of the target country has to assess first. Depending on that assessment, in order to derive an entry mode decision further investigations have to conduct accounting all the controllable and uncontrollable factors. Considering this argument and on basis of literature review chapter theoretical framework has been developed and it is a combination of the following theories which are essential for the research and find out objectives.

Porter (1998) Five Forces

Porter's (1998) National Diamond Model

Franklin Root's (1998), Internal and External factors of entry mode.

The concept of international market was brought up by Porter's (1998) five forces which evaluate the market, how that market is going to behave like in terms of entry barriers, availability of substitute, competition and supplier threats. Porter's (1998) the national diamond model which is needed to explore new market as country's international competence. This is convenient to make familiar with the condition depending upon the entrants own home market and the new market which company is going to enter and the industry it will belong to and the surrounded industry which is important to know beforehand. Porter's (1998) idea has been proved to be an effective guidance for strategic managers over the world and till now popularity of this theory is increasing. The concept of evaluating the market by Porter (1998) is handy and results in with the information of the degree of suitability of the market. Again a challenge is faced by a company that entering a market which entry mode should be taken. The concept of entry modes and factors influencing the entry mode by Franklin R. Root (1998) has been used to classify the entry

mode and factors which can affect the company's choice of entry mode. This project described the prime focal of estimation and strategic planning for entering a market with an approach to grasp the market share from the existing holders and also the growing market. For effective and better result it has fundamentally evaluated the International market through Porter's (1998) Five Forces and home country situation by National Diamond Model, as well as evaluated all the influential factors that should be considered for entry mode decision making.

3.6 Findings

After collection of primary and secondary data all relevant findings have been compiled. Compilations of all empirical information are necessary because these are very suitable and inevitable to fulfill the objectives of this project. The mentioned theories has been analyzed and evaluated on basis of these findings. These findings were also used to draw conclusion and recommendation of this project. The attempt has to find the current market size and focus on exploring the market such as present players of market, supportive industries, possible alternative of LPG, existing alternative fuels of LPG and country's demand condition along with possibility to expand business for a foreign LPG company in a developing country like Bangladesh. This helps to find out other objectives of this project and expressed the competition, challenges, barrier to start business. Finally this project has explored the LPG market of Bangladesh and also tried to verify what advantage this market has to offer to the multinationals companies in return of investing in the country.

3.7 Result and Conclusion

The analysis was based on the result of empirical information collected accordingly and a consolidated evaluation of relevant theory. All the collected information has been observed and analyzed according to the theory to find out the objectives. It was mentioned before that qualitative research method was conducted and these data helps to take decision and also to draw the conclusion. The recommendation was made based on the conclusion which also includes some further research direction.

Chapter-04

LPG MARKET IN BANGLADESH

Market potential is defined as "The maximum demand response possible for a given group of customers within a well defined geographic area for a given product or service over a specified period of time under well defined competitive environmental conditions". To find out the potentiality of LPG market it is very important to analyze the present situation of energy sector and social condition. The strength of LPG as fuel has been found by analyzing the possible alternating fuel and trend of fuel uses. To introduce LPG business it is also important to know source and supply chain of LPG, the strength and limitation of existing companies, rules regulations of LPG business and possible incentives or facilities. Sustainability of LPG business depends on demand trend, growth of market size, fuel switching tendency. In this chapter overall opportunity of LPG as fuel and business market has been described briefly.

4.1 Current Situation of Energy Sector

At present, Bangladesh has been utilizing energy supply from both renewable and nonrenewable sources. Nonrenewable energy comprises of natural gas, petroleum oil, coal, coal like substance. Renewable energy comprises of biomass, biogas, solar, hydro, wind power, wave energy. Moreover, the use of renewable energy has become popular worldwide in view of depleting reserve of non-renewable fossil fuel and these energies are also environment-friendly but uses of such kind of energies are limited in old traditional way.

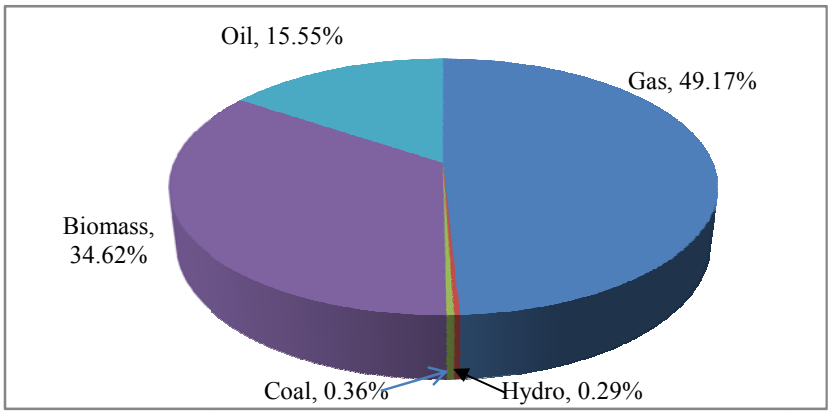


Figure 4.1: Energy Consumption Pattern by Source in 2004-05
(Source: Ministry of Power, Energy and Mineral Resources)

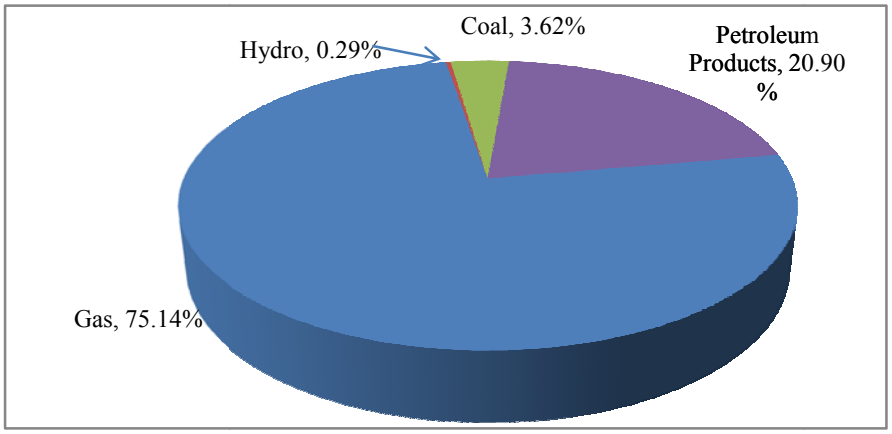


Figure 4.2: Share of Commercial Energy, 2005-06
(Source: Ministry of Power, Energy and Mineral Resources)

A brief description of various energy sources those are considerable as competitor of LPG and their present condition, amount, uses, future prospects are given below

4.1.1 Biomass Energy

Bio-Mass energy has been considered as the life line of the Bangladesh economy where about 80% people living in the rural area are fully depended on the bio-mass energy. Agricultural crops like paddy, jute, sugar cane generates large quantities of residues such as rice straw, husk and bran from rice plant, tails, roots and baggage of sugarcane, straw of wheat, jute stick. Such residues are important source of energy both for domestic and industrial purposes and for all kinds of economic activities. Other sources of biomass in the country are farm-animal waste, poultry droppings produced by the national herds and fuel wood from existing forests, tree residues such as twigs, leaves and saw dust from the forest-based industries. These three sources of biomass shares in energy supply are approximately 45, 20 and 35 per cent respectively (Huda, N. and Roy, M.K., 2000). The rural people are accustomed to use country sites the tree branches and the plants of different kind bushes and jungles for their cooking of food, heating of paddy for producing rice, processing of daily necessities e.g. household cooking and lighting . Energy demand for space heating is very limited and is usually in a limited number of households in northern districts and hill areas during winter months. In addition a large quantity of energy has been used in rural households seasonally for processing agricultural crops (e.g. parboiling of paddy, evaporation of date palm juice to make gur etc). According to BBS (2002) the total amount of biomass fuel consumed in the country was 56.38 million ton during the year 2001-2002.

The household sector consumed of 44.1 million tons (about 79% of total biomass consumption) of biomass in 2000 .A study conducted by Miah et al. (2009) shows that 4.24 tons of fuel wood is consumed per family per year in Bangladesh. The industrial sector biomass consumption was around 11.09 million tons per annum in 2000 and comprises around 18.5 % of the total biomass fuel consumption. The commercial sector biomass consumption was around 2.5 million tons per annum in 2000 and comprises around 3 % of the total biomass fuel consumption.

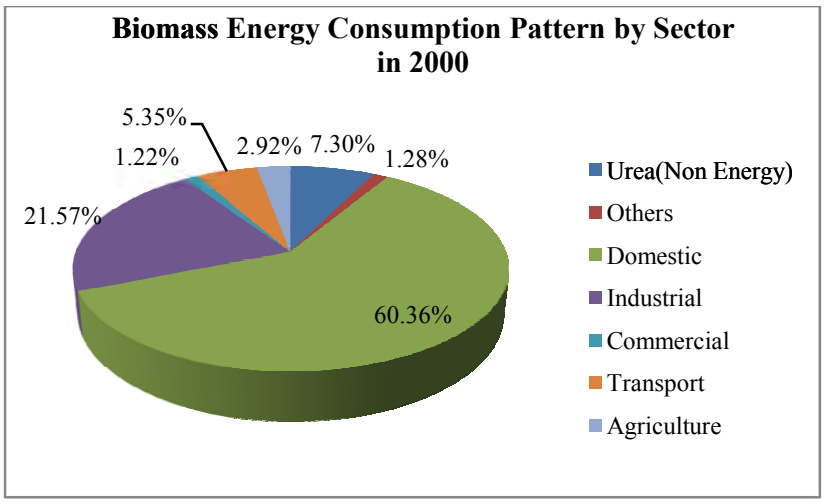


Figure 4.3: Biomass Energy Consumption Pattern by Sector in 2000
(Source: Miah, M. D., Al Rashid, H., and Shin, M. Y., 2009, Wood fuel use in the traditional cooking stoves in the rural floodplain areas of Bangladesh)

4.1.1.1 Overall Biomass Supply

The Bangladesh Bureau of Statistics (BBS) published figures on estimates of the energy supplied by traditional fuel table 4.1.

Table 4.1: Energy Supplied by traditional fuel

Year	Biomass in million ton								
	Cow Dung	Jute stick	Rice straw	Rice hulls	Bagasse	Firewood	Twigs,	Leaves	Others Total
1995-96	7.8	1.5	18.75	18.7	1.3	2.2	2.5	2.6	55.35
1996-97	8.0	1.8	18.95	19.9	1.4	2.3	2.5	2.6	57.45
1997-98	7.7	2.1	15.18	14.9	1.4	2.2	2.5	2.6	48.58
1998-99	7.9	1.9	16.12	15.2	1.2	2.1	2.4	2.5	49.32
1999-00	8.1	2.1	18.04	15.38	1.2	2.2	2.5	2.7	52.22
2000-01	4.8	2.2	18.76	16.0	1.3	2.2	2.6	2.8	54.26
2001-02	4.9	2.3	19.49	16.6	1.4	2.3	2.7	2.9	56.38

Source: Bangladesh Bureau of Statistics, 2002

In Bangladesh, natural gas has been supplied at household level only to main divisional cities like Dhaka, Chittagong, Sylhet, Khulna etc for this reason vast majority of the population has to depend mainly on traditional biomass fuel. However, Bio- mass energy has not yet developed as commercial energy, although fuel wood and the fuel sticks including bamboo and jute sticks are abundantly sold in the market. The requirement of Bio-mass is still high and scarcities of biomass are acute in some areas of the country. Crops production has increased in recent year as a result crops residue also increased. Due to high price of animal cattle, shortage of green field the number of farm animal is decreasing in an alarming rate so there is also scarcity of animal waste and those wastes are being used in lands, fields as fertilizer for cultivation.

4.1.1.2 Present condition of Forest

Forests under the management of the Forest Department (FD) are generally grouped into three categories namely Mangroves, Hill Forests and Plain Land (Sal). Most of forestlands (about 2.52 Mha) are owned by the government, of which 1.52 Mha are under the management of the FD among this about 761,924 hectares land is mostly in Chittagong hill tracts designated as USF and tree growth in 15.4 million homesteads and the rest is under the management of the Ministry of Land through Deputy Commissioners. Conservation of biological diversity is reportedly one of the forest management objectives (primary and secondary) for more than 25 per cent of the forest area (FAO, 2005). The National Biodiversity Mode & Action Plan for Bangladesh (October 2006) has pointed out that the forest cover has come down to 6% from 10% of the area of the country. According to UNDP between the year 2006 and 2009 it was only 6.7 to 10 per cent. Forest area is reducing primarily due to increasing deforestation. Depletion of forests is an ongoing process. The Millennium Ecosystem assessment (2005) and the Global Environmental Outlook 3 (UNEP 2002) have also highlighted the alarming rate of deforestation. Annual forest loss in Bangladesh is estimated about 0.015 Mha. The BFRI published data regarding forests on regular intervals. The volume of forest areas in the year 2000 are given in Table 4.2. This table indicates that there was 16.7% of the area of Bangladesh under forest coverage. Table 4.3 shows the decrease of forest over the years. It is a matter of anxiety that during the last 30 years, 35% – 45% of the forest area has been encroached for different purposes like housing, agriculture, roads, industries and biomass fuel. Day by day the deforestation rate is increasing in an alarming rate and forestations is fail to keep pace with this ruining rate of forest. Sundarban the largest mangrove forest in the world is now in

threat for its existence. The size of this forest is becoming smaller and its biodiversity is losing continuously.

Table 4.2: Forest Area of Bangladesh in 2000

Hill Forest	Coastal Forest	Plain Forest	Sundarban	Village Forest	Total
9%	1.3%	1.2%	3.5%	1.5%	16.7%

Source: Bangladesh Forest Research Institute, 2000

Table 4.3: Decrease in Forest Area

Annual Deforestation Rate	3% -4%
Timber production decrease (1985-96)	11.15%
Decrease in firewood production	1.2%
Forest Encroachment since 1971	35%-45%

Source: Bangladesh Forest Research Institute, 2000

Forest and biomass fuel are proportionately related with each other. The meaning of decrease of forest will be result of decrease in the supply of biomass fuel in the long run. Table 4.4 shows few selected biomass products from the forest. It shows the shrinkage of fuel wood supply over the years 1990 – 1995. It is to note that also timber, golpata and bamboo are used as fuel after being used as construction material, furniture, etc. Besides forest, the homestead trees supply a significant amount of fuel wood. In fact, most of the fuel wood consumed by the rural households is supplied by the home and road side trees. Moreover this source of fuel mainly consists of twigs and leaves. The trunks are used as timber or as fuel in the urban and suburban areas to industries.

Table 4.4: Selected Forest Products

Year	Timber (thousand cft)	Firewood (thousand cft)	Golpata (thousand ton)	Bamboo (million)
1990-91	8419	38241	72	84.24
1991-92	6600	13000	72	80.00
1992-93	8122	6663	67	119.20
1993-94	6766	9481	68	90.46
1994-95	6065	5718	62	73.25

Source: Bangladesh Bureau of Statistics, 2002

Due to population explosion the available homestead area per household is decreasing resulting in smaller number of trees per household. Due to new housing and over dependency on biomass the number of homestead trees, area of bush, jungle are reducing rapidly. This indicates that the available amount of fuel wood per household is becoming smaller. According to the FD 65% of total forest products are consumed as fuel wood. In

future there are limited prospects of increasing the supply of Bio-mass fuels. It is studies that the trend for firewood use is always depending on the availability of substitutes and competitive prices. Since the use of firewood in brick kilns has been banned by law, with stricter implementation of these rules the use of firewood will decline further and others modern fuel can take this place. Charcoal is becoming popular in urban an area which in turn is expected in future it will create a demand for quality charcoal. The use of LPG is becoming popular and increased in a rapidly especially in urban and areas.

4.1.2 Present Reserve, Consumption and Demand of Natural Gas:

It has been considered as one of the driving forces of the economy of our country. Main Source of primary energy is natural gas, according to Petrobangla (2010) 75 percent of commercial energy is provided from gas. Till now 23 gas fields have been discovered since 1955 when the first gas field was found in Haripur, Sylhet. The total estimated Gas in initial place (GIIP) is 28.8567 TCF out of which estimated recoverable gas reserve is 15.037 TCF. According to Petrobangla upto June 2010 as much as 8.548 TCF has been produced and leaving only 6.489 TCF of recoverable gas. There is estimation of 5.471 TCF gas under probable and 7.691 TCF gas in possible category in the 23 gas fields. Currently 17 gas fields are in operation and 79 are on stream out of 100 wells.

Table 4.5: The reserve and production of Natural gas up to 2010

Total number of gas fields	23
Number of gas fields which are in production	17 (number of wells-79)
Total reserve of extractable gas (proven and probable)	20.5 TCF
Total consumption of gas up to April 2010	8.5 TCF
Total reserve remaining (proven and probable)	12 TCF
Daily gas exploration	about 2000 MMCF
Production by Petrobangla	960 MMCF
Production by International Oil Companies(IOC)	1004 MMCF
Daily demand of gas	2500+ MMCF
Daily shortage of gas supply	500+ MMCF
Gas production increased from January 2009 to January 2010	208 MMCF

Source: Petrobangla, Annual Report, 2010

Against the average annual demand of 912 BCF (Billion Cubic Feet) at present only 730 BCF gas is being supplied from 79 wells of the existing 17 gas fields. As a result, there is a shortage of 182 BCF of gas annually. Table 4.6 shows a projection has been done for sector wise annual demand of gas from 2009 to 2015 considering the average rate of consumption

of gas in the country based on the last 17 years and in line with Vision of 2021 in which the target of production of 11500 MW new electricity by 2015.

Table 4.6: A Consecutive Estimates of Sector wise Demand of Gas (BCF)

Sector	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Power	278.2	300.5	324.5	50.5	378.5	415.8
Captive Power	120.9	142.6	164.0	188.6	216.9	238.6
Fertilizer	94.0	94.0	94.0	94.0	94.0	94.0
Industry	133.9	160.7	184.8	214.4	246.5	271.1
Household	88.9	99.5	111.4	124.8	139.8	153.8
CNG	37.2	44.7	51.4	56.5	113.0	124.3
Others	30.0	30.8	31.9	32.7	33.7	37.4
Total	783.1	872.8	962.0	1061.5	1222.4	1335.0

Source: Power and Energy Sector Road Map, 2010

According to the projections of Power and Energy Sector Road Map (2010) in the year 2014-15 total annual demand for gas will reach 1335 BCF. On the basis of the projected demand if the present supply of 2.0 BCF per day remains unchanged then daily shortage may stand at 1.66 BCF. Hence, it is not possible to meet this shortage with the existing reserves. The existing natural gas is mainly used in electricity, fertilizer, industry, housing sectors and transport (CNG). At present, about 37% of production of natural gas is used as fuel for electricity, 11% is distributed for fertilizer production, 10% household use, 5% CNG and the rest 37% is distributed to other purposes.

