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FINAL REPORT

MARKET SURVEY OF SMALL DIESEL ENGINES IN BANGLADESH

SUBMITTED TO UNIDO UNDER
CONTRACT NO. 90/108
PROJECT NO. BGD/84/037

BANGLADESH MANAGEMENT DEVELOPMENT CENTRE
DHAKA
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LIST OF ABBREVIATIONS USED

BADC	Bangladesh Agricultural Development Corporation
BDP	Bangladesh Diesel Plant
BFDC	Bangladesh Fisheries Development Corporation
BIWTA	Bangladesh Inland Water Transport Authority
BIWTC	Bangladesh Inland Water Transport Corporation
BKB	Bangladesh Krishi Bank
BMTF	Bangladesh Machine Tools Factory
BSEC	Bangladesh Steel & Engineering Corporation
BBS	Bangladesh Bureau of Statistics
BOI	Board of Investment
BWDB	Bangladesh Water Development Board
CBU	Completely Built in Unit
CKD	Completely Knocked Down
C&F	Cost and Freight
CCI&E	Chief Controller of Import & Export
DTW	Deep Tube Well
FFYP	Fourth Five Year Plan
GDP	Gross Domestic Product
HP	Horse Power
LLP	Low Lift Pump
R&H	Roads & Highways
RPM	Revolution Per Minute
STW	Shallow Tube Well

EXECUTIVE SUMMARY

The present study was aimed to provide BDP with statistical records and information for formulating future marketing strategy of its products.

The total current inventory of small diesel engines stands at 454,461 pieces of which 413,001 are imported and 40,460 are locally manufactured/assembled. Over the last ten years (1979-80 - 1988-89) 401,001 pieces of diesel engines worth Tk. 61.18 million have been imported mainly from Japan, U.K., Germany, China, India & Korea. The vast inventory of imported diesel engines in Bangladesh comprises of hundreds of brands and models.

In total eight enterprises, two in the public sector and six in the private sector, have been sanctioned to manufacture/assemble diesel engines locally. Of them, six are to manufacture/assemble diesel engines for irrigation purpose and the rest two was supposed to manufacture/assemble marine engines. But actually only BDP, the public sector undertaking is manufacturing/assembling diesel engines of the German Deutz brand on regular basis. BMTF, another public sector organization had also manufactured/assembled diesel engines of the Japanese Mitsubishi brand over a certain period (1981-87). The only private sector enterprise who manufactured some diesel engines during 1985 to 1988 is the Milners Engineering Complex Ltd. Over the last ten years BDP, BMTF and the Milnars have produced 15,053; 27,187 and 1,650 pieces of Diesel engines respectively. The total quantity of locally manufactured/assembled diesel engines (43,390) during the last ten years is thus only about 9% of the total current inventory.

From the different surveys executed in line with the objectives of the study it has been revealed that engines of 5-12 HP range (mainly of 5-7 HP) of 1 cylinder are most widely used and needed. For operation of IDW, heavier engines of 28-40 HP range are used. For STW, engines of 5-7 HP are common, while for LLPs, engines of 5-12 HP, as well as, 12-28 HP range are utilized depending upon the type of pumps used. The survey revealed that LLPs are gradually shifting from public to private sector. STWs are gaining popularity because of some inherent advantage.

It has further been revealed that Chinese engines, cheap and easy in operation are gaining increasing market acceptance and thereby increasing their market share. Small Diesel Engines are also suitable for putting into

multiple use. It was also found from the survey that customers are most satisfied with the use of Yanmar with [illegible] of the users expressing their satisfaction, while [illegible] with [illegible] favourable response is a close second. Customer satisfaction with BDF manufactured/assembled [illegible] is below average.