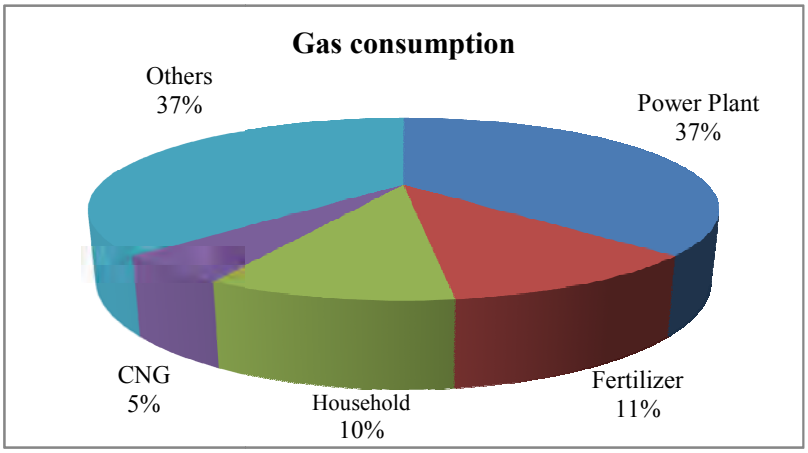


Figure 4.4: Gas Consumption by various sectors (2010)
(Source: Petrobangla, Annual Report, 2010)

Gas is most popular in domestic's purposes because of smoke free characteristics, easy to use without hazard and its flat rate. Now these flat rates are TK.400 for single burner stove and TK.450 for two burner stove per month. Gas consumption increased mainly because of

the increased consumption by the power sector due to installation of large gas fired power plants and generator based captive power were commissioned during 2000-03. There had been a rapid increase in gas consumption by industry because of many industries have switched from electricity and liquid fuel to gas due to take benefit of the low price gas. Many new large industries such as steel and rod, glass, small and medium industries have been installed and all industries are in production. The introduction of CNG as a substitute for liquid fuel in 2000-2001 resulted in substantial increase in gas consumption. Gas consumption in the domestic sector also substantially increased due to the increased number of household's connection to the gas distribution network. It is remarkable that there is strong evidence of misuse and loses of gas due to unconsciousness or intentionally by industries and domestic user. According to Petrobangla (2010) production has been increased by over 70% from 2001 to 2008 but this country is currently facing acute gas shortage. Due to shortage of natural gas, new connection of gas has been restricted, CNG stations are remain closed for six hours daily and gas rationing has started in textile sector. The situation is having a serious impact on the economic development. At the present consumption rate and taking into account of 10% growth rate of gas consumption, remaining recoverable gas would be sufficient for the rest 9 years (from 2011 to 2019). In this situation the present salient features of the natural gas discovery of new reserve of natural gas is time worthy. Now government has decided to import Liquefied Natural Gas (LNG) to mitigate the gas crisis. Already international tender is invited to build the infrastructure of two terminals of 500 MMCFD and to receive the imported liquid gas from the ship.

Table 4.7: Perspective plan for local production of natural gas and import LNG

Year	Local production (MMCFD)	LNG import (MMCFD)	Total daily production (MMCFD)
December 2010	2161	0	2161
2012	2946	500	3446
2013	3446	500	3946
2015	3826	500	4326

Source: Power and Energy Sector Road Map, 2010

4.1.3 Power Generation Distribution & Consumption

Power Division under Ministry of Power, Energy and Mineral Resources is responsible for formulating policy relating to power and supervise, control and monitor the developmental

activities in the power sector of the country. Power Cell has been created by the government under Power Division for Implementation of Bangladesh power sector reform. To implement its mandate the Power Division is supported by a number of organizations, related with generation by BPDP, EGCB, RPCL, IPP, NWZPCL, APSCL, transmission by PGCL and distribution by BPDB, DESCO, DPDC, WZPDCL, REB, SZPDC, PBS etc.

4.1.3.1 Generation and Statistics

Total installed capacity of power generation is 8931 MW and present capacity is 8351 MW. Public sector contributes the major portion of the Electricity generation (BPDB, July 2012). Bangladesh Power Development Board (BPDB) with its generation subsidies contributes 55% of the total electricity generation while, private sector constitutes of Independent Power Producer (IPP), small independent power projects (SIPP) and Rental Power Plants (RPP) contributes the rest 45%. The cost of electricity up to consumer point is around Taka 5.50 per KWHr. Present electricity generation is average 5000 MW against an average demand of 6500 MW creating a shortfall of about 1500 MW (BPDB 2012). This wide gap between production and demand is mainly due to gas shortage and this shortage seriously hurting the power sector. According to BPDB about 700-800MW of additional power could be produced if adequate gas is supplied. The average plant factor (an indicator of the utilization of generation plants) for most of the power plants is around 45% (the industry standard is around 65%-75%) indicating high level of non-availability and outage of generation plants. The salient feature of the present situation of the power sector is as follows:

Table 4.8: Power Generation Statistics (Updated up to July 2012)

Installed Capacity (MW)	8931
Derated Capacity (MW)	8315
Production (MW)	4000-5000(5000 average)
Maximum demand (MW)	6600(Forecasted)
Maximum Generation (MW)	6350(Highest in 2012)
Access to Electricity (Population)	47%

Source: Bangladesh Power Development Board, 2012

Most of large power plants installed are dependent on natural gas. In the east zone indigenous energy sources such as natural gas, hydro are used for the generation of electricity. There is only one hydropower plant situated in Kaptai Chittagong and installed capacity of 230 MW. Researchers are going on to build mini hydro project in eastern zone of the country. Due to high demand and rapid growth rate of electricity demand imported

petroleum fuels furnace oil (HFO) and diesel (HSD) fired based power plants are being installed as IPP, rental, quick rental basis mainly in those areas where natural gas supply is not available of such as West Zone. In the year 2012 fuel mix of power generation was as follows: hydro (2.6%), natural gas (67.11%), Diesel (6.15%) and Furnace Oil (21.70%). In order to minimize the effect of fuel cost on power generation, power that generated in the east zone is transferred to the west zone via East West Electrical Inter-Connector. Gas is already available at Baghabari - Seraganj in the west zone through Bangabandhu bridge (Jamua Bridge) and there is also plan to extend gas network all over the west zone. Gas power plants have been planned to be built gradually in the west zone for regional generation balance. Now government fully decided to supply natural gas only in power plant to increase generation of electricity besides a large amount of imported petroleum oil is being used for electricity generation.

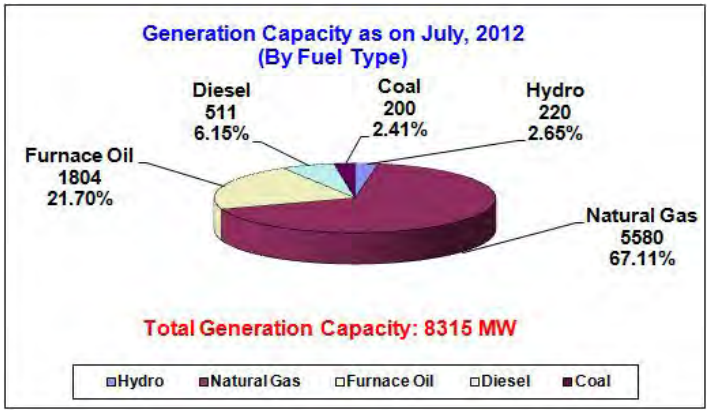


Figure 4.5: Generation Capacity (By fuel type)
(Source: Bangladesh Power Development Board, 2012)

The consumption of electricity in the year 2009 in different end-user categories were as follows: domestic (9.38%), small industries 1.83%, small commercial (2.39%), large industry (7.07%), agriculture (0.58%), REB (37.73%), DPDC (22.76%),DESCO(11.46%), WZPDCL(6.23%) and others (0.58%). During the period from 1982 to 2001 the share of domestic consumption of electricity has increased from 15.3% to 41%, whereas the productive use (commercial, industrial, agriculture) has decreased from 77.3% to 59%. Although over 67.11% of power generation is gas based and thermal efficiency remained around 32%. In 2001-2002, Bangladesh was successful in attracting two large IPP (360 MW Haripur and 450 MW Meghnaghat) using efficient combined cycle gas turbine technologies. Initiatives have been taken by the government to ensure public as well as government

patronized private investments and foreign direct investments. Government plans to invest about 1(one) billion US$ in the public sector and expects about 8 (eight) billion US$ investment from the private sector. After announcement of Power and Energy Sector Road Map in June, 2010, government could finalize establishment of new 33 power plants of total capacity of 3390 MW (base load- 1390 MW, peaking plant- 650 MW and rental- 1350 MW). This development is quite encouraging to address the challenges of this sector. To improve the present electricity crisis, initiatives have taken for importing electricity from South Asian countries under South Asian Regional Economic Cooperation. A project styled "Grid Interconnection between Bangladesh (Bheramara) and India (Baharampur) Project" has recently been approved with a transmission capacity of 250-500 MW Power. BPDB has taken a massive capacity expansion plan to add about 12000 MW Generation capacities in next 5 years and about 25000 MW by 2021 with the aim to provide quality and reliable electricity to all the people of country for desired economic and social development.

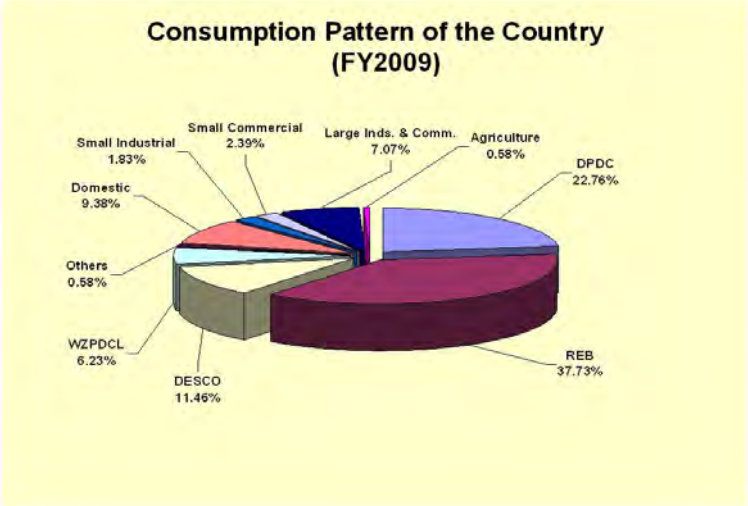


Figure 4.6: Consumption Pattern (2009)
(Source: Bangladesh Power Development Board, 2012)

Table 4.9 shows power generation project from 2012 to 2016 and he power generation has been expanded to keep pace with the fast growing demand.

Table 4.9: Power Generation Project from 2012 to 2016

Calendar year	2012(MW)	2013(MW)	2014(MW)	2015(MW)	2016(MW)	Total(MW)
Public	632	1467	1660	1410	750	5919
Private	1354	1872	1637	772	1600	7235
Total	1986	3339	3297	2182	2350	13154

Source: Bangladesh Power Development Board, 2012

4.1.3.2 Transmission

Power Grid Company of Bangladesh, one of the subsidiaries of BPDB, has the sole responsibility to build up the national electricity grid for the uninterrupted transportation of electricity in a safe, reliable and economical way. As on 2012, the company had length in Route kilometers 1324.4, length in Ckt. Kilometers 2647.3km of 230 kV and length in Route kilometers 3463.06 km, Length in Ckt. kilometers 6077.44 km of 132 kV transmission line (PGCB 2012).

4.1.3.3 Distribution

Bangladesh Power Development Board (BPDB) is the distributor of electricity in most of the areas in Bangladesh except Dhaka Metropolitan City and its adjoining areas under Dhaka Power Distribution Company Limited (DPDC) and Dhaka Electric Supply Company DESCO, few areas under West Zone Power Distribution Company Limited (WZPDCL) and some of the rural areas under Rural Electrification Board (REB). At present only 47 of the population is served with electricity and per capita electricity consumption is only 156Kwh (FY -2009). Presently BPDB's distribution network is comprising of 33 KV, 11 kV and 11/0.4 KV lines. Total distribution line in the country is about 2,09,932 km of which 29,176 km belongs to BPDB and total number of consumer of different category is about 24,32,055 at the end of FY 2011. The main grid and distribution line covers all most all the important area of this country.

4.1.3.4 Rural electrification Program

Rural Electrification Board (REB) is responsible for distribution of electricity in rural areas through a system of co-operatives known as Palli Biddyut Samities (PBS).REB has sponsored the foundation of 70 PBSs connecting nearly 9.12 million electric services, 48,682 villages by expanding 22,780 kilometers distribution lines for distributing electricity representing slightly over 45% of the rural population of Bangladesh.

4.1.4 Coal: Reserve and Usage of Coal Prospects

There are five fields have discovered containing high quality bituminous coal at Khalashpur of Rangpur, at Boropukuria, Fhulbaria, Dighipara of Dinajpur and at Jamalganj of Bogra in the north-western zone of the country (MPEMR 2010) . The total reserves of these fields have been estimated to be around 2800 million tons which may have heat generation capacity equivalent to 37 TCF of natural gas approximately (Power and Energy sector Road Map, June 2010). Among the 5 coal mines, so far only one coal field

Boropukuria coal mine in Dinajpur has started commercial production by using underground mining method from September, 2005 with the annual target of one million ton per year of coal extraction and Barapukuria Coal Mining Company Limited (BCMCL) is operating there. Based on the supply of the extracted coal of Boropukuria a 250 MW power plant has been running and connected to the National Grid. About 0.7 million MT of coal extracted from Boropukuria coal mine is being used daily in this power plant. Government has already undertaken power projects, four larger scale plants with capacity of 500-700MW each is planned to be set up at Meghnaghat, Zajra, Khulna and Chittagong. With aggregate capacity of 2000-2600 MW this coal based plants will require US$ 4 billion investment and around 6 million tons coal annually. Asia Energy Corporation (Bangladesh) Proprietary Limited is developing Phulbari Coal Field. Other than these two, majority of Jamalganj and Khalaspir resources are in too deep to be recover.

Discover of coal mine has brought diversification the sources of energy and created ample opportunity for our country. By establishing power plant based on coal and using it in the industries as a source of energy it can ensure the proper use of extracted coal. It is notable that the coal of Bangladesh is considered to be high quality due to its high level of hit generation capacity. Although there is a good reserve of coal in the country, there exists difference of opinion about the mining (extraction) method and the technological security. Government is now in the process of quick finalization of coal policy. If initiatives are taken for exploration all over the country, there are enough possibilities to discover more coal mines. The coal reserves of existing 5 coal mines are shown in the table 4.10 below:

Table 4.10: Coal Reserves of Five Coal Mines

Sl.	Exploration Year of location	Depth (Meter)	Magnitude of mine area (Sq. km.)	Actual Reserve (Million Ton)
1	Boropukuria, Dinajpur (1985)	119-506	6.88	390
2	Khalashpur , Rangpur (1995)	257-483	12.0	143 (GSB)33, 685 (Hosaf)
3	Fhulbaria, Dinajpur (1997)	150-240	30.0	572
4	Jamalganj, Bogura (1965)	900-100	16.0	1050
5	Dighipara, Dinajpur(1995)*	327	Not Available	200 (Partial Evaluation)

Source: Energy and Mineral Resources Division, 2010

4.1.5 Peat Prospects

Deposits of peat occur at shallow depths in different low-lying areas of Bangladesh. According to Geological Survey of Bangladesh, the reserve of dry peat is about 170 million

tons. The major deposits are in greater districts of Faridpur (150 million tons), Khulna (8 million tons) and Sylhet (13 million tons) (MPEMR 2010). Peat requires drying before making briquettes for use as fuel. Petrobangla implemented a pilot project for extraction of peat and making briquettes but the result were discouraging and economically not viable at present. This scenario may however change in future.

4.1.6 Renewable Energy

Renewable energy such as biomass, solar power and wind power are very familiar and being used since long time in our country. Renewable energy in the form of traditional biomass is the main source of primary energy in the country comprising of more than 60% of total primary energy use. Throughout the country especially in rural and semi urban area biomass is used for cooking and solar power and wind for drying of different grains as well as clothes, irrigation for cultivation are well known and common to all. However, this country has still lagging far behind in the scientific and improved use of such energy. At present, the different categories of renewable energy that are being used in limited ways in our country. The major sources of renewable energy are as follows:

- Hydro-electricity Tidal ,Wave
- Solar power generation using solar rays
- Wind-mill power generation using wind power
- Production of bio-gas using waste

4.1.6.1 Hydropower and Mini-Hydro

Bangladesh is a country flat and low land. There are some hilly regions in the north and northwestern part of the country. Due to only small hilly area in Chittagong hill tracts and Sylhet the scope of hydropower generation is very limited in Bangladesh. The only hydro power station of the country is located in Kaptai, across the river Karnafuly named Karnafuly Hydro Power Station installed in 1960s present generating capacity of 230 MW by 7 units installed in 1960s (Islam 2002) . Because of shortage of water, lack of proper maintenance and being old the capacity of plant reducing and running at lower Capacity. Several studies have been done and found some micro hydro potential sites in high stream rivers which ranges from 10 kW to 5 MW. Studies say that this power may available for 6 month, June to October. However, no appreciable micro hydro project has been installed yet. The main reasons why hydropower has not been developed in a country so rich on

water resources are lack of difference in altitude as well as high density population and great controversy of regulating the rivers. Bangladesh is not ready to carry the required high installation cost of hydro power plant and under challenges of destroying biodiversity along with losing living place of people**.**

4.1.6.2 Tidal Energy

The tides at Chittagong, south east of Bangladesh are predominantly semidiurnal with a large variation in range corresponding to the seasons, the maximum occurring during the south-west monsoon. A strong diurnal influence on the tides results in the day time tides being smaller than the night time. A study was conducted to access the possibility of tidal energy in the coastal region of Bangladesh, especially at Cox's Bazar and at the islands of Moheshkhali and Kutubdia (Islam 2002). The average tidal range was found to be within 4-5 meter and the amplitude of the spring tide exceeds even 6 meter. From different calculation it is anticipated that there are a number of suitable sites at Cox's Bazar, Moheshkhali, Kutubdia and other places, where a permanent basin with pumping arrangements might be constructed which would be a double operation scheme. Tidal energy might be a good alternative source for Kutubdia Island where about 500 KW power could be obtained. At present there are only 2x73 KVA diesel generator sets to supply electricity for 5-6 hours/day for 72,000 people and there is practically no possibility of main grid supply in the future (BPDB 2012).

4.1.6.3 Wave Energy

Still no attempt has been made by Government of Bangladesh to assess the prospects for harnessing energy from sea waves in the Bay of Bengal. Waves are generally prominent and show a distinct relation with the wind. Waves generated in the Bay of Bengal and a result of the south-western wind is significant. Wave heights have been recorded by a wave rider buoy and correlated with wind data. Maximum wave heights of over 2 m, with an absolute maximum of 2.4 m, on the 29 July were recorded. The wave period varies between 3 to 4 sec for waves of about 0.5 m, and about 6 sec for waves of 2 m (Islam 2002).

4.1.6.4 River Current

A network of rivers, canals, streams etc. numbering about 230 with a total length of 24140 km covers the whole of Bangladesh flowing down to the Bay of Bengal (Islam 2002). Different sizes of boats are the main carriers of people and goods for one place to another.

Boatmen usually use the water-sails to run their boasts against the wind direction. However, until now no research has been reported to utilize the energy of river current properly**.**

4.1.6.5 Solar Energy

Solar heat has been used in varieties of way such as drying of washed clothes, food-grains, fish, vegetable, raw jute, etc and for salt production processing of saline water by evaporation. The long-term average sunshine data indicates that the period of bright (i.e. more than 200 watts/sq.m intensity) sunshine hours in the coastal region of this country vary from 3 to 11 hours daily (Mondal et.al, 2005). The global radiation varies from 3.8 kwh/sq.m/day to 6.4 kwh/sq.m/day (Huque, S. and Mazumder, R. K., 2006). These data indicate that there are good prospects for solar thermal and photovoltaic application in Bangladesh. With good solar resource available in the country throughout the year, there is a good potential for PV in un-electrified villages. In this way solar technology can be extremely beneficial for remote areas of Bangladesh. Under the supervision of REB a total of 14,408 home solar systems have been installed in the areas out of the reach of the national grid. Till April, 2011 IDCOL has installed solar power systems with a capacity to generate 45 MW of electricity in more than 0.9 million households and business enterprises. The company has planned to install 2.5 million solar power systems with a capacity to produce 125 MW of electricity by 2014. Solar panels have already been installed in various public and private organizations including solar panel having capacity of 21.2 kilowatt in the Prime Minister's Office. Steps have been taken to set up 10-15 MW solar energy based power stations at 4 different places in the country (BPDB). The government has now given emphasis on installing solar panels on public and private buildings and exploring more opportunity to harness renewable energy. But due to high installation and maintenance cost people are far behind to take the advantages and growth of solar panel uses is slower.

4.1.6.6 Wind Energy

Statistics show that long term wind flow of Bangladesh specifically in islands and the southern coastal belt of the country indicate that the average wind speed remains between 3 to 4.5 m/s for the months of March to September and 1.7 to 2.3 m/s for remaining period of the year (LGED 1998). But during the summer and monsoon seasons, (March to October) there can be very low-pressure areas and storm wind speeds of 200 to 300 kmph can be expected (LGED 1998). Local knowledge of wind resources appears to indicate the potential for wind energy use in the coastal areas of Bangladesh for both grid applications

and for isolated village electrification. A study conducted by Bangladesh Centre for Advanced Studies (BCAS), in collaboration with Local Government and Engineering Department (LGED) and Energy Technology & Services Unit (ETSU), UK which was financially supported by the British Government shows that there is a good opportunity in island and coastal areas for the application of wind mills for pumping and electricity generation. Bangladesh is strongly influenced by the southwest monsoon winds that blow from about March to October. These winds are further strengthened as they pass through the V-shaped coastline of Bangladesh. Wind speeds are expected to be high enough for economic grid power generation to feed the main grid or for isolated grids in wind-diesel hybrid configurations. Good quality wind date for one year is now available for Patenga, Chittagong a potential wind farm site, where in 1995 wind speeds ranged from 4.2 to 8.1 m/s and averaged 6.5 m/s at 20 m. Winds are strongest from March to October, which exceed 5 m/s at 20 m for over 6000 hours per year (NEP 2004). There is wind potential at Patenga along is reportedly about 100 MW. Preliminary estimate of net output form a 500 KW wind turbine with a 40 m hub height is 1200 MWh/year at Patenga which seems to be feasible. There are a number of windy locations along the coast line where land is available and where there is grid and road access. Steps are taken to establishing a wind-mill run power plant of 100 MW (off-shore) capacities in Anowara of Chittagong. Two wind powered power plants with 1 MW capacity each have been built to supply electricity to coastal belts of Kutubdia and Feni (BPDB).

Table 4.11: Utilization of Wind Energies in Bangladesh

Organization	Type of Application	Installed Capacity (Watt)	Location	Present Status
Grameen Shakti	3 Hybrid	4,500	Grameen Offices in the Coastal Region	Functioning
	Hybrid	7200	Cyclone Shelter in the Coastal Region	Functioning
BRAC	Stand alone	900	Coastal Region	Functioning
	Hybrid	4320	Coastal Region	Functioning
Bangladesh Army	Stand-alone	400	Chittagong Hill Tracts	Functioning
IFRD	Stand alone	1100	Teknaf	Functioning
	Stand alone	600	Meghnaghat	Functioning
LGED	Wind-PV Hybrid	400	Kuakata	Functioning
Total		19720		Functioning

Source: Islam, M., (2002), Renewable Energy Prospects & Trends in Bangladesh

4.1.6.7 Bio-gas and Bio-electricity

Biogas is the most prominent renewal energy resource in Bangladesh. Because of availability of the raw material for biogas it seems very suitable country beside these raw materials are cheap. Hazardous materials such as poultry liter, cow dung, human excreta which pollutes environment, spread bad smell and diseases are the raw materials for biogas plants. Among all the renewable sources of energy, only biogas has drawn Government attention and a systematic development has been carried out in this sector. By establishing biogas plants electricity can be generated. First biogas plant was installed in Bangladesh in the year 1972 for an experimental basis (BCSIR). Now many organizations are involved in installing biogas plants throughout the country. Up to 2005 only 23,784 biogas plants were installed by Government, NGO's and research organizations. Currently IDCOL is implementing national domestic biogas and manure program (NEP 2004). Since 2006 IDCOL has started biogas program and it has already installed more than 20,000 domestic biogas plants are producing gas, which is being used for cooking purposes in the rural areas. According to IDCOL, it is possible to install 3 million domestic biogas plants and fixed the target to install an additional 1, 50,000 bio-gas plants by 2016 under the National Household Bio-gas and Fertilizer Program. GTZ is also providing technical and financial assistant to its partner organizations to install commercial and institutional biogas plants. Up to May 2010 GTZ implemented 1250 commercial and institutional biogas plants. There is ample scope for Bangladesh to produce 400 MW of power from the husks of paddy only. IDCOL has taken up several projects in order to make this technology popular. Currently there are 215,000 poultry farms and 15,000 cattle farms. Moreover, steps have been taken to produce bio-gas and bio-electricity on commercial basis in the poultry and dairy firms. Extension Department and non-governmental officers were trained up in BCSIR campus to help the implementation of the program. A project of LGED is also in progress for 10,000 plants of which 2,000 plants are community based. At present government has sanctioned a subsidy of Taka 5000 for a family type biogas plant. The matter of anxiety for this biogas is that raw material are reducing due to decreasing number of domestic animals and people prefer using these waste raw material direct burning for cooking purpose. A major portion of this waste is being used in land as fertilizer so there is always a shortage for raw materials. There is also a superstition and religious barrier to take biogas as easily for cooking purpose.

4.1.6.8 Waste to Electrical Energy

Capital city Dhaka and commercial city Chittagong has been suffering for a long time from a tremendous environmental pollution caused by municipal solid waste, medical waste and various industrial wastes. In order to save the city from environmental pollution the waste management as well as electricity generation from the solid wastes program is being taken by the Government. Chittagong City Corporation already contract with a company to installed 10MW plants at various location of the city using waste that generated by domestic's purpose.

The Renewable energy policy of Bangladesh announced in 2008 and main purpose of renewable energy policy was to generate environment friendly power from renewable energy sources. Various steps were taken for developing renewable energy resources to meet 5% of total power demand by 2015 and 10% by 2020. Government has been working to finalize the Sustainable Energy Development Authority Act (SEDA), 2011.

Table 4.12: The present achievement and target of Renewable Energy

Category	Target Capacity by 2015(MW)	Achievement made so far (MW)
a. Solar PV	200	30
b. Wind Energy	200	2
c. Biomass based electricity	45	<1
d. Biogas based electricity	40	<1
e. Others	15	<1
Total	500	<35

Source: Power Division, Ministry of Power, Energy and Mineral Resources, 2011

4.1.7 Nuclear Energy

Attempts had been taken since 1960s to establish a nuclear power plant in the country. Except land selection and acquisition for the nuclear power plant no effective action had taken in the last 50 years. With the assurance of technical assistance of Russia, present Government has made effective arrangement to establish a nuclear power plant with a capacity of 1000 MW in the pre-determined location at Roop pur, Rangpur. In this respect, Bangladesh government has signed a framework agreement with the Russian National Nuclear Institute. It is expected that the country will be able to enter into nuclear age through the establishment of nuclear power plant by 2020 (General Economics Division, Planning Commission, 2008). Besides government initiative has been taken by a private giant company Bashundhara Group to set up a nuclear power plant at Keraniganj, Dhaka. A contract has already sign with U.S.A to get technical assistant to set up a 2MW plant as

test basis in future which may expanded to 2000MW. As a third world country it is very costly attempts to set up nuclear plant. Besides being a densely populated country it cannot ignore the safety risk and environmental impact of nuclear plants. Recent disaster of Fukushima in Japan has created a bad consent about nuclear plant. Many political and environmental organizations are against the establishment of nuclear plant.

4.1.8 Kerosene

Like others least developing and developing countries kerosene is being used mainly for cooking and lighting in Bangladesh. Due to lack of natural gas connection and availability of LPG in urban and suburb area this became very popular as fuel of cooking and lighting. In the rural area it is mainly used for lighting purpose. Kerosene stove is easily portable, smaller than biomass cooking stove and save the time that required for fuel wood collection in areas where fuel wood is already scarce. In the FY 2010-11 the amount of kerosene consumed was 397,209MT among this 390,090MT about 98.21% was used for cooking and lighting purpose only. Other uses include brick firing, irrigation pumps and transportation in a small amount (BPC). In FY 2011-2012 forecasted demand for kerosene was 415000MT. This huge amount of kerosene is either being imported as refined product or extracted from crude oil at ERL. In the FY 2010-11, 101839MT refined Kerosene was imported and 282767MT Kerosene was found by processed crude oil. Presently the price of Kerosene is 61 taka (0.74 USD) per liter after giving 23 to 25 taka directly subsidy by the government.

Table 4.13: The consumption volume of Kerosene in last five years

FY	2006-07	2007-08	2008-09	2009-10	2010-11
Kerosene consumption MT	462357	405101	342703	376645	397209
Domestic uses (MT)	448486	384846	332422	369112	390090

Source: Bangladesh Petroleum Corporation, 2012

Table 4.14: Division wise Kerosene consumption in the FY 2010-11

Division	Dhaka	Chittagong	Sylhet	Rajshahi	Rangpur	Khulna	Barishal
Kerosene consumption MT	125644	111971	24842	41769	29773	38256	24954

Source: Bangladesh Petroleum Corporation, 2012

From the data analysis of BPC about division and district wise kerosene consumption it has been found that Kerosene consumption is higher in large town and city than rural.

4.2 Opportunity of LPG Market

Present scenario shows that LPG is mainly used for domestic and commercial cooking in urban and suburb besides a small amount is used in light workshop, ship breaking yard. Now major portion of the country's suburb and rural households solely depend on firewood, others biomass, kerosene, domestic residue for cooking. These biomass fuels are being burn in inefficient way such as open fires and traditional stoves that causes of severe health and environmental hazards. But with increasing rate of urban housing, literacy rate, women's involvement in outside job, increasing purchasing capacity of people overall shortage of suitable alternative fuel the demand of LPG is increasing rapidly over night. LPG is becoming popular more due to its clean burning, lower smoke and lower greenhouse gas emissions characteristics than any other fossil. It does not require a fixed network, can be easily transported, stored and reasonable expensive. It is also non-toxic, consider as cost-effective fuel since its large proportion of its energy content is converted into heat about five times more efficiently than traditional fuels and do not contaminate soil or aquifers. LPG is a multi-purpose energy source and according to world LP gas association there are more than a thousand applications, from cooking, heating, air conditioning and transportation, to cigarette lighters and even the Olympic torch. Md Abdul Aziz Khan, Managing Director of TGTDCL the largest gas distribution company of PetroBangla told the newspaper Daily Financial Express that they had received nearly 0.15 million applications of fresh gas connection seekers since the ban was imposed in 2010. Around 99% of the applications have come from household users. He also added that the government has planned to promote LPG in place of piped gas for the households to reduce pressure on the use of natural gas. The key official of the company also said only industries and CNG sector will come under the piped gas connections. So LPG is the right option for domestic use. According to REHAB some 16,000 ready apartments remained unsold over the past one and a half years mainly due to halt in gas connection. If the government does not lift the embargo, the realtors will be in great trouble from early 2012 when nearly 22,000 more ready flats will be added to the list of the existing unsold apartments. Mr. Mustafizur Rahman, Deputy Managing Director, Bashundhara Group said to a daily news paper that "We're receiving good responses from consumers in recent times, consumers, especially those who purchased new apartments, after the restriction was imposed, had to

rely on LPG to meet their fuel requirement for cooking purpose and their number is increasing gradually". Mr. Khizir Ahmed, Head of Marketing & Sales of Bashundhara LP Gas Ltd (BLPGL) said “Real estate companies have started negotiating with almost all the LPG firms for supplying cylinder gas facility to facilitate disposal of their ready flats, which remained unsold for months only for not having gas connections and we have already signed deal with 20 such real estate developers to provide LPG”. At present distribution subsidiaries of Petrobangla are supplying 10% of total production of natural gas to the households for cooking to meet a demand of 275 million cubic feet. A huge investment is required for exploration and development of pipe network for natural gas. So there is no possibility to install such gas lines in rural regions with long distances between customers and sources because then gas will be very expensive and government has no ability to bear this expense. Studies indicated that two thirds of all the remittances that come to Bangladesh goes to rural areas. Such remittances to the rural areas have contribution to change the cooking fuel from fuel-wood to kerosene and LPG. Another remarkable change is that being economically solvent people are now migrating especially from rural areas to cities. Such migration is enhancing the demand kerosene and LPG. It is consistent that kerosene always plays the role of a transition fuel at an intermediate level of the energy ladder between solid fuels and LPG. Uses of large amount of kerosene for cooking purpose shows a good sign of trend of cooking fuel switching. Now use of LPG is not only confining in cooking purpose recently its use increased in various ways including generator fuel, automotive fuel, brick kiln fuel etc.

The final consumers also include:

- Large bulk clients such as industry which use LPG as fuel, petrochemical plants which use LPG as feedstock.
- Medium bulk clients such as real estate companies, LPG fuel station.
- Smaller bulk clients such as commercial, agricultural and ship breaking yard.

4.2.1 LPG Sources Analysis

LPG is mainly produced from condensate that found in natural gas processing in the division of Sylhet and crude oil refining in Eastern Refinery Limited (ERL) at Chittagong. When natural gas is extracted from the earth, it is a mixture of several gases and liquids. The remarkable quality of natural gas of Bangladesh contains about 95% to 99% methane and almost no sulphur. The average compositions are 97.33% methane, 1.72-% ethane, 0.35% propane and 0.19% higher hydrocarbons. In most of the fields dry gas is found, but

in a few fields it is wet, with remarkable amount of condensate. The total condensate reserve in the country is estimated about 65 million barrels (BPC). Before natural gas can be supplied or finally used, the LP Gases (propane and butane) which are slightly heavier than methane but major component of natural gas are separated out. Depending on the "wetness" of a producing gas field, gas liquids generally contain 1%-3% of the unprocessed gas stream. Some LP Gases are also trapped in crude oil. In order to stabilize the crude oil for pipeline or tanker distribution, these dissolved natural gases are further processed into LP Gas. Worldwide, gas processing is a source of approximately 60% of LP Gas produced (world LPG association). Worldwide, crude oil refining is another source of other 40% of total LP Gas supplies although the ratio between gas processing and refining varies among regions. In crude oil refining, the LPG is the first product that produced on the way to making the heavier fuels such as diesel, jet fuel, fuel oil, and gasoline. Roughly 3% of a typical barrel of crude oil is refined into LP Gas although as much as 40% of a barrel could be converted into LP Gas. Demand of petroleum products are increasing due to over dependency as transport fuel and number of vehicles also increasing rapidly. Establishment of diesel and furnace oil based power plants have made this demand so high that a major portion of foreign currency is expend to bear this import bill and most of all petroleum products are imported from middle east. Table 4.15 shows the amount of crude oil imported by BPC during last three years and LPG production in ERL, imported LPG.

Table 4.15: Imported crude Oil, Production LPG, Imported LPG

Year	2008-09	2009-10	2010-2011
Amount of Crude Oil(MT)	860877	1136567	1409302
Production of LPG(MT)	6278	11829	13284
Imported LPG (MT)	80000	80000	80000

Source: Bangladesh Petroleum Corporation, 2012

LP gas has its own distinct marketing advantages and can perform nearly every fuel function of the primary fuels from which it is derived. It has been found that most of the natural gas liquid (NGL) recovered from the gas field in Bangladesh contain adequate amount of propane ranging from 0.87% to 0.20% and butane ranging from 0.35% to 0.06 % of the gas composition (BPC). BPC said that by installing Turbo Expander with molecular Sieve Plant more than 200000 MT of LPG can be recovered from the selected higher propane and butane contained gas fields per year. The most important information found from RPGCL is that there is possibility of production total 62 MT LPG daily through processing 175 MT NGL and 110 M. ton condensate within the existing facilities at the two

plants at Kailashtila. But at present the KTL plant (Unit-1) is shut down for lack of raw materials because of the setting up of the 2nd Molecular Sieve Turbo Expander (MSTE) plant by the Sylhet Gas Fields Limited has not finished yet (RPGCL). Table 4.16 shows LPG Production from NGL.

Table 4.16: LPG Production from NGL

Financial Year	Quantity of NGL Supplied from SGFL [in Litre]	LPG Production [M. Tons]
2008-2009	23476000	5256.28
2007-2008	27942000	5046.17
2006-2007	27061000	5014.13
2005-2006	28799000	7831.58
2004-2005	27482763	7857.73
2003-2005	27969000	7956.29

Source: Rupantarita Pakritik Gas Company Limited, 2009

4.2.2 LPG Distribution Process (Supply Chain)

ERL in Chittagong and RPGCL at Kailashtila are the only two LP gas producing plants in Bangladesh. Rest huge amount of LP Gas is imported from overseas country by LPG tanker vessel. LP Gas Bottling Company uplifts LPG from the production site or tanker vessel through piped line or LPG carrying lorry and stores it at their storage site. LPG Marketing companies are mainly distributing filled gas cylinders to LPG Dealer and store them for distribution. The LPG that is produced by state own company provides LPG to state own marketing company for LPG distribution purpose but private bottling company directly supply filled cylinder to dealer and distributor. Appointed dealer and distributors collect filled LPG cylinder with exchanging empty cylinder from marketing company site. Dealers and distributors carry their cylinders on the distribution point. From their distribution points cylinders are supplied to the retailers or agents from where it is provided to the end user. Distribution process and supply chain of LPG has been illustrated in the following diagram

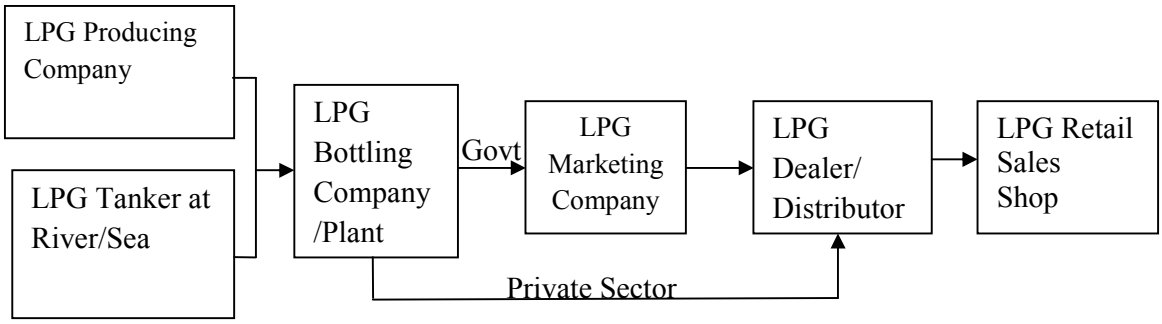


Figure 4.7: LPG Distribution Process (Supply Chain)

Equipment and service industries supporting the supply chain include: Cylinder manufacturing, testing, rehabilitation, requalification and recertification all facilities are available. LPG appliances and equipment such as valves, hoses, regulators, stoves, automotive conversion equipment and installation, bulk tank manufacturing and installation services are also available here.

4.2.3 Demand Growth Rate

Till now two feasibility studies regarding LPG as cooking fuel in Bangladesh has been done in earlier. The abstract are given below:

A Canadian company RMT Engineering Ltd conducted a feasibility study in 1989 to determine the demand of LPG in Bangladesh.RMT determine 2,589,600 LPG cylinder potential urban household in Bangladesh in 1995 with a yearly growth rate of 4% and these potential urban per household will use 1.45 cylinder LPG (1 cylinder LPG=12KG) per month. In the year 1995 LPG demand in this country for urban household cooking with a growth rate of 4% over 1989= 2,589,600 x 1.45 x 12.5 x 12/1000 MT = 563,238 MT.