The future demand for diesel engines of various HP range considering recent growth trends, future possibilities in line with the BWDB irrigation schemes, electrification program of REB during the next five years, aspects of diesel engine uses for other purposes like country boats, vibrator machines, mixture machines, threshing machines etc. would be as under :

HP Year	1990-91	1991-92	1992-93	1993-94	1994-95
[illegible] - 10	44[illegible]8	37[illegible]4[illegible]	44[illegible]	45414	44[illegible]
11 - [illegible]	8[illegible]87	80[illegible]	8647	25[illegible]	8544
[illegible] - 4[illegible]	4884	[illegible]679	5481	5[illegible]	5478
46 - 120	338	38[illegible]	405	531	[illegible]
Total :	[illegible]	46[illegible]	59466	[illegible]	[illegible]

It was found that the existing capacity utilization rate of BDF in the recent years is about [illegible] on an average. It indicates that under the given conditions BDFs possible share is about 4% of the average future annual demand. Provided BDF enhances capacity utilization rate upto an extent of 80%, its possible share may increase to 10%.

The replacement demand for 46-120 HP engines of BDF is extremely low.The average annual demand is only 0.82% of the total engines in this range.The production of 4-6 cylinder engines in the last ten years was only 0.32% of the total engines produced by BDF.The possibility of getting a market for this range of engines for Bus,Truck,marine transport etc. is bleak.Besides several varieties of make and model of engines are currently used in this sector, all of which are not compatible to BDF engines.However BDF may find out a market in this sector with appropriate marketing strategy in a limited manner.

The export potentialities of BDF prove to be very bleak under the existing conditions.

Mechanization of country boats has been found to be a prospective area for utilizing diesel engines. BDF may

aim at producing light and small diesel engines of 5-7 HP range to tap this potential area. At present the country boats using diesel engines do not have gear boxes and hence they are hazardous to safe communication and are not registered with the competent authority. Through designing suitable diesel engines with gear boxes at cheap prices BDF may increase its shares.

It was identified that, BDF in particular and local manufacturing assembly of diesel engines, in general, are encountered with many impediments of external and internal nature. However, the impeding factors for BDF are :

i) absence of comprehensive marketing strategy.
ii) lack of market orientation in determining product mix.
iii) total dependency on BADC as market.
iv) high price of product.
v) complain about quality.
vi) high cost and non-availability of spares.
vii) inconsistent government policies.
viii) availability of multiple brands and models in the market.
ix) extensive rural electrification programme and
x) stipulation of unfavourable terms and conditions by the donor agencies.
xi) many brands and make of engines in the transport sector.
xii) almost all the transport equipments are imported with the engine mounted on the chassis.

In a view to overcome the present weaknesses and threats and to make best utilization of the opportunities whatever BDF do have, it would require some governmental policy supports along with some modifications in the present production system and introduction of some policy measures regarding marketing of its products.

BDF requires to discontinue the present F1L 210D model and introduce a new product line for manufacturing small engines of 5-7 HP range so as to avail the advantage of huge demand of STW engines in the market. It is also suggested to manufacture small diesel engines of 5-7 HP range with gear boxes at cheap prices in a view to tap the potential area of country boat mechanization. This steps will ensure BDF a market oriented production programme. To realize this end, BDF may go for new venture with foreign collaborators.

BDP needs to open a new marketing outlet through employing dealers in all the districts who along with BDP engines will also carry spares parts. Specific target group may be served with higher HP engines, servicing facilities and diversified product ranges.

The professional and technical skill available with BDP should be used for diversified products and services to reduce the cost of production. A capital intensive unit like BDP cannot sustain with low (30%) capacity utilisation.

The government strategy of open market economy and privatization should also take into account the necessary aspects of protecting the local industries through required tariff and non-tariff barriers, as being done in Japan and also in many other Newly Industrialized Countries.

The governmental supports immediately needed for BDP are control of diesel engines used in the country by various users through proper standardization measures and policy modification regarding tender consideration on the basis of total cost instead of C&F prices and adherence to the existing government decision of rendering 15% allowance to the locally manufactured products. Government may also consider to impose restrictions on import of diesel engines with 2-6 cylinders provided BDP can set a competitive price in the market.

CHAPTER - ONE

INTRODUCTION

1.1.0 OBJECTIVES OF THE STUDY

1.1.1 Bangladesh Diesel Plant (BDP) Ltd. an enterprise of Bangladesh Steel & Engineering Corporation (BSEC), is facing multi-dimensional problems due to lack of insufficient data essentially required to formulate a comprehensive market strategy and production programme.

1.1.2 It was visualized that in course of time BDP would be one of the major suppliers of small diesel engines to meet the demands of national irrigation programmes. However, it did not materialize. Today, the market for small diesel engines is conspicuous by the preponderance of hundreds of varieties of imported brands and models. In the interest of the national economy however, it is imperative that BDP and other local manufactories of small diesel engines should have a greater share of the domestic market for small diesel engines, particularly, for the sizes used for minor irrigation projects.

1.1.3 The major objectives of this detailed market study were thus to submit a comprehensive report which would:

a. Serve as a statistical record.

b. Provide adequate guidelines for developing product marketing strategies.

c. Provide necessary indicators for customers services.

d. And, incorporate recommendations as to various options to be considered by BDP/BSEC management and the Government of Bangladesh.

1.2.0 SCOPE OF THE STUDY

The scope of work as contained in the terms of reference were to :

1. Prepare an inventory of all types of diesel engines with their types, sizes, makes, and origin, manufactured assembled and imported in the country since 1980, together with their sources of finance, if any.

2. Study and present in the report the year-wise import of all types of diesel engines in the country since 1980. Unit C&F prices of these items in the respective years of import should also be furnished.

3. Make an assessment of the existing capacities/facilities for local manufacture/assembly of the various types and sizes of diesel engines in the country providing information regarding, location, the year of the sanction of these local facilities, year of going into commercial production and the year wise actual production achieved by these undertakings.

4. Study and analyze the manner of the current use of diesel engines in the country for various purposes and in various fields.

5. Study the existing demand of diesel engines in various fields and activities and also project the growth of the demand of these engines in these fields taking into account the possible diversified use of diesel engines.

6. Investigate the manner in which the demand of diesel engines is presently met. Also indicate the sources, extent and nature of financing of the procurement of the diesel engines for use in various fields.

7. Determine BDP's possible share of the future demand of diesel engines in the country and that of BDP's competitors taking into account the competitive price structures and other relevant influencing factors.

8. Find out and examine the nature of impediments to the marketing of BDP's diesel engines and suggest measures and strategies to counter the impediments.

9. Suggest necessary Government Policy measures to remove hindrances, if any, for marketing of BDP's diesel engines.

10. Study the export potentials for the BDP's diesel engines and mention the countries where this potential exists.

11. On the basis of the findings of the study and taking into consideration the marketing strategies pursued by BDP's competitors, formulate a comprehensive marketing strategy for BDP taking into purview all possible ways which might have positive effect for the expansion of demand for BDP's engines.

12. Submit draft final report.

1.3.0 BACKGROUND OF THE BANGLADESH DIESEL PLANT LTD.(BDP):

1.3.1 The Bangladesh Diesel Plant Limited (BDP) was incorporated on 11 November 1981 as a public company under the Companies Act (Act. VII) of 1913. One of its stated objectives was "to manufacture diesel engines and spare parts of such engines and assemble such engines from imported parts and to buy, sell, manufacture, store, repair, convert, alter, remodel, let-on hire, and deal in diesel engines and other machinery, implements, and hardware of all kinds."

The authorized capital of the company have been gradually raised to Taka two hundred fifty Million (Tk. 250,000,000) from Taka Seventy million till 85-86.