A USA based company Martech International Inc was appointed to conduct a feasibility study on the demand of LPG in 1997. Bangladesh Petroleum Corporation and Petronas, Malyasia jointly appointed this company to conduct the feasibility of demand of LPG. From the study of Martech the projection of LPG demand in Bangladesh in the year 1997, 2000, 2005 and 2010 were respectively 675,503MT, 745,124 MT, 889,347 MT and 1,060,656 MT. Ministry of Mineral and Energy Resources says that present LPG demand is 0.5 million MT per year but according to current market players official it is nearer to 1 million MT.

In 1989 the LPG production was 9000 MT per year and about 53% of LPG was used in residential cooking, 33% was used for industrial energy requirements, another 9% for commercial cooking and the remaining 5% for transportation. The current cooking fuel use patterns reveal that LPG is used by 0.5 million homes. Basundhara LP Gas Ltd estimates that within affordable prices at Tk 400-600 LPG can bring more in another 10,00,000 users within a couple of years and LPG demand will be more than 1 million only for domestics purpose.

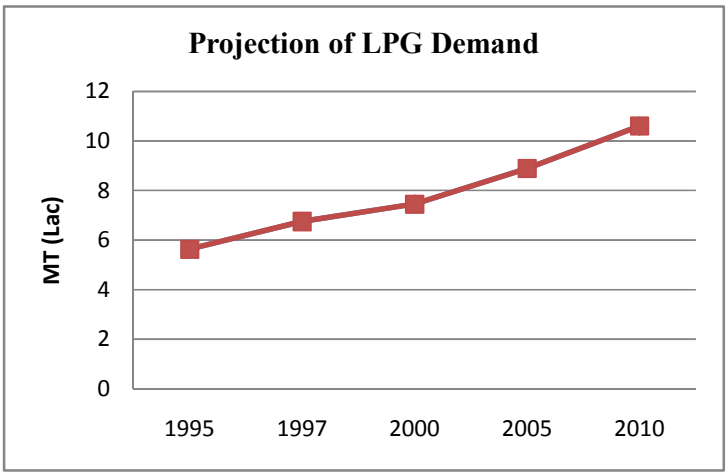


Figure 4.8: Projection LPG Demand
(Source: BPC, LPG Feasibility by Martech International Inc,U.S.A,1997)

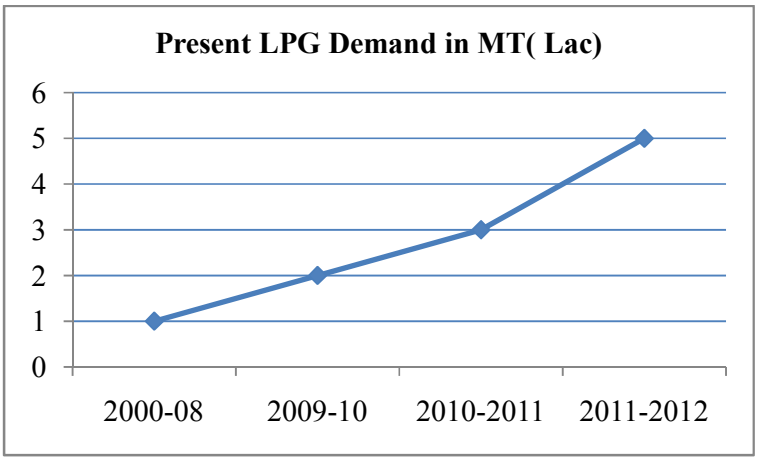


Figure 4.9: Present Demand of LPG
(Source: Bangladesh Petroleum Corporation, Domestic LPG Demand, 2012)

According to population census 2011 the average family size is 4.4. In 2005, 59.9% of families are consisting of 3-5 persons and 14.2% families consist of 6 members. In general female members (mostly wives of household heads) involved in cooking and spent 2.5 hours on average (Min 1.5, Max 3.5) a day for cooking. Fifty-four percent of the households were used to cook twice (Morning- Afternoon/Evening) a day. About one third (32%) of the households cooked thrice (Morning-Afternoon-Evening) a day and most of them purchased fuel for cooking. After market survey it has been found that a family consisting of four members consumes 1 to 1.5 cylinders per month. With the increasing rate of urbanization the dependency in LPG increased but it is not only confining in urban area as well as in suburb and rural area also.

Table 4.17: Division wise LPG and Kerosene uses in 2010-2011

	Chittagong	Dhaka	Sylhet	Rajshahi	Rangpur	Khulna	Barishal
LPG(MT)*	13035	351	2943	2049	81	1647	398
Kerosene(MT)	111971	125644	24842	41769	29773	38256	24954

* LPG supplied by only State owned company
Source: Source: Bangladesh Petroleum Corporation, 2012

It has been found that the dependency on firewood and kerosene is reducing remarkably in urban area. Almost all urban families have shifted away from natural gas to LPG because of new piped gas connection has been banned since July 2010, its easier use as well as unstable pressure of piped gas pressure. Besides firewood accessibility is gradually shrinking and the price of kerosene is going up, lack of other fuel options and improvement of more regular cash incomes the popularity of LPG is increasing rapidly.

4.2.4 Government Policy, Rules and Regulations for LPG

To encourage use of LP Gas as a substitute of piped natural gas, environmentally threaten fuel such as kerosene, biomass government has taken many effective steps. Previous time there was two main barriers to achieve greater use of LPG for policy in Bangladesh such as:

• Cost of LP Gas fuel

• Unavailability of LP Gas

As a step to reduce the price of LPG government has already reduces import duty on LPG. Honorable finance minister said in his budget speech FY 2011-12 "We will also have to reduce the use of fuel-wood and kerosene for the sake of environment. For this purpose, steps have been taken to make Liquefied Petroleum Gas (LPG) available and popular, some new proposals are placed regarding import duty and supplementary duty so that LP gas cylinder can be produced locally and its raw materials are available at economic price to reduce the price of LPG cylinders". In the budget for the financial year 2005 it was imposed an additional 15 per cent value added tax on imported LPG cylinders while there had been a 7.5 per cent import duty on propane and butane the ingredients of LPG. Local manufacturers of LPG cylinder pay 35 per cent more taxes for importing raw materials which makes the cylinders more costly. In the previous budget 2010-2011 the import duty on LPG is around nine per cent, which includes five per cent customs duty, three per cent AIT and one per cent PSI charge. It has already made zero the tariff on LPG import from the current FY 2011-12. Import duty on raw materials of LPG cylinder has also been reduced. Energy ministry has already asked the LPG firms to increase their import of LPG. To make available LPG supply government has made easy process to set up new

LPG plant and to import LPG quickly.

Table 4.18: Reducing duty rates for LP Gas and LP gas cylinder raw materials

Sl.No.	Description of goods	Existing Duty Rate (%)	Proposed Duty Rate (%)
1	LP Gas	5	0
2	Submerge welding flux for LPG	12	3
3	Flat-rolled products of iron or non alloy steel, of a width of 600 mm or more, hot-rolled, not clad, plated or coated of a thickness of less than 3 mm	5	3
4	Wire of iron or non-alloy steel plated or coated with other base metals	5	3
5	Safety or relief valve inner diameter not exceeding 1 inch for LPG.	5	3

Source: Budget Speech 2011-2012

The government has reduced the time for obtaining licenses from different state owned entities which will be very helpful and private entrepreneurs will be highly inspired for LPG business. The energy ministry is now preparing a policy to help avoid the previous restrictions in setting up LPG bottling plants in the country. In exercise of the power conferred by section 59 of Bangladesh Energy Regulatory Commission Act.2003 (Rule 13 of 2003), the Commission is pleased to make the few regulations: these regulations are called the LPG Operation, Storage, Supply, Distribution and Marketing Regulations-2011. According to these regulations a private firms will have 18 months to set up LPG bottling plant after receiving permission. After attaining the government consent the companies have to submit progress report on installation of LPG plants within the first three months. If companies fail to fulfill the criteria, then their license would be cancelled. Besides, the company must be abide by the LPG Rules 2004, Gas Cylinder Rules-1991 and Gas Field Rules 1995 and would take necessary permission from environment directorate, BSTI, explosive directorate and Board of investment to get the license. The company also needs the approval of the Bangladesh Energy Regulatory Commission (BERC) before signing a deal with the Bangladesh Petroleum Corporation (BPC) for setting up and running LPG bottling plants. The new LPG plants have to depend on imported gas initially. Importers can now easily import gas from Abu Dhabi, Singapore, Malaysia and Indonesia. On the availability of LPG gas production in this country private company will be able to use local gas in future. Government will import bulk amount of LPG for new state owned bottling plants and decision has taken to provide excess LPG to others private company. In addition, the government has planned to go for LPG bottling projects in public-private partnership.

Present policy will be succeeding to remove the main barrier of high price that deters the growth potential of the market. Md Muktadir Ali, Chairman, BPC told to a daily Financial Express "It will help to encourage the use of LPG in households in absence of piped gas, and also reduce its price in local market,"

4.3 Fuel Switching Trend

According to a multi country study of household Energy Use in Developing Countries October 2003 conducted by jointly UNDP and World Bank Energy Sector Management Assistance Programme (ESMAP) a number of variables are found to affect fuel choice and fuel switching. Household expenditures, education, urbanization, electrification status, and water source: these variables all have a significant impact on the choice between modern and traditional solid fuels. Many studies reveal that there is a strong income-dependence and normality in the usage of clean cooking fuels such as LPG and electricity. The tendency to use modern fuel is not commonly found in rural areas but is used amongst middle or high income groups in urban areas. Prices of fuels play a vital role for fuel choice. General economic development helps in itself to some extent trigger fuel switching. This is particularly true in urban areas. Many households in LDC and developing countries routinely use multiple cooking fuels. That is why introduction of a new fuel may not displace other fuels. In fact, if uptake of a new fuel coincides with an expansion of household energy consumption it may not even reduce the consumption of other fuels. In rural areas, however, modern fuels play a relatively modest role and are often used mostly in the top income brackets. And once rural households start using them, modern fuels sometimes complement and sometimes displace solid fuels. The prospect for modern fuels to combat indoor air pollution is therefore significantly better in urban than in rural areas. It is seems that higher income and other factors households will shift from traditional biomass and other solid fuels to more modern and efficient cooking fuels such as LPG, kerosene, natural gas, or even electricity. Throughout the world it is common that LPG and use of any nonsolid fuel more generally consistently is much higher in urban as compared to rural area.

4.4 Growth of Urbanization and Housing

Bangladesh has experienced a rapid growth of the urban population. The current rate of urban growth is one of the highest in Asia. At present there are 522 urban centers in the country including 269 municipalities and 8 City Corporations. Size of urban population has increased gradually to 5.19% in 1961 and then rapidly reached respectively to 9.9% in 1975,

23.39% in 2001, 24.3% in 2003, 25.2 % in 2008 and 25.7% in 2009 and is projected to be 30% by 2015 (BBS, SVRS-2009).

Table 4.19: Total urban and rural population levels and trends in Bangladesh

Year	Total population (million)	Growth rate %	Urban population (million)	Urban % Growth rate	(urban) %	Rural population (million)	Rural % Growth rate	(rural) %
1961	55.2	-	2.6	4.8	-	52.6	95.2	-
1974	76.4	2.5	6.0	7.9	6.6	70.4	92.10	4.3
1981	89.9	2.4	14.1	15.7	10.6	77..8	84.30	6.1
1991	111.45	2.17	22.45	20.15	5.4	89.0	79.61	1.5
2001	129.25	1.48	28.8	23.39	4.2	100.44	76.61	1.3

Source: Bangladesh Bureau of Statistics, Population Census, 1981, 1991 and 2001

A recent study about Bangladesh conducted by Asian Development Bank (ADB) in the year 2000 has estimated that by 2025 about 40% of the total population will be living in urban area in Bangladesh (ADB 2000). Dhaka, the capital of Bangladesh is the highly population dense city of the country as it was share 34% of national urban population in 2001. The present population of Dhaka mega city is estimated at 11.3 million. Estimated present urban population density in this country is at approximately 3008 persons/sq.km. Population density of Dhaka is approximately 8573 persons/sq.km. In order to reduce rapidly increasing population pressure on Dhaka city it has already been expanded over an area of 1,528 square kilometers towards Keraniganj, Narayanganj, Gazipur and Savar. Similarly decisions of establishment of three satellite cities at Sirajdikhan in Munshiganj, Dhamrai in Dhaka and Singair in Manikganj have been finalized. Besides, the Government has taken initiatives to work out a Detailed Area Plan (DAP) for land use in all divisional cities. Plans for Dhaka, Barisal, Chittagong and Sylhet divisions have already been prepared. To provide housing facilities to lower and middle income people a new project named 'Housing for All' has taken to construct multistoried building comprising 22,500 flats at Uttara. The project has already made significant progress. In parallel, steps have been taken to build prototype flats at Mohammadpur, Mirpur, Purbachal, Jhilmil, Dohar in Dhaka and Halishahar in Chittagong. Development of Residential Flats at Basila to Rehabilitate Non-Bengalis of Geneva Camp at Mohammadpur' project is going on. In recent year it seems that Real estate is a potential sector of the country's economy (Budget Speech 2011-2012). There is smooth expansion of the real estate sector. Due to a large size of population with economy development it has seen that almost all giant company has invested in this business and in consideration of the sector's importance.

Table 4.20: Population and Housing Census 2011, Bangladesh

Total Household (Enumerated)	3,21,73,630	100
General Household	3,18,63,396	99.04
Institutional Household	26,677	.08
others Household	2,83,557	0.88
Average Household Size (Enumerated)	4.4	

Source: Bangladesh Bureau of Statistics, 2011

"Real Estate Development and Management Act 2010" has been finalized to promote. Government has taken initiative to allocate Tk. 21.89 billion for FY2011-12 comprising both development and non development budgets, for land management and housing sector (Budget Speech 2011-2012). There are others smaller and larger satellite project to be implemented by RAJUK, CDA and authorities of various cities which are at preliminary stage. This urbanization scene is not only confining nearer in the large city but also throughout the country. Nearly all the urban centers are experiencing rapid growth among these Dhaka. Chittagong, Khulna and Rajshahi are experiencing conspicuous rapid growth. These four cities are containing about 43% of the total urban population (2000).

Table 4.21: Number of urban centers by size (1961-2001)

Year	1961	1974	1981	1991	2001
Size of urban places					
All sizes	78	108	491	522	522
Above 1 million	-	1	2	2	3
100,000-999,999	4	5	14	23	23
25,000-100,000	20	37	66	92	117
Less than 24,999	54	65	409	405	379

Source: Bangladesh Bureau of Statistics, 2011

4.5 Green House Gas (GHG) and Global Warming

In Bangladesh, massive deforestation is going on and contributes to change climate, geography, global warming. A large proportion of the rural cooking stove and restaurants that depend on fuel wood for cooking purposes use inefficient stoves with efficiencies in the order of 8% -12%. A large proportion of the industries that depend on fuel wood use the inefficient boilers with efficiencies in the order of 12% - 20% (Barners 2010). Similar unplanned and uncontrolled use of bio-mass fuels is contributing environmental degradation and burning of biomass releases tones of carbon dioxide which contribute to increase global warming. Bangladesh will be one of the biggest victims of global warming due to greenhouse gas (GHG) emission. In the year 2000 CO_2 emissions from the household, industrial and commercial sector are in the order of 22.50, 20.33 and 4.58 million tons. The

emission of Greenhouse Gas in 1990 from household, traditional biomass burned for energy was 7.67%, 5.67% of total CO_2 equivalent respectively. This rate has already reached in a threatening condition (ADB, 1998). Being concern about environmental pollution Bangladesh has signed in Convention on Biological Diversity (CBD), CITES, Cartagena Protocol, United Nations Convention to Combat Desertification (UNCCD), United Nations Framework Convention on Climate Change (UNFCC). These steps are utilizing to create some positive impact on the forestry sector of Bangladesh. As result of conservation steps of forestry following are the important improvement regarding the relative contributions of the commercial and biomass fuels in the national energy scene in 2000.

(i) Domestic sector consumption decreased from 64.8% in 1990 to 60.4% in 2000.

(ii) Contribution of biomass fuels decreased from 73.1% in 1990 to 68.0% in 2000.

(iii) Industrial and commercial use of biomass fuels account for 13.8% in 1995 and 13.7% in 2000 of the total national energy consumption.

Apart from low efficiency of traditional stove the black smoke it emits affect the health of the users especially cooks and makes the kitchen dirty. Because of incomplete combustion of biomass fuel in traditional cook stoves, large quantities of irritants, toxins and carcinogens, are released in the kitchen environment and these pose a major threat to the respiratory system of the users. In general, the combustion products of wood are carbon dioxide, water vapor and carbon monoxide, particulate and polycyclic organic matters. The last three are known and regarded to be pollutants hazardous to human health. With the increasing rate of literacy people are becoming more conscious about environment and health hazard. As a result there has been increasing a tendency of fuel switching in remarkable rate.

4.6 Present Market Players

There are existences of all type companies such as local public, private and multinational in this current market. There are 7 companies now involve in LPG bottling business besides two state own LPG production plants. Brief descriptions about their business nature, strength, plants, present LPG production, capacity, market share, limitation are discussed.

Supporting industries of LPG and name of all new licensees are discussed here.

4.6.1 LP Gas Company Limited

Under the supervision of Bangladesh Petroleum Corporation (BPC) in 1978 LP Gas plant in Chittagong was established and it is the first LPG plant in this country. This company was

formed in a Public Limited Company in the year 1988 with enhancement of authorized and 100% share own by BPC. For the use of LPG as an alternative fuel to firewood and kerosene this company is supplying LPG throughout the country. The LPG plant in Chittagong has bottling capacity of 10,000 MT of LPG one shift per year though its average production is 15,000 MT per year over the last five years. LPG extracted from crude oil fractionation process in Eastern Refinery Limited is the main raw materials of this company. LPG obtain from Rupantarita Pakritik Gas Company Limited (RPGCL) by Natural Gas liquid (NGL)/ condensate processing is used in LPG bottling plant at Kailashtila, Sylhet having capacity of 7,000 MT per year. The Kailashtila LPG plant has been installed during in 1986-1997 and main purpose was to reduce the dependency of imported energy as well as to provide environment friendly clean fuel. Later another NGL/Condensate fractionation plant was set up and installed after commissioning on turnkey basis by a foreign contractor in November, 2007. Presently this company has been supplying on an average over 20,000 MT of LPG to various parts of the country which is small portion sharing the current demand. The bottled LPG is being marketed through four marketing companies of BPC. At present apart from POCL, JOCL, MPL, companies of BPC, SAOCL is also engaged in marketing LPG bottled by the company all over the country**.**

4.6.2 Premier LP Gas Ltd

Premier LP Gas Ltd in Bangladesh is a subsidiary of France Company named Total raffling and marketing. Total is the world's fourth-largest publicly-traded integrated oil and gas company and operating in more than 130 countries. It is engaged in LPG import, storage and distribution in the cylinders and in the bulk tanker in Bangladesh under the brand name TOTALGAZ. It was launching TOTALGAZ product in Bangladesh in August 2002 and today it is the fastest growing LPG brand in the country. TOTALGAZ has a LPG import Terminal cum LPG Bottling Plant located at Sitakunda, Chittagong. The terminal has two spheres and a LPG marine import facility to handle 50,000 MT of LPG annually. But presently it is producing 12,000 tons bottled LPG annually and few amounts selling to others LPG and marine company for various purposes. It is mainly produced 12.5 kg and 33kg bottle filled LPG besides it sells bulk tanker to others industries. It is one of the larger LPG importers in Bangladesh and has developed a dedicated customer base of more than 350,000 customers spread in all the thanas of the country.

4.6.3 Kleenheat Gas Limited

Kleenheat Gas is a major stakeholder in a multi-national joint venture LPG project in Bangladesh. It is an Australian based company has huge experience in LPG industry and establishing new LPG markets throughout the world. Kleenheat gas entered in Bangladesh as a result of a joint venture between Wesfarmers Ltd of Australia with a 55% holding share, Elpiji Group of Malaysia and Palmal Group of Bangladesh. Kleenheat Gas is brand name of Wesfarmers Limited for marketing and distribution of LPG. An LPG import terminal located at Mongla, Bagerhat was commissioned in September 2001. The terminal currently has a capacity of 1,800 MT of commercial grade LPG product and supplies the domestic cylinder market as well as industrial and bulk customers. This company has also negotiated with the real estate companies to supply LPG. By observing a steady growth in LPG use this company has increased LPG import to 15,000MT in 2011 from the previous year's 13,000 MT. Kleenheat Gas is pioneering the LPG autogas industry in Bangladesh and it is in the process of commissioning a country wide network of Kleenheat AutoGas stations.

4.6.4 Bashundhara LP Gas Limited (BLPGL)

Bashundhara LP Gas Limited is one of the subsidiaries of the Bashundhara Group and the first local private LPG bottling and marketing company in Bangladesh. It has a higher production rate than any other LPG bottling plant in Bangladesh. The company started its commercial operation in the year 1999. It possesses 3000 MT storage capacity, which is the largest all existing LPG plant in Bangladesh. The plant having 36000 MT LPG processing capacity per year with a land area of 10.4 acre is situated in Mongla port industrial area on the bank of the Pashur River. It has its own jetty facilities and LPG sourcing is solely import oriented. Storage facilities consist of six spherical tanks each of 500 MT capacities (total 3000 MT capacity) and have a carousal system with 24filling posts. At present the plant has 12.5 Kg & 45 Kg of LPG cylinders in operation. The plant can fill 800 to 1000 cylinders an hour. BLPGL alone provides 14,40,000 LPG filled cylinders and other companies provide LPG filled 4,80,000 cylinders each. This company is marketing their product in the brand name of 'Bashundhara LP Gas'. Bashundhara Group has very wide and established channels of distribution and BLPGL utilized these opportunities for LP Gas marketing. BLPGL has already signed deal with 20 real states developers to provide LPG. It has now 12 transportation trucks for distribution of LPG cylinder and facilitative a very good grip over distributors. Higher capacity (3000 metric tons) of storage facility provides an

advantage in import of LP Gas as ocean going LP Gas tankers can easily berth at its own jetty. To meet the rising demand for bottled liquefied petroleum gas (LPG) in the country BLPGL is going to increase its production. The BLPG has also entered into an agreement with a Danish company Kris Kossan to commission another LPG bottling facility at Sundarban industrial complex. To increase supply of LPG, BLPGL has already signed an agreement with the Malaysian government owned oil and gas company Petronas. Engr. Md Jahidul Islam, General Manager (Operation) of BLPGL said "We are at present producing 30,000 MT of LPG every year now we have targeted to raise our production to 100,000 MT by 2012". The company will invest around Tk 2000 million to Tk 3000 million to implement the mentioned expansion and new LPG project. The BLPGL has also a plan to establish regional supply chain offices and LPG filling plant in seven divisions in the country. BLPGL has a plan to supply LPG for garments and textiles units, gas generators and even captive power plants of the country as alternative fuel.

4.6.5 Linde Bangladesh Limited

Linde Bangladesh Limited former BOC Bangladesh Ltd is a member of the Linde Group that has been present in Bangladesh for over 50 years with continuous expansion in operations and business as a pioneer multinational company in the gases business. Linde Bangladesh has an LPG Bottling plant at Bogra with a capacity of 5000MT annually. This plant takes LPG for industrial uses from BPC. Recently due to inefficient supply of LPG from BPC Linde authority has taken a decision to sell the LPG plant. Recently Premier LP Gas Ltd has bought this plant and further procedures are going on to make it suitable for production.

4.6.6 Summit Surma Petroleum Company Limited (SSPCL)

Summit Group is a leading power generating company and Summit Surma Petroleum is a unit of the Summit Group of Bangladesh. This group is comprised of 10 companies involved in the power, shipping, transport and energy sectors in Bangladesh. SSPCL mainly import and distribute LPG in Bangladesh and operating a LPG bottling plant with a capacity of 12,000MT is situated at Mongla, Bagherhat. But in the year 2007 Picnic Corporation Ltd, the largest cooking gas producer in Thailand acquired a 90% stake in Summit Surma Petroleum Company with the purchase of 159,077 shares from Cosmopolitan Traders Private Limited. The picnic is a market leader for a long time in Thailand and has business of refinery and LPG. Picnic will rebrand Summit Surma Petroleum to Picnic Bangladesh

and targeting to increase its market share up to 30% within the next several years. At present SSP has a 10% LPG market share in Bangladesh. An agreement has also been reached with Jamuna Spacetech Joint Venture Ltd to sell gas from SSPCL, projected gas sales of 12,000 tons annually. Picnic Corporation expects to generate huge revenues within few years from its investment in an LPG business in Bangladesh.

4.6.7 Jamuna Spacetech Joint-Venture Ltd (JSJVL)

Jamuna Spacetech Joint-Venture Ltd is an Indian-Bangladeshi venture. Spacetech Equipment Structural Limited, India, a Bombay-based company, specializing in LPG gas storage tanks and pipelines, owns a 10 per cent share and Bangladeshi company Jamuna Enterprise holds a 90 per cent share in the venture. This joint venture started distribution of bottled LPG targeting energy starved region in this country. It has confined its marketing liquefied petroleum gas northern region of this country that region familiar as energy starved. The plant set up at Bogra in 1996 with a capacity of 4000MT which later expanded to 8000MT. BPC sold LPG to this Company in bulk quantity. JSJVL receives LPG in their pressurized vessel (road tanker) from RPGCL at Kailashtila, Sylhet. They also collect LPG from TOTALGAZ at Chittagong. Recently this company has fallen in crisis due to short supply of LPG from BPC. Though this company was expecting to meet most of the LPG demand of this country with an annual production of 1.9 million LPG filled of 12.5 kg and rest amount will be exported to neighboring country.

Table 4.22: Production capacity and market share of LPG Company

Sl	LPG Company	Capacity MT/Year	Current Production MT/Year	Market Share %	Type
1	Bashundhara LP Gas Limited	36000	30000	33.33	Local Private
2	Kleenheat Gas Limited	15000	15000	16.67	Joint Venture
3	LP Gas Ltd (Chittagong)	15000	14000	15.56	Public
4	Premier LP Gas Ltd	50000	12000	13.33	Foreign Private
5	Summit Surma Petroleum Ltd	12000	8000	8.89	Joint Venture
6	LP Gas Ltd (Sylhet)	8500	7000	7.78	Public
7	Jamuna Spacetech Joint-Venture Ltd	8000	4000	4.44	Joint Venture
8	Linde Bangladesh Limited	5000	0	-	Foreign Private
	Total	**149500**	**90000**	**100**	

Source: Bangladesh Petroleum Corporation, 2012

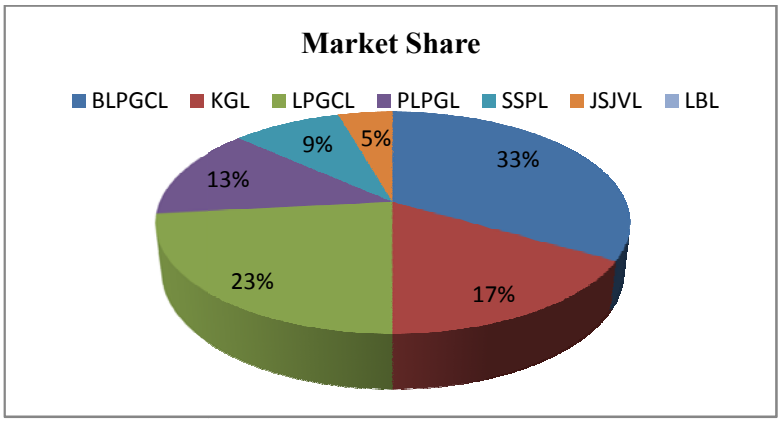


Figure 4.10: Present Market Share of various Companies
Source: Companies website

4.6.8 New Project of BPC

Steps have been taken to build liquefied LPG storage and bottling plant by the governments. The selected site is near the Mongla seaport, with the production capacity of 100,000 tons per year based on imported LPG from the international market (BPC). The Development Project Proposal of the plant at Mongla has already been sent to the energy ministry. According to BPC Chairman Abubakar Siddique international tender will be floated soon to build the LPG plant by 2014. Besides, the BPC has recently completed evaluating the expression of interests, submitted by sponsors, to build another LPG plant under Public Private Partnership (PPP) at Kumira near Chittagong seaport with 100,000 tons yearly capacity.

4.6.9 New license for LPG business

According to Ministry of energy and mineral resources division at least 50 companies had applied so far to get LPG plant licenses. After conducting quick evaluation government consent to give 22 new licenses to private entrepreneurs to set up LPG bottling plants and the product must be supply in market within FY2011-12 (BPC). The new entrants are fully import based company, they are : 1) Sonar Bangla Gas & Petroleum Ltd, 2) Meghna Group of Industries (Fresh LPG) 3) Omera Petroleum Ltd 4) Decan LPG Limited 5) M/s Mahmud & Brothers 6) Orion Group 7) Coastal Gas Ltd 8) Euro Petro Product 9) Crystal Energy Limited 10) Amin Mohammed Energy Limited (Amin Group) 11) Navana CNG Limited 12) Sanwara LPG (Sanwara Group) 13) BNB Energy Limited 14) F and F System 15) ZNZ Energy Limited 16) Acron Infrastructure Service Limited 17) Progga Petroleum Corporation 18) Promita Oil and Gas Ltd 19) Index Power & Energy Ltd 20) Bangla Trac

Oil Gas Ltd 21) Intraco Group 22) Bangladesh Petrochemical Company Limited. There is also possibility to get new license for LPG business of the following company: East Cost Group (Mobil), NGGL Group. Most of the companies that got license for LPG business have no experience in the LPG bottling or LPG related business. There is also absence of technical knowhow and no experience to conduct of any LPG plant. Most of these firms are fully dependent and seeking bank loans for installing the plant which is very time consuming and a long run process. The information also found that some of these companies are even trying to sell the licenses. Few companies have advanced in LPG project they are:

4.6.9.1 Orion Gas Limited

Orion Group is one of the leading industrial groups in Bangladesh. Now it is going to start new business of LPG. The company has its own 10.0 acres industrial plot at Mongla port industrial area, Bagerhat with LPG import jetty and capacity of 3,000 MT bulk LPG storage tanks. This would be a major import based LPG terminal in Bangladesh and bulk LPG would be imported mainly from some Asian countries like Malaysia, Indonesia, Singapore, UAE, KSA etc. capacity of this plant will be 30,000 MT per year which can fill 30, 00,000 cylinders (12.0 Kg) per year. Construction, testing and commissioning is going on. This company has classified its bottled and bulk LPG products in various categories and sizes such as Domestic Fuel: Normal Size: 12.0/12.5 Kg per cylinder, Small Size: 5.0/5.5 Kg per cylinder, Commercial Fuel: Medium Size: 24.0/25.0 Kg per cylinder, Large Size: 33.0/40.0/50.0 Kg per cylinder, for Bulk Fuel: 8.0/10.0/15.0/20.0 MT LPG in bulk tank which would be located at industrial clients' premises that may be used as LPG generator fuel, gas cutting fuel, at some Orion authorized oil filling stations for their mini filling unit and at some multi-storied apartments for colony fuel etc. Portable mini filling station: specially for domestic cylinders, there would have some LPG road tanker (Lorry Mounted Bulk LPG) fitted with filling machines on board which would stop at some major demanding locations to facilitate from the Clients from their nearest points.

4.6.9.2 Index Power & Energy Limited

Index Power & Energy Limited is a local company and already purchased land for LPG project and finalized appropriate plan to erect necessary infrastructures and other superstructure on the acquired land in Mongla port area, Khulna. The project will be under based on imported LPG with bottling and distribution plant of production capacity of 30,000 MT per year. For this project LP Gas to be imported most likely from Indonesia,

Qatar & Malaysia. This local company is associated with ZICOM Equipment Pvt Ltd, Singapore.

4.7 LPG business related Supporting Company

LPG cylinder, valve, seal, hose, regulator and many types of equipment related to bottling plant are integral parts for LPG business. Beside local and international technical supporting companies are also available here and many renowned international companies have their office and service station. There are three plants in the country to produce cylinders and few local company produce valve, seal etc that maintain international standard. Large portions of the equipments are imported by many companies and so there is availability of all of these parts. Few local companies import cylinder from China, Brazil etc. The LPG cylinder manufacturing companies are following:

4.7.1 T. K. Gas and Gas Cylinder Ltd

It is one of larger cylinder manufacturing company in Bangladesh. Existing LPG bottling companies of Bangladesh are often depend on the cylinders that manufactured by this company. The factory at Latifpur currently produces 400 cylinders every day but it has capacity to produce 300,000 LPG Cylinder per year. This company is ensuring production of gas cylinder of international quality standard without any risk of leak or other accidents. This company has started to export LPG cylinder in foreign countries and got familiarity.

4.7.2 Bashundhara LPG cylinder

The Bashundhara Liquefied Petroleum Gas Limited is solely depending on the gas cylinders produced at one of its sister concern the Bashundhara Steel Complex Limited (BSCL) at Manikganj. BLPGL has launch new LPG bottling facility enlarging its capacity, for this reason the Bashundara group has taken steps to set up a cylinder manufacturing plant at Sundarban Industrial complex at Mongla. It will be a mega project to produce international standard gas cylinder. The project has been implemented under the technical support of two Chinese companies -Hunan Technical Import and Export Corporation and Jiangyan City Yuehai Manufacturing Company Ltd. The installed production capacities of the plant will be 100 thousand cylinders of different size a month. It is also expected that the existing LPG marketing companies will get sufficient cylinders for enhancing the supply of the LPG at the market and rest excess cylinder will be exported to the north-east India, Nepal, Bhutan and Sri Lanka.

4.7.3 Jamuna Spacetech Joint-Venture Cylinder

JamunaSpacetech JV in Bogra produces 600 cylinders a year. They have also plan to increase production.

4.8 Analysis about Bangladesh

To understanding essential facts about entry into the LPG market it is important to analyze the target country. There are many factors related to country that would consider determining the international competence and entry decision. To take the entry decision target the country's location, environment, economics, political, language, culture and social facts analysis are important to evaluate properly.

4.8.1 The country

Bangladesh is located in South Asia on the eastern flank of India .The country has an area of 147,570 square kilometers and extends 820 kilometers north to south and 600 kilometers east to west. Bangladesh is bordered on the west, north, and east by a 4,095-kilometer land frontier with India and in the southeast, by a short land and water frontier (193 km) with Myanmar. On the south is a highly irregular deltaic coastline of about 580 kilometers, fissured by many rivers and streams flowing into the Bay of Bengal. The territorial waters of Bangladesh extend 12 nautical miles (22 km), and the exclusive economic zone of the country is 200 nautical miles (370 km). About 10,000 square kilometers of the total area of Bangladesh is covered with water, and larger areas are routinely flooded during the monsoon season (BOI 2012).

4.8.2 Geographical Position and Climate

Bangladesh is located in the northeastern part of South Asia between 20034′ and 26038′ degree North latitude 88001′ and 92041′ degree East longitude. Bangladesh has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and high humidity. Three seasons are generally recognized: a hot, muggy summer from March to June; a hot, humid and rainy monsoon season from June to November; and a warm-hot, dry winter from December to February. In general, maximum summer temperatures range between 38 and 41 °C (100.4 and 105.8 °F). April is the hottest month in most parts of the country. January is the coolest month, when the average temperature for most of the country is 16–20 °C (61–68 °F) during the day and around 10 °C (50 °F) at night. . Winds are mostly from the north and northwest in the winter, blowing gently at 1 to 3 kilometers per hour (0.6 to 1.9 mph) in northern and central areas and 3 to 6 kilometers

per hour (1.9 to 3.7 mph) near the coast. From March to May, violent thunderstorms, called northwesters by local English speakers, produce winds of up to 60 kilometers per hour (37.3 mph). During the intense storms of the early summer and late monsoon season, southerly winds more than 160 kilometers per hour (99.4 mph) cause waves to crest as high as 6 meters (19.7 ft) in the Bay of Bengal, which brings disastrous flooding to coastal areas (BOI 2012).

4.8.3 Population and Language

It is one of the most densely populated countries with a population of nearly 150 million and density (Per Sq. km) 1015 with growth rate 1.37. The number of male is 74.98 million and female 74.97 million that consisting of 50.06% and 49.94% of total population (BBS, 2011). The percentage of the urban population was 23.39 per cent while the rural was 76.61 per cent (BBS 2001). It is remarkable that the urban population has grown at a much higher rate than others developing countries. Although Bangladesh is the eighth most populous country in the world, with the highest population density and a low per capita income but recently the country's demographic and economic indicators have recorded considerable improvements. The official language is Bangla (Bengali). English is widely used in Government, Business and Universities. Ethnic communities use their respective language in social life and in society. Out of total population, Muslim 89.6 %, Hindu 9.3 %, Buddhist 0.5%, Christian 0.3% and Other 0.3%. The time difference is GMT+6.

4.9 Economic Overview and Investment Opportunities in Bangladesh

Though Bangladesh is an agro based country but transition process from an agrarian economy to a manufacturing and service based economy has already started. The private sector is now the major source of investment in the country. Policies of liberalization deregulation and reforms have been bringing huge changes in almost all sectors of the economy to keep pace with globalization advancement and challenges. By removing all barriers to investment and business, Bangladesh has opened up its economy. Bangladesh is currently one of the top exporters of Readymade garments (RMG) to the USA and Europe. Fisheries (shrimp mainly) and leather products are also being exported at an increasing rate. It has achieved self dependency on cement, steel, battery etc production. The population is reaching nearly15 million and this large size population made Bangladesh as one of the most potential market in the world with increasing number of economic middle class, increasing purchasing power. In last few years there is also good improvement in poverty

reduction due to development of agriculture, industrial sectors with good flow of foreign remittance from many countries.

4.9.1 Investment Climate and Policy

Bangladesh inherits a largely homogeneous society, in which people live in harmony and peace, irrespective of race and religion. It is a democratic country, providing broad and non-partisan political support for market-oriented reforms and for active encouragement of foreign investors". Bangladesh is the third easiest country in which to do business in South Asia," reported a World Bank-International Financial Corporation report of 6th September 2006. The report further observed that Bangladesh has undertaken steps to improve its business climate and one notable reform made recently was the introduction of a new land registration act to improve security and reduce corruption in land transactions. The Board of Investment (BOI) was established in 1989 to encourage investment in private sector, to provide necessary facilities and assistance in the establishment of industries. The wide range of services BOI provides includes investment promotion and facilitation covering support, suggestion and aftercare support to the investors. The prime vision of BOI is to promote domestic and foreign investment as well to enhance international competitiveness of Bangladesh. The Foreign Private Investment (Promotion & Protection) Act 1980 provides protection for investments made in this country. Among South Asian FDI regimes, a World Bank report (FDI in Bangladesh: Issues of Long-run Sustainability, 1999) judged the Bangladeshi regime to be the most liberal, with no prior approval requirements or limits on equity participation or on the repatriation of profits and income. According to the report, not only has FDI in Bangladesh been growing but it may be significantly underreported, on account in part of the more open regime. Bangladesh is a signatory to the Multilateral Investment Guarantee Agency (MIGA); Overseas Private Investment Corporation (OPIC), USA; International Center for Settlement of Investment Disputes (ICSID); World Intellectual Property Organization (WIPO).