1.3.2 Inception:

In pursuance of the Industrial Development Policy of Government of erstwhile Pakistan, the necessity for establishing a diesel engine manufacturing plant in the territory what is now Bangladesh, was felt in the early sixties on the basis of the growing demand for diesel engines in different sectors such as agriculture, industry, fishing, marine/road transport, energy etc. With the objective of catering to the immediate need of the then East Pakistan Agricultural Development Corporation now Bangladesh Agricultural Development Corporation (BADC) requiring 30,000 engines during the period (1965-70) for low lift pumps (LLP) for irrigation under the "Green Revolution Programme" of the Government, the then East Pakistan Industrial Development Corporation (EPIDC) decided to set up a plant in the name and style of "Pakistan Diesel Plant" (now BDP) at Joydevpur, Dhaka. Accordingly, an agreement was signed in December, 1966 between EPIDC and German Consortium consisting of M/S. Kloeckner-Humboldt- Deutz AG.,(KHD) as the licensor and

M/S. Countinno,Cargo & Co. (CCC) as the supplier of the plant for progressive manufacture of Deutz air-cooled diesel engines of the FL 511 series (1 to 6 Cylinders) in the power range of 8 to 100 H.P.

1.3.4 Implementation:

1.3.5 On the basis of the agreement and the provision of suppliers credit of about DM 8.00 Million a scheme was prepared for setting up the plant for the progressive manufacture of 1 and 2 cylinder engines (8 & 16 H.P.) with a capacity of 3,000 engines per annum. The implementation of the project started in the middle of 1968 after the approval of the Agreement and the scheme by the Government in April, 1968. The plant was scheduled to be completed in 24 months i.e. by middle of 1970 and it was expected to achieve the local manufacture to the optimum level of 70% by value, within this period in 3 stages (1st stage - assembly, 2nd stage -40% localization and 3rd stage 70% localization). Although the project was ready to start the first stage of production i.e. assembling in January, 1970, the whole project could not be completed as envisaged due to various difficulties and bottlenecks. With the start of liberation war in March, 1971, the implementation of the project was delayed for an indefinite period. At that stage, nearly 85% of the plant/machinery were received at site and installed.

1.3.6 Reactivation of the plant for completion:

1.3.7 Project implementation could not be resumed immediately after liberation since the agreement with M/S. KHD & CCC could not be implemented with the emergence of Bangladesh as an independent state from December.16, 1971. Furthermore, financial assistance was needed for supplies, replacement of items damaged or lost during the war, repair of the machineries which have been idle for a long time, technical assistance and for repayment of the outstanding credit. Subsequently negotiations started with KHD/CCC for reactivation and completion of the plant. Finally, the Government of Bangladesh approached the Government of the Federal Republic of Germany(FRG) for a capital aid in September, 1973 to enable completion of the project. After series of discussions and thorough appraisal of the project, the Government of the Federal Republic of Germany, through KFW, granted a project loan of DM 8.4 million with interest rate of 0.75% per annum repayable in 30 years with a grace period of 10 years under a loan and project agreement concluded in March, 1975. An agreement with KHD/CCC was signed in August, 1976 for completion of the project under Phase-I with the

production of a smaller model engines, type F1L 210D (6 to 12 H.P.) where 73% by value, of every engine manufactured would be locally produced. The production of FL 912 series engines (2 to 6 Cylinders), 20 to 100 H.P. have been gradually introduced under Phase-II and III as soon as production line for F1L 210D models was fully operational.

1.3.8 Trial production of F1L 210D engines started in October, 1979, with 42% local component and this percentage progressively increased to the optimum level of 73% by value of the locally manufactured components by June-1980. Subsequently, the local manufacture of FL 911 series engines (2 to 6 Cylinders) started from the fiscal year 1981-82 and by 1984 the localisation of over 30% by value for F2L 912 (2-Cylinder engines) had been achieved. Other than diesel engines BDP has the capacity for manufacturing Front & Rear Hub and Rear axle for the triwheeler (Mishuk), Sparkle hardening, Alum. Casting, precision machining and engine repairing work. At present production situation of BDP is shown in Chart 1.1.