Government has initiated various supportive policy initiatives to promote socioeconomic development. The main key features of the Government industrial policy are indicated here

- To expand the production base of the economy by accelerating the level of industrial investment.
- To promote the private sector to lead the growth of industrial production and investment.

- To raise industrial productivity and to move progressively to higher value added products through skill and technology upgrading.
- To develop technology and expand production based on domestic raw materials.

4.9.2 Incentives and Facilities for the Investors

In order to encourage the inflows of FDI the government of Bangladesh offers one of the most liberal investment policies and attractive packages of fiscal, financial and other incentives to foreign entrepreneurs among South Asian countries. Consecutively Bangladesh is introducing new incentive and facilities for foreign investor. Concessionary duty on imported capital machinery has given in table 4.23

Table 4.23: Concessionary Duty on Imported Capital Machinery

Industries outside developed area	Import duty at 5% is charged in case of capital machinery and spares listed in NBR's relevant notification. Additional import duty at 2.5% is secured in the form of a bank guarantee or cash deposit to be returned after installation of the machinery
Industries in developed areas	Import duty at 3% is charged in case of capital machinery and spares listed NBR relative notification

Source: Board of Investment Bangladesh

Table 4.24: Major incentives to stimulate private sector direct investment

Tax Exemptions	Generally five to seven years' tax exemptions are available for many business investments
Duty	No import duty is applicable for export oriented industry. For other industries it is 5%
Income Tax	In case of bilateral agreement, double taxation could be avoided. Exemption of income tax up to 3 years for expatriate person
Remittances	Facilities for full repatriation of invested capital, profits and dividends are the norm in most situations
Exit	An investor can wind up an investment either through a decision of an annual or extraordinary general meeting and finishing the formalities to exit the country investor can repatriate the net proceeds after securing proper authorization from the central bank
Ownership	Foreign investors can set up ventures, either wholly owned or in joint collaboration, with local partners
Investing in The Stock Market	Foreign investors are allowed to participate in initial primary offerings (IPOs) without any regulatory restrictions. Also, incomes from dividends are tax-exempt for investors.

Source: Board of Investment Bangladesh

4.9.3 Foreign Investors

Bangladesh offers important investment opportunities reflected in the inflows of foreign direct investment. It increased from virtually zero in the 1980s to over US$300 million in the late 1990s.There was an inflow of $666m foreign direct investment in 2007 which rose significantly in 2008 to US$1086 million. In the year 2011 Foreign Direct Investment (FDI) was US$1136.38 million and the amount is 24.42% higher than US$913.32 million recorded in 201 (BOI). Bangladesh has adopted a liberal approach to foreign investment with schemes such as no restrictions on equity participation, repatriation of profits or income and no prior approval requirements. In the FY 2009-10 (February), there were 89 new foreign and joint venture investment projects registered to BOI which amount to US$590 million. The projects have invested for mainly the service, engineering, clothing and agricultural sectors.

4.9.4 Economical Strength for Doing Business

Doing Business sheds light on how easy or difficult it is for an entrepreneur to open and run a business when complying with relevant regulations. Bangladesh is ranked 122 in 183 countries in the world where regional average (Asia) is 117. Doing Business 2012 Bangladesh by World Bank presents quantitative indicators on business regulations and the protection of property rights that can be compared across 183 economies. Below the table 4.25 shows the ranking of Bangladesh in economical sector based on different aspects.

Table 4.25: Economic ranking of Bangladesh

	Ranking
Ease of doing business	122
Dealing with Construction Permits	82
Getting Electricity	182
Registering Property	173
Ease of getting credit	78
Starting a business	86
Strength of investor protection index (0-10) 6.7	24
Paying Taxes	100
Enforcing Contracts	180
Resolving Insolvency	107
Ease of trading across borders	115

Source: Doing Business 2012, Bangladesh, World Bank

4.9.5 Economy and Industry

Against all odds the GDP growth has been a steady 5% for nearly two decades. GDP growth averaged 4.5 percent during FY 1990-2000 periods, rising to 5.4 percent during FY 2000-

2005. In FY 2008-09, Bangladesh achieved 5.7 percent real GDP growth against 5 percent negative growth of global economy. This trend continued in FY 2009-10 and 6.1 percent real GDP growth was achieved (Bangladesh Bank, Bangladesh Bureau of Statistics and Bangladesh Economic Review, 2011). In this fiscal year this country achieved a provisionally estimated 6.7 percent growth%, Inflation: 11.3% (Budget Speech 2012-13). Per capita GDP stood (Million) TK.4,724,769 in 2006-07, 5,458,224 in 2007-08, TK.6,147,952 in 2008-09,TK.6,943,243 in 2009-10 (BBS, GDP of Bangladesh at 2007-08 to 2010-11). Although Bangladesh is predominantly an agricultural country, a good number of large-scaled industries based on both local and imported raw materials have been installed. Presently the contribution of agriculture, industries and services in GDP are successively 18.4%, 28.6%, and 53% (FY2011-2012). In manufacturing and industrial sectors the Ready-made Garments (RMG) industry is the largest foreign currency earner. Besides RMG, jute, cotton, paper, sugar, chemical, fertilizer, tanneries, etc are important. Other remarkable industries have been growing in iron, steel, painting, cable, ceramics, cement etc. Cottage industries have been contributing significantly in this sector. Except readymade garments Bangladesh exports jute and jute goods, leather and leather goods, tea, frozen fish and seafood etc and total export $1447 million (September 2011.) The import list is enormous: petroleum products, machinery and equipment, electronics goods, textiles, chemicals, iron and steel, aluminum, polymer resins, several different foodstuff, coal and cement clinker are the main items and total import $6938 million (July 2011). However, the largest foreign exchange earnings are the remittances of millions of workers abroad. Last three years industrial growth has decreased and it was 8.3% in 2005, 9.7% in 2006, 8.4% in 2007, 6.8% in 2008, 6.5% in 2009-10, and 6.32% in 2011-2012 that's why the government has taken several steps to increase industrialization and increase export. The important measure was the simplification and easier the procedures for setting up of an industry. Power supply shortage has been the largest obstacles for further development. The Government is also trying to attract foreign direct investment in nearly all sectors. Although the private industrial and commercial sectors are growing rapidly, and in terms of employments are much bigger than the public industrial and commercial sectors, the public sector still plays the biggest role in the industry GDP because nearly the entire energy sector and the giant fertilizer industry are government owned. Table 4.26 shows relative position of Bangladesh in selected development parameters.

Table 4.26: Relative Position of Bangladesh in Selected Development Parameters

	Benchmark	FY09	Target (2012)
Real GDP Growth (%)	5.9	8.o	10.0
As per cent of GDP			
Gross Investment (%)	24.2	32.1	37.5
Gross Domestic Savings (%)	24.0	27.0	30.0
Total government revenue (%)	10.4	15.5	17.1
Total government expenditure (%)	13.8	20.5	21.8
Exports (billion US$)	15.6	36.3	91.1
Imports (billion US$)	20.3	49.6	131.3
Remittances (billion US$)	9.7	22.7	48.5
CPI inflation (%)	6.7	7.4	7.9
Unemployment rate (%)	30.0	20.0	15.0
Poverty (head count (%)	36.0	24.5	14.4

Source: General Economics Division, Planning Commission, Government of The People's Republic of Bangladesh, June 2010

Despite being a least developed country with low per capita income, the country falls in the category of medium Human Development Index (HDI) of UNDP. HDI of Bangladesh has rose from 0.422 in 1990 to 0.521 in 2000 and 0.547 in 2005 (UNDP, Human Development, 2007/2008). The Millennium Development Goals: Bangladesh Progress Report11 jointly prepared by the UN and the Government of Bangladesh that published in February 2005, notes how Bangladesh is consistently keeping on track in meeting the UN Millennium development Goals. For Bangladesh, the goals to be achieved by 2015 include lowering of poverty rate to 29.4 percent (presently 44%), a 100 percent universal primary education (83% in 2003) and environmental sustainability about 20%.

4.9.6 World Economy and Bangladesh

Although the world economy has been affected by the recession of 2008-2009, Bangladesh performed well along with other Asian countries. Table 4.27 shows World Economy and Bangladesh according to IMF World Economic Outlook, April, 2010.

Table 4.27: World Economy and Bangladesh

Economic growth rate (%)	2007	2008	2009	2010	2011	2015
Bangladesh	6.3	6.0	5.4	5.4	5.9	6.2
Developing Asian economies	10.6	7.9	6.6	8.7	8.7	8.5
Emerging economies and developing economies	6.5	9.2	5.2	6.2	4.7	3.8
Developed economies	0.2	0.5	0.4	0.4	0.3	0.1
World	5.2	3.0	0.6	4.2	4.3	4.6

Source: IMF World Economic Outlook, April, 2010

4.9.7 Currency and Banking

Currency of the country is Bangladeshi Taka (Tk). The financial system of Bangladesh consists of Bangladesh Bank (BB) as the central bank, 4 State Owned Commercial Banks (SCB), 5 government owned specialized banks, 36 domestic private banks, 9 foreign banks and 29 non-banking financial institutions. The financial system also embraces insurance companies, stock exchanges and co-operative banks. Bangladesh Bank is both the Government's banker and the banker's bank, a "Lender of the Last Resort". Bangladesh Bank, like most of the central banks of different countries, exercises monopoly over the issue of currency and the banknotes.

4.10 Transport and Communication

The transport sector of Bangladesh consists of a variety of modes. There are three modes of surface transport, i.e. road, railway and water, are widely used in carrying both passengers and cargo. The airline network is also extensive and effective.

4.10.1 Road

In Bangladesh, among the various modes of transport, road transport system is vital and playing a significant role in transporting both passengers and goods. The Roads and Highways Department (RHD) manage several categories of road. RHD has total length of 20,948 Km road under its control. RHD also Control a total number of 4,659 bridges and 6,122 culverts. RHD are currently operating about 161 ferry boats in 81 crossings (13 on national highways, 11 on regional highways and 57 on feeder roads) on its road network throughout the country. As of January 2010, Local Government Engineering Department (LGED) has so far constructed a total of 133,514 km (64,691 km dirt road and 68,823 km paved roads) upazila and union roads and 971,498 bridges/culverts. The 4.8 km long Bangabandhu Bridge (Jamuna Bridge), which was opened to traffic in 1998, is the 12th longest in the world. It has established a strategic link between the East and the West of Bangladesh. It is generating multifaceted benefits to the people and promoting inter-regional trade. Apart from quick movement of goods and passenger traffic, it is facilitating transmission of electricity and natural gas and has integrated the telecommunication links.

4.10.2 Air

The Civil Aviation Authority is a public sector entity entrusted to construct, maintain and supervise airports and regulate air traffic. The national flag carrier Biman flies to 26 international and eight domestic destinations. There are now 3 operational, 5 domestic and 7

Short Take-off and Landing (STOL) airports in Bangladesh. These are Dhaka, Barisal, Chittagong, Comilla, Cox's Bazar, Ishurdi, Jessore, Rajshahi, Syedpur, Sylhet and Thakurgaon. The airports at Dhaka, Chittagong and Sylhet serve international routes. Air cargo and STOL services have been handed over to the private sector by the government.

4.10.3 Rail

About 32% of the total area of Bangladesh is effectively covered by railways. Bangladesh Railway had a total network of 2,460 km (Broad Gauge 659 km, Dual Gauge 374.83 km and Meter Gauge- 1,801 km)(2010) and a total of 440 stations at the end of the year 2009-2010. Train services between Dhaka-Kolkata have been commenced on 14 April 2008 in order to establish communication between Bangladesh and India. After inclusion of railway track over the Bangabandhu bridge (Jamuna Bridge), railway link between east and west zone has been established. Rail is the cheapest mode of transportation of goods.

4.10.4 Waterways

Country made crafts are the most widely used carriers on the rivers. These carry passengers and merchandise on a large scale. The landscape of Bangladesh is dominated by about 250 major rivers which flow essentially north-south. Wherever there is a river and a village, a launch or steamer will play for trade. Bangladesh Inland Water Transport Authority (BIWTA) has been established by the Government for maintenance of navigability of ports and channels while the state-owned BIWTC provides passenger and cargo services in inland waterways and coastal areas of the country. The entire coast along the Bay of Bengal is 710 km long. There are two major ports in the country. Chittagong, the oldest port, has been an entry-port for at least 1,000 years. The Mongla port in Khulna region serves the western part of Bangladesh.

4.10.5 Communication systems

Communication system in Bangladesh is based on telephone, mobile communication, TV broadcast, radio, internet etc. Three types of radio broadcast stations; AM15, FM 13 and shortwave 2. There are 266 Internet hosts with 9, 95,560 internet users (2010) and now internet density increased from 3.2 percent to 7 percent. Recently telephone density has less than 1 per 100 persons. Mobile cellular density has increased from 32 percent to 35 percent. The country is introducing digital systems, trunk systems which include VHF and UHF microwave radio links and some fiber optic links. The country has a link to Europe with SEA-ME-WE-4 fiber optic submarine cable.

4.11 Culture

Culture is considered among the most challenging aspects while selecting a market. According to Cateora and Graham (1999) a successful marketer must be a student of culture because it deals with a group's design for living and it is pertinent to the study of international marketing. Therefore, culture is integral to the marketing concept, which is based on satisfaction of wants and needs of potential buyers. The issue that are underlying in culture, like language, attitudes and values can affect the negotiation process. People in Bangladesh are much more open, relaxed and indirect. They are much more concerned about building up a relationship and like to meet also during their free time. People in Bangladesh are very spontaneous, informal. There are a lots of multinational giant companies are doing business here which imply that this cultural barrier is very low for start a business here. English language is used in Government, official, Business and Universities which is good sign of easy communication. Due to popularity of television and internet this country's present culture and life style is highly influenced by western countries. This country deserves a good reputation for business about hundreds of years.

4.12 Political System and Government

The official name is People´s Republic of Bangladesh. It deserves a republic parliamentary democracy. Under the constitution of Bangladesh, the Prime Minister, as the executive power, is the head of the government and the president is the chief of state. A cabinet of ministers assists the Prime Minister. Government is chosen by general election for one term and the tenure of the national parliament known as the Jatiya Sangsad is also for a five-year period. The head of state is the President, who is chosen by parliament for a five-year term. It is a unicameral body vested with legislative powers and has 300 elected members and 50 reserve women member.

4.13 Labor Market, Laws and Regulations

Due to availability of labor force the wage in Bangladesh is probably the lowest in south Asia. The productivity and performance of the employees is satisfactory maintaining a standard and apt to change is frequent. The wage in Bangladesh is controlled by the relevant statutes and job responsibilities. The minimum wage is ensured by the constitution in few sectors and wages vary from sector to sector. A remarkable characteristic of the Labor market of Bangladesh is a high rate of labor force growth and low rates of employment. Agriculture is still the major sector providing employment about 45% (2008) of total working labor force in country. The labor market shows the existence of high

underemployment, dominant rural share and smaller share of women employment. Bangladesh experienced a modern annual growth rate in labor force (2.7%) until the end of the 1970s. But over the period of 1981 to 2008, total labor force increased from 25.9 million to 75.42 million recording an annual average growth rate of 8%. Total industrial labor force is 33.35 million in 2005-2006 about 30% of total labor force. This country offers an abundant supply of hard working, disciplined, easily trainable and low-cost work force suitable for any labor- intensive industry. Furthermore, there is an increasing supply of professionals, engineers, technologists and other middle and low level skilled workers who have received technical training from universities, colleges, technical training centers and polytechnic institutions. Bangladesh is a member to ILO and both the private and public sectors are encouraged to observe the principles so enunciated in the ILO convention and recommendations. The Labor Act, 2006 consolidated and amended previous laws relating to employment of workers, relationship between workers and employers, determination of minimum wages, payment of wages, compensation for injuries arising out of and in the course of employment, formation of trade unions, raising and resolving industrial dispute, health, safety, welfare and environment of employment of workers and apprentice and related issues. Occupational health and safety is an important worker's right. The legal framework of Bangladesh provides some basic protection to workers in industrial sectors in this issue.

Chapter-05

ANALYSIS AND RESULTS

Among the all modern fuels Liquefied Petroleum Gas (LPG) is prominent in Bangladesh. Day by day with the increasing demand, LPG is becoming an integral part of energy policy. There are a lot of benefits enjoying this country that are in the form of fiscal, social, economic and environmental. The government of Bangladesh has made energy policy where a lot of emphasis on the importance of the development of private sector and private investment for LPG. Present energy policies are very reasonable, convenient and give a great support for the development of the emergence of new technologies or investments of foreign companies in the Bangladeshi market. Recently the government has announced a reduced, reform taxes and import regulations, in order to stimulate the growth of the private sector and foreign investment in LPG sector. Companies in this sector usually have to import major necessary components and elements of the products they sell. High import duties and a tax structure that constrain the growth of the LPG sector in Bangladesh logically constrain the development of a viable private LPG sectors are minimized. Bangladesh had been experiencing a slow development in terms of LPG growth in last decade. This may due to availability of biomass, low income, unconsciousness, lower living standard and illiteracy. However, in last few years the demand of LPG has increased in a unique rate as cooking fuel. Considering present energy crisis and as an alternate cooking fuel the government provides a favorable fiscal environment for LPG business. This favor helps to get fast returns on this investment through rapid growth of LPG demand. LPG consumption at rural household in Bangladesh is limited but in the urban, suburb household and restaurants the demand is 0.5 million MT though there is no subsidy on LPG. Reductions in taxes and duties about 3% from 15%, no tariff barrier with the inherent benefits of using LPG will enable it to become a more competitive fuel leading to economic growth. There are many reason that helps to increase the demand of LPG but the main reason that contributing a good prospect for LPG are: 1. Shortage of alternate fuel for cooking purpose (electricity, biomass, Kerosene) 2. Negligible number of solar cooker's user 2. Priority is given to supply natural gas to industry and power generation. 3. High price of kerosene and biomass. 4. Clean burning, less smoke characteristics and easy usable. 5. Existence of LPG production both source: natural gas processing and crude oil refining 6. Short and easy supply chain of LPG handling bottling process along with marketing and distribution 7. Two feasibility studies found demand growth rate high 8. Reduction of duty

from LPG, raw materials cylinder and other accessories 9. Short time to get license, LPG related rules and regulations of international standards 10. Increasing literacy rate and awake fuel switching trend 11. Rapid urbanization, migration of people to urban area 4. Purchasing capacity of people increasing both in urban and rural. 12. Shortage and unavailability of natural gas to use in transport sector as CNG 13. Increasing number of small and medium industries 14. Poor and unequal natural gas distribution network 15. Government's inspirations switch traditional fuel and natural gas to LPG for domestics' purpose 16. Increasing awareness among the end users for carbon emissions and global warming.

From all types of development study it has been found that Bangladesh is a not far from being a developing country. According to "Doing Business 2012" published by World Bank, Bangladesh ranked for Starting a business 86th, Ease of doing business 122th out of 183 and 24th for Strength of investor protection index (0-10) scored 6.7. Present policy of government is very suitable for the company that wants to invest in this country as policy has made easy entry facilities and many rational options. Even few options are more lucrative and best among the south Asian country. The more remarkable one is facilities for full repatriation of invested capital, profits and dividends are the norm in most situations. Easy licensing facility, tax free time frame, 100% ownership possibility, easily exit etc options has made the entry very easy and tempting in the country. Bangladesh always careful and hungry for foreign investment and taking new initiatives for foreign investment by establishing organization like Bangladesh Investment Board, Export Processing Zone (EPZ) and implementation of foreign private investment (Promotion & Protection) Act 1980 for the protection of investments made in this country. These findings prove that the Bangladesh is welcoming eagerly and offer convenient options for new entrants of foreign countries. This project work has also revealed that Bangladesh government is very liberal about foreign investors.