1.3.9 Further Technical Assistance:

When the implementation of the project was nearing completion further financial assistance was required for obtaining the services of experts to assist in the local manufacture of F1L 210D engines and to provide training to the local engineers/technicians. Therefore, the German Government was again requested for an additional DM 4.3 million as technical assistance grant and this was granted through KFW under an agreement signed in 1980 where KHD was to provide the services of 9 experts for a total of 216 man-months during the period 1980-81 and 1981-82. This TA was granted to transfer technology in the production of model F1L 210D engines. However, when the FRG Government was again approached for the third time to provide further technical assistance for production of model F2L 912 series engines, the request was not approved. Reason for the rejection was, the German Government wanted BDP, first to concentrate in manufacturing single cylinder engines before going into the production of larger engines.

1.3.10 Commercial Production:

1.3.11 The assembling of engines started from January 1970. Till 1980 the project assembled and supplied about 14,000 F1L 208/210D model diesel engines to BADC for LLP & STW. Besides another 4731 numbers of F1L 712 engines were supplied to BADC by the then Deutz (PAK) Ltd. Tongi to BADC during 1967-68 and 1968-69.

CHART 1.1

BANGLADESH DIESEL PLANT LTD.
Present Product and Field of Application

Description of BDP Products/Services	Max. Capacity		Field of Application
	HP	RPM	
F1L 210D (1 Cyl. Engine)	12	3000	LLP.STW pump set. Marine. Auto Temp. rice husking M/C. Gen. set.concrete mixture.
F2L 912 (2 Cyl. Engine)	38	2800	DTW pump set. LLP. 2 cusec pumpset. marine. Gen. set. etc.
F3L 912 (3 Cyl. Engine)	58	2800	DTW Pump set. LLP 3 cusec pump set. marine. Gen. set etc.
F4L 912 (4 Cyl. Engine)	80	2800	LLP 5 cusec pump set. marine. Gen. set. Mini-bus. Truck. Tractor
F6L 912 (6 Cyl. Engine)	120	2800	Bus. Truck. Marine. Gen. Set Re-engining work
Low Cost (1 Cyl. Engine)	8	2200	STW Pump set. Gen. Set Marine
Low Cost (2 Cyl. Engine)	33	2250	LLP pump set. Gen. Set.Marine. Auto-Tempo. Rice husking
Front & Rear Hub			Mishuk & Honda Motor Cycle Suzuki Motor Cycle etc.
Rear Axle Mishuk			Mishuk of Atlas Bangladesh Ltd.
Sprocket hardening			Mishuk of Atlas Bangladesh
Al-casting & precision machining			Al-Casting & precision machining.
Engine Repair			Repair of BDP engines and and engines of other model & make in the field

1.3.12 The commercial production of F1L 210D (6-12 HP) model started in 1980-81 with the production target of 8000 in three shift operation per year with 73% local component & 27% imported component. The manufacturing of bigger horse power engines (F2L912) with capacity utilization of 80%, started in 1981-82. Besides other models of 912 with HP range of 20-120HP viz. F3L, F4L & F6L were also assembled. From 1981-82 to 1989-90 BDP manufactured/assembled a total of 15,053 engines of various sizes and models.

1.3.13 Some of the justification for reactivation of the BDP was described in the PP (June 1977) were :

- The diesel engines produced by BDP will be used for multiple purpose to meet the demand of agriculture sector, Marine, Road Transport sector and Industrial sector.

- BDP can substitute the import and save upto 245.00 million taka annually.

- Ensure availability of locally manufactured spare parts for the manufactured engines.

- Standardization of diesel engines in the country under national control.

1.3.14 A comparative price analysis was done in 1976 to emphasize the justification of BDP production. The different price at that time was Tk.6336.00 for Yanmar T3L105C, Tk.6782.00 for Mitsubishi NM85 and Tk.8650.00 for BDP (ex-factory) F1L 210D. The fuel consumption of these three brands of engines were also shown as 190 Gr, 190 gr and 174 gr at 1500 RPM, making Deutz F1L 210D, the most fuel economic. And that was placed as justification for the relatively higher price.

1.3.15 After Sales Service

With the increasing number of Deutz engines being used in Bangladesh, the after sales services of BDP had to be strengthened. In the past, after-sales services of BDP-manufactured engines were undertaken by BADC, but, it was brought to the attention of BDP that BADC's services were not satisfactory. In order to correct this situation, Government advised BDP to provide after sales service. In 1982 it was decided to establish four regional centers and a central workshop in its factory compound to service the after sales requirements of their customers. BDP also appointed Deutz(BD) Ltd.(DBL) as its principal service

agent. Consequently, enlarged its central service workshop and Training Center situated at Tejgaon Industrial Area, Dhaka and opened two more service centers outside Dhaka one at Cox's Bazar and another at Bogra. The central service workshop of Deutz Bangladesh Limited (DBL) is equipped with modern facilities, mobile service vans and manned with German Engineers, German trained Bangladesh Engineers and local skilled technicians.

1.3.12 The other two service centers are recently put into operation at Mymensingh and Jessore.

1.4.0 METHODOLOGY OF THE STUDY

1.4.1 In order to facilitate the smooth conduct of the study, rational analysis of data and to ensure realistic and practicable recommendations, the consultants evolved appropriate methodology for the study.

1.4.2 Upon receipt of the award letter of UNIDO, the Bangladesh Management Development Center (BMDC) mobilized its team of Consultants and chalked out a detail action plan.

1.4.3 The consultants examined the details of data specifications and data requirements from secondary and primary sources. Types of data required for the study were identified and are listed below.

1.4.5 Required Data

Some of the information/data required for :

* Type of diesel engines.
* Size of diesel engines.
* Number of diesel engines imported each year.
* Different types and make of diesel engines available.
* Price range of different diesel engines.
* Name, address & capacity of local manufacturers.
* Production of engines by local manufacturers.
* Number of diesel engines required for different use.
* Agriculture production - current and forecasted.

* Irrigation schemes - current and future projection.

* Year-wise production and sales of BDP engines.

* Price of different engines.

* Service facilities available from supplier/ manufacturers.

* Distribution system of different supplier/ manufacturers.

* Management of BDP.

* User's perception of different engines.

* C & F price of engines.

* Sales tax and custom duties in percentage.

* Government import policy.

1.4.6 Sources of Data

1.4.7 The Sources for the above mentioned data/information both Secondary & Primary - were identified and are listed below. The sources have been classified by nature of their organization viz, Government sector for Macro level data. Public Sector and Private Sector Organizations for both Macro and Micro level data. User level for micro level data etc.

a) Government Level : Planning Commission

Bureau of Statistics

Customs Authority (Chittagong & Khulna)

Chief Controller of Import and Export

Ministry of Industries

Board of Investment

b) Organizational Level :

Public Sector :

Bangladesh Agricultural Development Corporation (BADC)

Bangladesh Rural Development Board(BRDB)

Bangladesh Krishi Bank (BKB)

Bangladesh Water Development Board (BWDB)

Rural Electrification Board (REB)

Bangladesh Diesel Plant(BDP)

Bangladesh Steel & Engineering Corporation (BSEC)

Private Sector :

Local Manufacturers
Importers, Traders, Wholesalers

c) User Level :

- Farmers in Irrigation Schemes
- Cooperative Societies.
- Boat owners
- Other users.

1.4.8 Having identified the data required and determined specification thereof, the consultants formulated methodology for data collection that would be appropriate for different types of data sources. To collect data - primary and secondary - following specific methods were used :

- Questionnaire
- Interview
- Meeting
- Observation
- In depth critical review of published materials

1.4.9 It was decided that four different types of sample survey would be conducted for collection of primary data.

1. Market Survey of users of small diesel engines
2. Census of current producers
3. Channel survey
4. Survey of BADC/BRDB officials at the selected upazilas.