5.1 The Market and Porter's (1998) five forces

In spite of having a high demand of LPG more than 0.5 million MT annually only about 0.1 million MT is available. Therefore, there is an acute crisis of LPG in existing market. Production in economies of scale create a strong barrier for entry of a company as LPG has been imported from overseas country and large quantity production can reduce price. To involve in competition there is no way instead of reducing price of LPG. Therefore, production in economies of scale will force any company to enter into this market with a

large production capacity. It is also remarkable that till now no one company faces unsold inventory of LPG. In this present market situation no impact of branding has been found and till now people are not interested and conscious of LPG brand but they are concern for cheap price and availability. Remarkable evidence of customer loyalty to any LPG brand has not found so product differentiation cannot create a high impact in entry. LPG handling terminals and bottling plants are builds with high technology as well as for raw materials a large amount capital investment is required. A high initial capital investment besides to survive in the market there may requirement of expansion of plant size and capacity in future. Such kind of huge capital investment for LPG business offers a big challenge and matter of anxiety to start business. All type unrecoverable cost associated with installations of equipments, land and factory infrastructure development, ancillary equipment, contract, transport, salary and training have made switching cost very high for any company. The requirement of high initial cost to start LPG production that cannot be recovered creates a high barrier for entry decision. Distribution system of LPG is very easy in this country and all company possesses their own distribution channel and transport vehicles. Beside there are also few independent LPG carrying lorry supplier who rent on basis of trip. Due to good communication and transport infrastructure distribution system offers a good opportunity. Company who has no previous LPG business experience will be affected by the factor of cost disadvantages independent of scale. Existence of multinational experienced companies offers barrier of cost disadvantage independent of scale and few companies are enjoying a little benefit from government organization; location etc and most of them have already gathered a good experience of LPG business and social environments. The company that has previous LPG business experience can easily overcome those factors by self business strategy, experience of cost minimization, others influence of entry barrier of cost disadvantages independent of scale can be either minimize or ignored. Government policy of Bangladesh is very liberal and always welcomed for entry of a foreign company. After all present condition shows that sufficient supply and lower price can be a crucial mode to grasp the market.

Due to shortage of LPG supply and unavailability substitute of cooking fuel in the market the bargaining power by customer is low. Price of all fuel such as kerosene, biomass are increasing. There is also shortage of cooking fuel. Price of petroleum fuels, electricity and gas is regulated by Energy Regulatory commission of Bangladesh and these fuels are highly subsidized. However, in case of LPG there is no price restriction and any company can have

their own price plan. Government does not give any direct subsidy for LPG. Ppresent situation has compelled people to buy LPG with high rate.

Except raw LPG only cylinder, regulator valve, hose pipe, clamps etc are main component that distinctly related to LPG business. There are three large LPG cylinder manufacturing plant along with many importers import cylinder and other accessories from foreign country. Besides pressure regulator valve, hope clamp etc importers, suppliers and manufacturer are available in this country. Presence of available local and international suppliers have made the bargaining power of the suppliers is low in this LPG market. Besides only 7 companies are exist in this market which makes the supplier weaker and suppliers are fully depends on those companies. There is no strong influence that can be created yet by supplier in price, production quality, design etc.

Banned and shortage of natural gas connection, lower per capita electricity production, absence of uses of solar energy, high price of kerosene, unavailability of biomass has created limited scopes of substitute fuel especially in town and suburb. About 66% increase of LPG demand between the FY 2011 to 2012 indicate that there is not availability of substitute. Besides present LPG companies are not capable to meet the present demand of LPG.

There are 8 LPG bottling plants of 7 companies are existing in this current market. Recently 22 new companies have got license for LPG business but they are long far from entering into market within few years. A local company Bashundhara LP Gas Limited is the highest market share holder in Bangladesh (33.33%) which is almost one third of the total market. But presence of international LPG giant player TOTALGAZ, Picnic Corporation Ltd, Kleenheat Gas Ltd has made this sector more challenging. Each company deserves the capacity to invest more, can increase their production and capable to bring a rapid change in strategy of business and in price. State owned company LPGCL sells LPG cylinder within very cheap price comparatively from others private companies. Being a least developing country most people are price sensitive so there is limited scope to gain high profit by increasing retail price too much high. For a little price difference people will prefer to buy the low priced LPG. As an example LPGCL sell a 12.5 kilogram cylinder to dealers at Tk.631 and retail price is TK.800 within 40 KM range of a depot but others company's cylinder retail price is more than TK.1500. These existing 7 competitors in the market have

made high possibility of substitutes of similar product and high competitions. At a glance the strength of Porter's (1998) five forces are given in table:

Table 5.1: Porter's (1998) five forces analysis

Five forces	Strength
Entry Barriers	Moderate
Bargaining power of customer	Low
Bargaining power of suppliers	Low
Availability of substitute	Low
Existing competitive pressure	Moderate

5.2 The Country and Porter's (1998) National Diamond

Applying Porter's (1998) National Diamond theory it has found that Bangladesh has a preferable factors condition. Geographic position makes this country very lucrative for business person and world politics. It can play vital role as a business zone and economy of south Asian countries. Tough small or large natural calamities almost visit this country but overall climate is very good as it is in tropical zone. About 33.35 millions (2008) industrial labor force has created availability of cheap and highly competent skilled labor, technical person. Wide range but bad infrastructure of land, relatively good water and air ways offers a good probability to conduct business. Tele communication infrastructure is very good.

Demand condition in the country seems to be very high. Having a population of 150 million, 522 urban centers containing 23.39% of total population and 32.17 million household is showing a great opportunity of LPG for domestic purpose only. Presently more than 0.5 million MT of LPG demand with a good increasing rate of consumer is showing the smooth growth of the market. From the feasibility study of Martech international Inc it was estimated that the demand will be 1 million in the year 2010. Authorities of all private LPG bottling companies also claim that actual demand is more than 1 million. Even though per capita income is low, it could not create any obstacle in the growth of the LPG market. It is becoming a dire need in the town and city because people want to switch fuel and to enjoy cost effective, health and environmental benefit from LPG. The popularity of LPG is spreading rural area also.

There is availability of related and supporting industries and suppliers of LPG business in Bangladesh. Adequate LPG business supporting companies are able to provide the producers with extra competitive advantages and opportunities to run LPG business here.

The main supporting industries with LPG industry are: Logistics, Energy, Equipment Manufacturer, Auxiliaries Manufacturer, IT, Banking and Finance, Insurance, Business consulting and Environmental Services. A good number of giant multinational companies are providing technical support. Kosan, ABB, Siemens as well as many Chinese and local companies are playing a vital role by providing a huge technical support all local companies. Homemade and imported world class cylinder and others element such as hose, seal, regulator etc manufacturer and suppliers are available. T.K, Basundhara, Spachtech are producing world class cylinder and their production capacity enough high to export excess cylinder to neighboring country. Others supporting industries are playing a very important role for the overall development of the LPG sector. Existence of developed network of dealer and suppliers in the country makes it possible to offer less competitive environment.

In the LPG market there are 7 companies competing themselves to capture market share and lowering product costs as well as to take advantage on the market with lowering prices. This competition forces them to introduce and change mode, compel them to adopt new production plan and increase production capacity. They are alert enough to response with the change in market demand. Presently LPG sector is dominated by local companies holding about 60% of total market share. Presences of few numbers of multinational giant companies have created more competition among existing companies and difficulties of starting business, more capital investment. They are enjoying fast turnover of invested capital compared to other products. The private-operated firms are developing very fast but lack of huge capital and technological knowhow most of them have desired to start joint venture. Present existing companies are mainly focused on the domestic market and few companies are expected to expand it in south Asia. Existing rivals are pushing each other to lower costs, improve quality, innovation of modes and the prospects for international expansion, success. Existing firms have their own variety of structures and modes. The social structure of this country might be able to have an effect on the management style.

This country is suffering from energy crisis and banning of piped natural gas connection, lower alter fuel options, high price of kerosene and shortage of biomass fuel providing LPG sector a huge chance to growth.

It has already been discussed in the previous about the government policies for LPG business. Briefly it can be said that all policies about LPG and LPG sectors are convenient

for any foreign investor. The government of Bangladesh is not interfering in the company's decision making which seem to be intensifying the possibility of success of the company.

Table 5.2: Porter's (1998) National Diamond Model analysis summary

Factors	Conditions	Notes
Factor conditions	Good	Good location, climate, Cheap and skilled labor, Good communication infrastructure, limited natural resource
Demand conditions	Very High	Present demand more than 0.5 million MT, Projected to be about 1 million MT.
Supporting industries	Very competitive supporting Industry	T.K group, Basundhara, Jamuna for cylinder and other accessories are either locally produced or imported by many companies. Presence of Spachtech, Kosan, ABB, Siemens for technical support.
Rivalry	Moderate	Existing giant companies Totalgaz, Picnic, Kleenheat, local Bashundhara.
Chance	High	Fuel crisis and unavailability of alternate fuel
Government Policies	Very liberal	Easy licensing, Less duty, Tax free time, less interference in company policy

5.3 Entry Modes

In this section, the factors that could be influence to take entry mode decision have analyzed.

5.3.1 External Factors - Foreign country

From the demand scenario it is clear that the sales potential of LPG in the market is very high. The LPG market demand is growing frequently and also there is large amount of population that makes this market potential more bright. Last two years the market growth was faster rate than the expected rate. The LPG consumption growth rate was about 66% in last two years that is beyond projected demand. It is remarkable that the current competition in LPG market is oligopolistic type as the large market has been shared by some big companies. As the labor cost in Bangladesh is very low, attractive tax exempt and incentive policy, good communication infrastructure remarkably its water ways that offer very cheap goods carrying cost. The government follows liberal policies for foreign investment and also having liberal policies for import. In this fiscal year customs duty on LPG is cut down to zero and duties on LPG production related elements and equipments also reduce. As a result production cost will reduce remarkably and sales volumes will also increase. From the economic statistics of Bangladesh, it shows that the condition of the economy is

dynamic as the economy is showing good movement. The GDP growth rate is on average 6.4, total GDP is $105.00 billion (2010-11) and per capita GDP is $775 (2010-11). Investment in private sector is increasing rapidly which is growing at an annual average rate of 10% and increased its share in GDP from 16% in FY2001-02 to 18.5% in FY2005-06. In the year 2011 FDI was US$1136.38 million which is highest ever level in the history of Bangladesh. The amount is 24.42% higher than US$913.32 million recorded in 2010. The FDI inflow mostly comprises fresh equity amounting to US$431.85 million, while US$489.63 million came from reinvested earnings. Developed countries those invested in Bangladesh the remarkable are Canada, Austria ,Belgium, China, France, Germany, Singapore, Italy, Malaysia, Poland, Romania, Switzerland, Turkey, Thailand, Egypt, USA, Netherlands, UK, South Korea, Hong Kong, Pakistan, Japan, Sri Lanka, India, Denmark, Saudi Arabia, Norway and in FY 2009-10, 89 new foreign and joint venture investment projects registered to Board of Investment. The presence of investment of European, ASEAN countries revels that cultural difference is not a barrier to conduct successfully any business in Bangladesh. Language is considered as main determiner of cultural difference for a foreign country but English is widely understood and spoken in Bangladesh. Intensity and frequency of natural disasters in Bangladesh has lesser occurrences compared to Japan, Philippines and other countries in Asia and even in America. This is because the country is located outside the zones of major earthquakes. Bangladesh has a largely homogeneous society with people living in harmony irrespective of race and religion and it is a moderate, democratic and homogeneous country. It is a constitutional republic with a multi party parliamentary democracy. Though politically Bangladesh is unrest this is due to lack of understanding between government and oppositions, recurrence of strike in the country pollute the investment climate and affect the fruitful operation of project. But last few years it is seems that national politics is not hampering to conduct business here.

5.3.2 External Factors - Home country

If the LPG market of investor's home country is relatively smaller than LPG market of Bangladesh and company faces high taxation policy, high labor cost in home country as a result the production cost is high then the investor can choose Bangladesh as one of the suitable country for LPG business. Bangladesh is very lucrative country for those companies that conducting business in economically very expensive market. Bangladesh is offering low operating cost for LPG business comparatively very lower than many country's of the world.

5.3.3 Internal Factors

In Bangladesh people are not conscious for LPG brand and this business are not highly influenced by product differentiation .Price is the main competitive factor as well as supply availability is another influential factor. For LPG bottle carrying cost will be higher as a result only local production can bring down its production cost and remove high carrying cost. Besides bulk production can bring more benefits of reduction in production cost. Recently cut off duty from LPG import is assisting to reduce production cost remarkably as a result retail price will be reduced in future. If interested company deserves a good amount of resources such as capital, technical knowhow, then the company can take the opportunity to invest in LPG sector in Bangladesh. Depending on its resource the company can take suitable entry mode.

On the basis of findings and analysis of this project work the table 5.3 is formulated. Here only those factors are considered that can influence to choose entry mode in Bangladesh and factors that cannot influence in entry mode are deleted from the original Root's (1998) table.

Table 5.3: Internal and External factors those are influential for entry in Bangladesh

	Indirect and agent/distributor exporting	Licensing	Branch/ subsidiary exporting	Equity investment /production	Service contract
External Factors (Foreign Country)					
High sales potential			X	X	
Oligopolistic competition				X	
Good marketing infrastructure	X				
Low production cost				X	
Liberal import policies	X		X		
Liberal Investment policies				X	
Small geographical distance	X		X		
Great geographical distance		X		X	X
Dynamic economy				X	
Exchange rate depreciation				X	
Small cultural distance				X	X

	Indirect and agent/distributor exporting	Licensing	Branch/ subsidiary exporting	Equity investment /production	Service contract
Great cultural distance	X	X			X
Low political risk			X	X	
External factors (Home country)					
Small market	X		X		
Atomistic competition	X		X		
Oligopolistic competition				X	
High production cost		X		X	X
Internal Factors:					
Standard products	X		X		
Technology intensive products		X			
Low product adaptation	X				
High product adaptation		X	X	X	
Limited resources	X	X			
Substantial resources			X	X	
Low commitment	X	X		X	
High commitment			X	X	
Total	10	7	10	15	4

From the table above it is found that Equity investment/production (Investment entry mode) as got the highest number (15). Branch or subsidiary kind of direct exporting and agent/distributor kind of indirect exporting has got 10 each. Licensing has got 7, Service contract has got 5. These findings will change slightly on the basis of cultural distance, geographical distance, product adaptation, level of commitment for the company that wants to enter in LPG business in Bangladesh.

Chapter-06

CONCLUSIONS AND RECOMMENDATION

The objectives of this project are to know the Potentiality of LPG market of Bangladesh, present competitive environment of market and country situations for LPG business, Factors that can affect entry mode decisions of an internationalized LPG company, Suitable entry modes to choose in Bangladesh. After analysis all data reveals that future of LPG is very bright and LPG market of Bangladesh is very potential. Present energy demand situations, government policy, existing only 7 LPG companies, market demand are ensuring a good prospect to invest in LPG sector. Michael Porter's (1998) five factors have been applied to assess competitive environment of the LPG market and it has found that all the factors such as Entry Barriers is moderate, Bargaining power of customer is Low, Bargaining power of suppliers is Low, Availability of substitute is Low and Existing competitive pressure is Moderate. Michael Porter's (1998) national diamond model has been analyzed to assess the country condition. These four major factors or determinants such as: Factors condition, Demand condition, Related and supported industries and finally firm's structure, strategy and rivalry shows positive aspect for which a LPG company can takes decision to start business and conduct business in Bangladesh. By analyzing Franklin Root's (1998) internal and external factors of entry mode it has found that entry mode decision is influenced by a number of factors but one or two factors are often crucial in the decision. In this project, it has been found that external factor of foreign country (Bangladesh) is the main influential key to choose an entry mode decision. Because there are 13 external factors of Bangladesh, 4 external factors of home country (the country of investor), 8 internal factors of a foreign company that can influence in entry mode decision basis of this project analysis. This project has taken score from Franklin Root's (1998) internal and external factors table 5.3 to find out suitable entry modes to select for Bangladesh. From the table 5.3 it has found that Investment entry mode has got the highest score (15), indirect/ direct exporting and branch/subsidiary entry modes have scored 10 each. According to the score joint venture or wholly own subsidiary such as green field venture and acquisition are the best suitable entry modes for a foreign company that want to enter in LPG market of Bangladesh. From this analysis it is also clear that external factors of foreign country (Bangladesh) are dominant factors to choose entry decision as 9 points out of total 15 for investment mode comes from external factor of foreign country (Bangladesh). Considering the uncertainty, risks that could be faced by a foreign company due to the unfamiliar LPG market and country

environment it is suggested that joint ventures are the best entry mode for a foreign LPG company. It will be better for a LPG company to have a joint venture with an existing LPG company or a company that has license for LPG business and want to introduce its business in LPG market. In summary, it can be concluded that LPG market of Bangladesh is very potential for LPG business and joint venture is the best mode for a foreign company.

This project has identified the suitable entry mode for a foreign company to enter into LPG market of Bangladesh. This project has considered all possible influential factors of foreign country (investor's country). However, those factors have not been considered for a specific country or targeting any country. Further study can be done for companies from a specific country to select an entry mode for this LPG market.

REFERENCES

"A Situation Analysis Report on Environment (MDG 7)-Bangladesh", (2009), General Economics Division, Planning Commission, Government of the People's Republic of Bangladesh and UNDP Bangladesh.

"A Guide to Doing Business in Bangladesh", (2011), Amir & Amir Law Associates, Dhaka, Bangladesh, pp.9-14

Agarwal, S., Ramaswami, S.N., (1992), "Choice of Foreign Country Entry: Impact of Ownership, Location and Internalization Factor", *Journal of International Business Studies,* 1st quarter, pp.1-27.

Agyarko, A.O., (2009), *"Household Energy, Coping Strategies and Health Effects in the Bongo District of Ghana",* PhD Thesis, Department of Planning, Kwame Nkrumah University of Science and Technology, Knust-Kumasi.

Ali, M. E., (2002), *"Energy Consumption Pattern in Rural Bangladesh - The Opportunity for New Zealand: A Household Survey"*, Department of Applied and International Economics, Massey University.

Antonette, D. S., and Murthy, K.V.N., (2004), *"Report on the use of LPG as a domestic cooking fuel option in India"*, International Energy Initiative, Benson Town, Bangalore, India.

"*Annual Report 2010*", Petrobangla – Bangladesh Oil, Gas and Minerals Corporation, Ministry of Power, Energy and Mineral Resources, Government of the People's Republic of Bangladesh .

"An Investment Guide to Bangladesh Opportunities and conditions", (2000), International Chamber of Commerce, The world business organization, United Nations, New York and Geneva.

"Appendix-2 Bangladesh: Some Selected Statistics Table-V: Growth and Sector wise Share of GDP (at FY96 constant prices)", (2011), Department of Statistics, Bangladesh Bank, Dhaka, Bangladesh.

Arkhipova, O., and Pustovalova, V., (2010), *"Marketing Research and Entry Mode Suggestions, Case Turijobs Tourism Services S.L."*, M.Sc. Thesis, International Business, Rovaniemi University of Applied Sciences.

Barnes, D. F., Khandker, S.R., and Samad, H., (2010), "Energy poverty in rural Bangladesh*"*, *Energy Policy,* Elsevier, Vol. 39, pp.894–904.

Cateora, P. R., and Graham, J. L., (1999), "*International Marketing"*, 11th edition. New York, McGraw Hill Companies, pp.252-253.