1.4.10 A set of questionnaires were prepared, pretested and then finalized for collection of data for these surveys. These questionnaires are enclosed as annexure 1 through 4. A set of structured data collection sheets were also designed and develop for collection of historical data from the different institutional sources and are enclosed as annexure 5 through 7.

1.4.11 Sampling Techniques : Selection of samples and determination of sample size:

1.4.12 In the determination of study locale and sample size, both purposive and stratified random selection method was applied. The underlying guiding principle was to accommodate representation of regional and sub regional concentration of users as well as to ensure rational reflection of use pattern.

1.4.13 Some of the salient features of and rationale for sample selection and determination of size of the sample are discussed below :

1.4.14 Study Locale

- Initially 46 upazilas (10%) were selected randomly from al the 4 divisions of the country. Subsequently another 12 upazilas were added as per recommendations of BDP authority. All the Four Divisions of Bangladesh were covered purposively.

- 100% of the major manufacturers and potential manufacturers and suppliers of diesel engines were covered.

- Efforts were given to identify the concentrations of BDP diesel engine users.

- The target from users viz farmers, boatmen and others are selected purposively but the respondents were selected randomly.

1.4.15 Selection of Sample and Determination of Size

1.4.16 Respondents were selected purposively to cover

- main users viz Farmers, Boatmen, other users in each selected upazilas. A total of 14 respondent were selected in each upazila - 10 farmers, 2 boatman, 2 other users. These were selected randomly.

- main suppliers of small diesel engines viz BADC, BRDB, BKB. They were purposively selected.

- Ensure adequate representation of different sub groups by purpose of use of small diesel engines viz. DTW, LLP, STW etc. samples were selected in random basis.

- Main current manufacturers/assemblers as well as potential manufacturers/assemblers (sanctioned units)

- Importers/Wholesalers/Retailers selected randomly.