Choudhury, J. K., and Hossain, M.A., (2011), *"Bangladesh Forestry Outlook Study"*, Food and Agriculture Organization, United Nations Regional Office for Asia and the Pacific, Bangkok.

Chanmongkolpanic, K., and Panthong, S., (2009), *"The Internationalization Process of Telenor: A Case Study of Telenor in Thailand"*, M.Sc Thesis, International Business and Entrepreneurship, School of Sustainable Development of Society and Technology, Malardalen University, Sweden.

Deari, H., Kimmel, V., and Lopez, P., (2008), *"Effects of cultural differences in international business and price negotiations- A case study of a Swedish company with operations in e.g. South America"*, M.Sc Thesis, International Marketing Strategy, Vaxjo University.

"Development Project Proposal (DPP) on LPG Import, Storage and Bottling Plant at Mangla", (2011), Bangladesh Petroleum Corporation (BPC), Chittagong, Bangladesh, pp.1-8.

"Doing Business 2012: Doing Business in a More Transparent World", (2012), The World Bank and the International Finance Corporation, Washington, DC, U.S.A.

"Doing Business in Bangladesh", (2012), Howladar Yunus & Co. Chartered Accountants, Dhaka, Bangladesh, pp.29-44.

"Energy for Cooking in Developing Countries", (2006), World Energy Outlook, OECD and IEA, Chapter 15, pp.419-445

"Evaluation of the Implementation of the Paris Declaration, Phase – II", (2010), Country Evaluation Bangladesh, Final Report, Natural Resources Planners Ltd., Dhaka, Bangladesh.

Fazal, I., (2009), *"The process of International Expansion of Firms"*, Master Thesis, Masters Programme in Business Administration, Blekinge Institute of Technology School of Management, Sweden.

Fiberesima, D. D., and Rani, N. S. A., (2011), "An evaluation of critical success factors in oil and gas project portfolio in Nigeria", *African Journal of Business Management,* Vol. 5, pp. 2378-2395.

"*Guidelines for LP Gas Use in Rural Energisation"*, (2002), World LP Gas Association.

"Guidelines for Good Business Practices in the LP Gas Industry", (2008), World LP Gas Association and the International Chamber of Commerce (ICC).

Hassan, Md. K., Pelkonen, P., Halder, P., and Pappinen, A., (2012), "An Analysis of Cross-sectional Variation in Energy Consumption Pattern at the Household Level in Disregarded Rural Bangladesh", *J. Basic. Appl. Sci. Res.*, Vol. 2 Issue. 4, pp. 3949-3963.

Haque, A.K.M.E., (2010), "Natural Gas Management of Bangladesh: Future Powerhouse of South-East Asia?" *The 1st International Applied Geological Congress*, Department of Geology, Islamic Azad University, Mashad Branch.

Huque, S., and Mazumder, R. K. (2006). *"A concentrator PV power system in water pumping"*, National Seminar on Renewable Energy: Biomass/Bio Energy, Dhaka, 24th March, 2006.

Hill, C. W., (2007), "*International Business-competing in the global market*", McGraw Hill, London, pp. 480-499.

"Household and Population Characteristics, Chapter-ii, HIES- 2010", Bangladesh Bureau of Statistics, Government of the People's Republic of Bangladesh, Dhaka.

Hossain, M. D., (2004), *"Proposed National Energy Policy for Bangladesh",* FBCCI Executive Committee, Dhaka, Bangladesh.

Huda, N., and Roy, M.K., (2000), *"State of Forests in Bangladesh",* State of Environment Report 16, FAO Biomass Energy Study, Bangladesh.

Inkoom, D. K. B., and Biney, B. S., (2010), "The Potential of Liquefied Petroleum Gas (LPG) as a Viable Energy Option for the Industrial Sector in Ghana", *Journal of Sustainable Development in Africa,* Vol. 12, No. 6, pp.34-61

"Increasing Global Renewable Energy Market Share Recent Trends and Perspectives", (2005), Department of Economic and Social Affairs, United Nations.

"International Recommendations for Energy Statistics (IRES)", (2011), Draft version, United Nations, New York.

Islam, M., (2002), *"Renewable Energy Prospects & Trends in Bangladesh"*, Bangladesh Power Development Board, Electronic Book 2: Utilization of Renewable Energies in Bangladesh, Version 1.

Johnson, G., and Scholes, K., (2002), "*Exploring Corporate Strategy*", 6th edition, Harlow, Financial Times, Prentice Hall, New Jersey, U.S.A, pp.106-107.

Johnson, G., Scholes, K., and Whittington, R., (2009), *"Fundamentals of Strategy"*, 1st edition, Pearson Education Limited, UK, pp.30-38

Kamal, S., (2009), "Greenfield VS Acquisitions: Determinants of Choice in Emerging Economies*" BRAC University Journal*, vol. 1, no. 2, pp. 63-71.

"Key World Energy Statistics", (2010), International Energy Agency.

Kojima, M., (2011), *"The Role of Liquefied Petroleum Gas in Reducing Energy Poverty"*, Extractive Industries for Development Series 25, World Bank.

Kotler, P., Keller, K., Koshy, A., and Jha, M., (2009), "*Marketing Management*", 13th edition, A south Asian Prospective, Dorling Kindersley (India) Pvt. Ltd, Delhi, India, pp.88-99.

Kotler, P., (2000), "*Marketing Management Millennium Edition*", 10th edition, Prentice-Hall Inc., New Jersey, U.S.A., pp.103-116.

Li, J., and Frydrychowska, M., (2008), *"The International Expansion of a Multinational Company: A Case Study of H&M"*, Master's Thesis, International Business and Entrepreneurship, School of Sustainable Development of Society and Technology, Malardalen University, Sweden.

"LP Gas Markets-Guidelines for LP Gas Use in Rural Energisation", (2002), World LP Gas Association.

"*LPG Operation, Storage, Supply, Distribution and Marketing Regulations",* (2011), Bangladesh Energy Regulatory Commission, Dhaka, Bangladesh.

Matthews, W.G., and Zeissig, D.H.R., (2011), *"Residential Market for LPG: A Review of Experience of 20 Developing Countries",* Houston International business corp. Energy and Environmental Policy Consultants, Texas, U.S.A.

Mahbub, M. Z., Bustam, H.A., Suvro, M.M., Shahriar, T.M., Uddin, I. and Saad Md. A., (2012), "Comparison Between Conventional Power Generation And Renewable Energy Power Generation In Bangladesh", *International Journal of Engineering Research and Applications (IJERA)*, Vol. 2, Issue 2 , pp.896-902.

Mamun, M.R.A., Kabir, M.S., Alam, M.M., and Islam, M.M., (2009), "Utilization Pattern of Biomass for Rural Energy Supply in Bangladesh", *Int. J. Sustain. Crop Prod., Vol.* 4, Issue 1, pp.62-71.

Men, A.P.D., (1994), "1980, 1985, 1990: a Porter Exegesis", *Scand J. Mgmt*., Vol. 10, No-4, pp.437-450.

Miah, M. D., Rashid, A. H., and Shin, M. Y., (2009), Wood fuel use in the traditional cooking stoves in the rural floodplain areas of Bangladesh: A socio-environmental perspective, *Biomass and Bioenergy*, Elsevier, Vol. 33, Issue 1, pp.70-78.

Mondal, A. H., Iqbal, M. Z., Mehedi, A.T.M. S., (2010), *"Skills for green jobs in Bangladesh, Unedited background"*, Country study, Skills and Employability Department, ILO.

Murshid, K.A.S., and Wiig, A.R., (2011), *"A review of Development Trends in the Energy Sector of Bangladesh"*, Development Studies and Human Rights, Chr. Michelsen Institute, Bergen, Norway.

Munir, A., Saddozai, A. K., Khattak, D. B., and Hashim, D. S., (2011), "Porter Five Forces Analysis of Pakistan Mobiles Communication Limited (Mobilink): A Critical Approach", *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 3, No 5, pp.704-712.

"National Strategy for Accelerated Poverty Reduction II -FY 2009 – 11", (2009), General Economics Division Planning Commission, Government of the People's Republic of Bangladesh, Dhaka.

Nevad, S., (2009), "A*nalyses of the* C*ompetitiveness of* F*orest* I*ndustry in the* R*epublic of* M*acedonia",* Masters Thesis, Forest Faculty, SKOPJE Belgrade.

"Outline Perspective Plan of Bangladesh (2010-2021), Making vision 2021 a Reality", (2010), General Economics Division Planning Commission, Government of The People's Republic of Bangladesh, Dhaka.

Ozlem, O., (2000), "Assessing Porter's framework for national advantage: the case of Turkey Reports", *Journal of Business Research*, Elsevier*,* Vol. 55, pp. 509– 515.

Pan, L., *"The Feasibility Study of Sativex in China"*, (2007), Master's Thesis, International Management, Master of Science of Business Administration, University of Twenty, Netherlands.

Pearce, J., and Robinson, R., (2005), "*Strategic Management"*, 9th edition, McGraw Hill, New York, NY.

"People's Republic of Bangladesh: Preparing the Clean Fuel Sector Development Program", (2009), Volume 2: Main Report, Technoconsult International Limited, Dhaka, Bangladesh.

Porter, M. E., (1998), "*Competitive Strategy, Techniques for Analyzing Industries and Competitors"*, The Free Press, New York, pp. 3-33.

Porter, M. E., (1998), "*On competition",* Harvard Business Review Book Series, USA, pp.166-178.

Porter, M. E., (1998), *"The Competitive advantage of nations"* Houndmills, London, pp. 158-178.

"Population and Housing Census Bangladesh", (2011), Bangladesh Bureau of Statistics, Government of The People's Republic of Bangladesh, Dhaka.

"Pre-Feasibility Study- LPG Marketing & Distribution Business", (2007), Small and Medium Enterprise Development Authority, Government of Pakistan.

"Preparing the Gas Sector Development Program", (2009), Final Report Volume 2, Main Report Project Number: 38164, ADB and Technoconsult International Limited Dhaka, Bangladesh.

"Promotion of renewable energy, energy efficiency and greenhouse gas abatement (PREGA)", (2003), Bangladesh country report, Draft Final Report, Bangladesh.

Puljeva, A.,Widen, P., (2007), "*The influence of internal and external factors on entry mode*", Master's Thesis, Department of Marketing, Lulea University of Technology, Sweeden.

Rahman, S. H., Wijayatunga, P.D.C., Gunatilake, H., and Fernando, P. N., (2011), "*Energy Trade in South Asia Opportunities and Challenges",* Asian Development Bank.

Rahman, M. A., Tantu, F. D., (2011), *"Emerging Markets: A Case Study on Foreign Market Entry in Bangladesh"*, Masters Program, School of Business and Economics, Linnxus University.

"Reducing Greenhouse Gas Emissions by Promoting Bioenergy Technologies for Heat Applications", (2006), Report No. EP/RAS/106/GEF Country Report, Bioenergy Study-Bangladesh, Local Government Engineering Department (LGED).

Root, F. R., (1998), "*Entry Strategies for international markets*", Lexinton Books, New York, USA, pp. 8-17.

Smit, A.J., (2010), "The competitive advantage of nations: is Porter's Diamond Framework a new theory that explains the international competitiveness of countries", *Southern African Business Review,* Vol. 14, pp.105-130

"Strategy for Integration of Energy & Rural Development (Draft)", (2005), Power Division, Ministry of Power, Energy and Mineral Resources ,Government of The People's Republic of Bangladesh, Dhaka.

Stone, H.B.J., and Ranchhod, A., (2006), "Competitive advantage of a nation in the global arena: a quantitative advancement to Porter's diamond applied to the UK, USA and BRIC nations", *Strategic Change*, Vol. 15, pp. 283–294

Tamim, M., and Hossain, I., (2006), "*Energy and Sustainable Development in Bangladesh",* Sustainable Energy Watch, Helio International, India.

Talukder, M. F. S. I., (2010), *"Impact assessment of biogas plants: A case study in Bangladesh",* Master of Engineering, Energy and Environmental Management, International Institute of Management, University of Flensburg, Germany.

Terpstra, V., and Sarathy, R., (2001), "*International Marketing*", 8th edition, Chicago IL, Dryden Press, U.S.A, pp. 300-315.

Uddin, M.B., and Akhter, B., (2011), "Strategic Alliance and Competitiveness: Theoretical Framework", *Journal of Arts Science & Commerce,* Vol. 2, Issue. 1, pp.43-54

Vaishnav, R., (2010), *"Seminar Report on Contemporary Management Issues-Porter Five Forces"*, Master of Business Administration (MBA), Rajasthan Technical University, Kota, India.

Wua, P. J., Fenga, C. M., and Chuan, Y, (2011), "Decisions about entry modes for telecom companies into digital music business: An empirical case study", *8th International Telecommunications Society (ITS) Asia-Pacific Regional Conference*, Taiwan.

Xiaohua, W., Dai, X., and Yuedong, Z., (2001), "Domestic energy consumption in rural China: A study on Sheyang County of Jiangsu Province*", Biomass and Bioenergy,* Elsevier, Vol. 22, pp.251 – 256'

Youssef, K. B., (2007), *"An Analysis of Entry Mode Strategies and International Performance: Learning from Japanese Investment Experience in Australia and Europe"*,

Doctoral Program in Social Systems and Management, Graduate School of Systems and Information Engineering, University of Tsukuba.

Zekiri, J., and Angelova, B., (2011), "Factors that Influence Entry Mode Choice in Foreign Markets", *European Journal of Social Sciences,* Vol. 22, Number 4, pp.572-584

Internet Sources

Bangladesh Parliament, http://www.parliament.gov.bd, 05 April 2012, 22:00 pm

Bangladesh LPG demand surges 66% on year to 500,000 mt/year in 2011-12,
http://www.platts.com/RSSFeedDetailedNews/RSSFeed/NaturalGas/7813365.
02 August 2012, 2:00 am

Bangladesh Power Development Board
http://www.bpdb.gov.bd/bpdb/ 03 July 2012, 22:00 pm

Bashundhara LP Gas Ltd
http://www.bg.com.bd/LPGas/index.php?view=aboutus , 06 July 2012, 10:30 am

Bashundhara Group to produce LPG cylinder
http://thenewnationbd.com/newsdetails.aspx?newsid=24241, 09 July 2012, 22:00 pm

Bangladesh: Some Selected Statistics
www.bangladesh bank.org/pub/annual/anreport/ar0405/app22.pdf, 02 June 2012, 11 am

Board of Investment, Bangladesh
http://boi.gov.bd/about-bangladesh/why-bangladesh/bangladesh-strategic-locationangladesh
http://boi.gov.bd/how-to-invest/investment-incentives
http://boi.gov.bd/about-bangladesh/government-and-policies
http://boi.gov.bd/about-bangladesh/transport-infrastructures
http://boi.gov.bd/about-bangladesh/transport-infrastructures
http://boi.gov.bd/component/content/article/438
06 July, 2012, 23:00 pm

BPC moves for setting up 2 LPG bottling plants to meet growing demand
http://www.unbconnect.com/component/news/task-show/id-56657 .
05 April 2012, 22:00 pm

Coal Reserves of Five Coal Mines
www.biiss.org/epls_presentation.pdf , 06 July, 2012, 23:30 pm

Cylinder LPG price shoots up abnormally in N-dists
http://www.newstoday.com.bd/index.php?option=details&news_id=56189&date=2012-03-15, 27 April 2012, 10:30 am

'Dealers double LPG price'
http://mobile-us.bdnews24.com/details.php?id=220401&cid=4, 27 April 2012, 10:00 am

Energy-hungry Bangladesh to import LP gas
http://in.reuters.com/article/2011/08/10/bangladesh-gas-import-idINL6E7J50PB20110810, 11 March 2012

Daily Star-Business
http://www.thedailystar.net/2003/05/26/d30526050227.htm , 06 July 2012, 12:00 am

Govt eases rules on setting up LPG plants
http://news.priyo.com/business/2011/08/13/govt-eases-rules-setting-lpg-p-34506.html
28 February 2012, 23:20

Global energy peak and Bangladesh scenario
http://www.thefinancialexpress-bd.com/more.php?news_id=98452&date=2012-02-14
08 March 2012, 12:00 pm

Govt plans to expand LPG use to end energy crisis
http://www.thefinancialexpress-bd.com/2010/01/03/88485.html. 15 July 2012, 23.00 pm

How to bring in more FDI
http://www.thedailystar.net/newDesign/news-details.php?nid=237086,
26 July 2012, 21:00 pm

Indo-Bangla LPG venture starts marketing gas
http://www.rediff.com/money/2001/may/21indo.htm. 07 July 2012, 19:00 pm

Joint Venture with ELPIJI GROUP formed in Jan 2012
http://www.petredec.com/bangladesh.html, 18 June 2012, 22:00 pm

Kleenheat Gas
http://www.kleenheat.com.au/gas/about-us/bangladesh.aspx, 05 July 2012, 23:00 pm

LPG Bangladesh
http://www.lpgbangladesh.com/index.php?action=page&id=3, 05 July 2012, 22:00 pm

LP Gas Company Ltd
http://bpc.gov.bd/contactus.php?id=36, 06 July 2012, 10:30 am

Orion Gas Limited
http://www.orion-group.net/construction_1.php, 06 July 2012, 11:30 am

Oil and Gas Energy Production Statistics in Bangladesh: Govt To Build Lpg Plant Near Mongla By 2014
http://www.reportlinker-news.com/n042679203/Govt-to-build-LPG-plant-near-Mongla-by-2014.html, July 10 2012, 21:00 pm

Power Grid Company Limited, Bangladesh
http://www.pgcb.org.bd/index.php?option=com_content&view=article&id=288&Itemid=207, 06 July 2012, 1:00 pm

Policy for Private Sector LPG Bottling in Bangladesh Very Soon
http://gurumia.com/2011/07/29/policy-for-private-sector-lpg-bottling-in-bangladesh-very-soon/ 17 February 2012, 21:00 pm

Picni invests in Summit Surma Petroleum Co., Ltd.
http://www.accessmylibrary.com/article-1G1-137479594/thailand-picni-invests-summit.html, 06 July 2012, 10:00 am

Picnic Corp buys LPG Company in Bangladesh.
http://www.accessmylibrary.com/article-1G1-137534457/thailand-picnic-corp-buys.html 06 July 2012, 10:00 am

Politicians smash rules to award LPG licenses to their favorites
http://www.daily-sun.com/details_yes_05-12-2011_Politicians-smash-rules-to-award-LPG-licences-to-their-favourites_424_1_1_1_3.html, 27 April 2012, 11:00 am

Rush to set up LPG plants
http://www.thedailystar.net/newDesign/news-details.php?nid=204905, 26 April 2012, 22:00 pm

Rupantarita Prakritik Gas Company Limited
http://www.rpgcl.org.bd/op_act.php?ltype=op_lpg , 06 July 2012, 12:00 pm

T. K. Gas and Gas Cylinder Ltd.
http://www.tkgroupbd.net/business-sectors/our-business-sectors/packaging-containers/t-k-gas-and-gas-cylinder-ltd, 05 July, 2012, 23:00 pm

TotalGaz Bangladesh
www.total.co.bd/lub/lubbd.nsf/vs_opm/2A8431D8B1087A62C125762E0052FDFDe79b.html, 06 July 2012, 10:30 am

Titas Gas and Transmission Company Limited
http://www.titasgas.org.bd/ Accessed 06 July 2012, 11:00 am

Use of LPG rises sharply
http://www.money.com.bd/2011/12/use-of-lpg-rises-sharply/, 04 April 2012, 22:00 pm

VAT on cylinder may retard move to popularize LPG-Industry people fear
http://www.bangladesh-web.com/view.php?hidRecord=12020, 26, April 2012, 23:00 pm