1.4.17 A schematic representation of the selection of sample and determination of sample size is shown in figure 1.1

1.4.18 Date Collection and Processing :

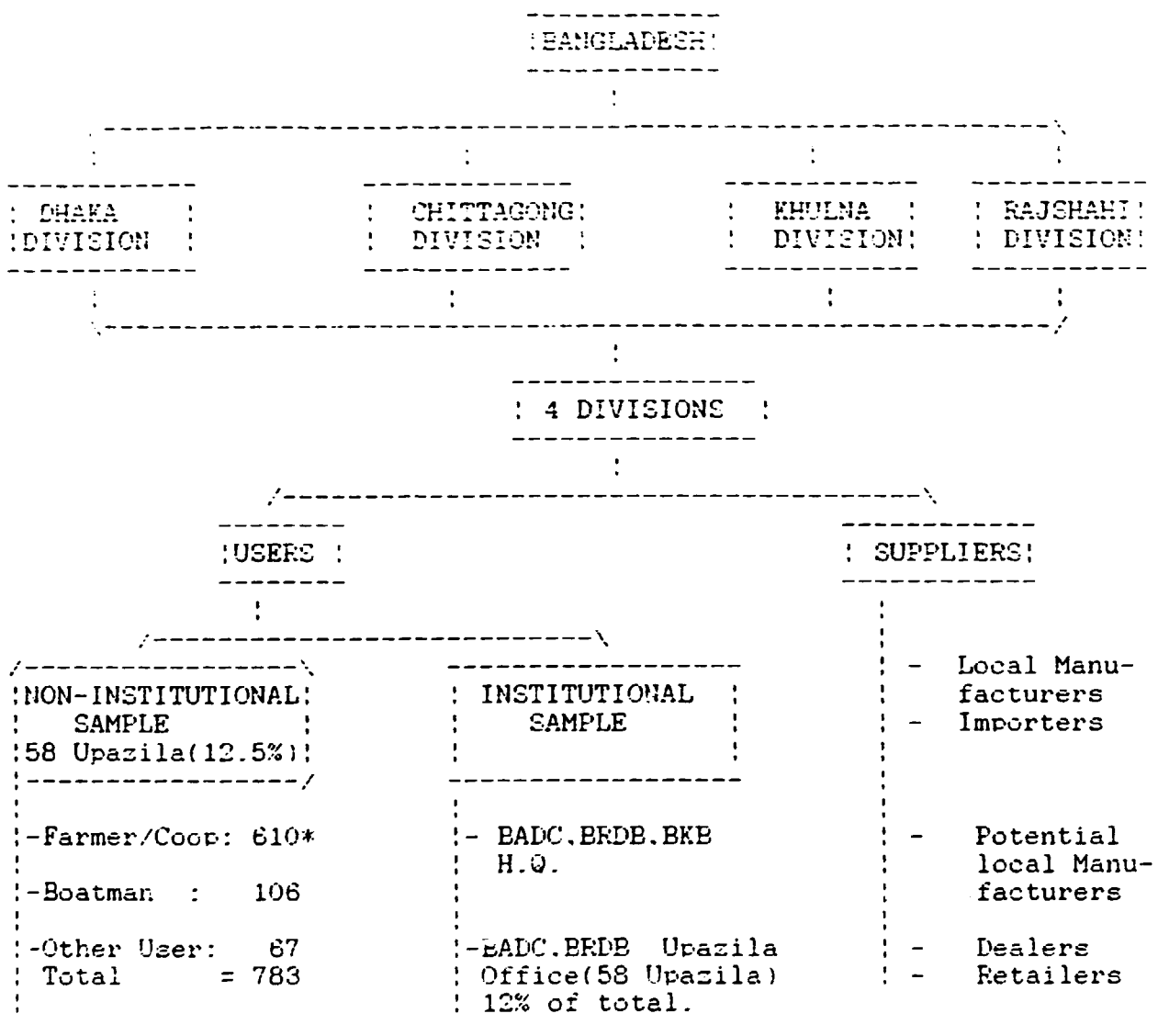
1.4.19 Data were collected from the various sources through administration of structured questionnaires and formats. For this purpose a team of Field Investigators and Research Associates - both from within and outside of BMDC - were employed. They were imparted short but comprehensive training in the art of data collection.

1.4.20 Data thus collected was fed into computers using Foxbase+ package. Different short but specific programmes were designed for processing and analyzing data as per requirement of the study.

1.4.21 Subsequent amendments and corrections have been done in the Final Report after discussion with DBP authorities and UNIDO representatives.

Figure 1.1

STRATIFIED RANDOM SAMPLING COVERAGE AND PROCEDURES



* Among farmers at least 2 responses from DTW/STW/LLP were cover.

1.5.0 **LIMITATIONS:**

1.5.1 The major problem that the consultants encountered in the conduct of the study was the lack of any reliable and authentic source of import data. Since most of the diesel engines are imported into the country the two possible sources of data were the Custom Authority and the Bangladesh Bureau of Statistics (BBS).

1.5.2 The Customs Authority do not have readily available data in any form except Daily Bulletin. The Bulletin shows only the name of importer, consolidated number of engines and value against the H.S. Code/BSTC Code. No information on brand, type, size, speed, and capacity are mentioned in the bulletin. The consultants felt that collection of data through compilation of daily bulletin for the last 10 years will therefore not generate any fruitful result.

1.5.3 In terms of data from the BBS some different problems were faced. Consolidated import data is readily available in the Export and Import Statistics document in terms of BSTC and H.S. Coding, quantity of import, country of origin and value. There is however no mention of brand, type, size, speed in the report.

1.5.4 However, since it is a government publication, it is the only authentic source of published data that is available for import statistics. Thus, in this study only the data from BBS has been used.

1.5.5 Data maintained by BBS is guided by international coding practices viz. H.S. code since 1988-89. Prior to that the standard practice was the BSTC code. To avoid overlapping, in this study HS Code No.840890, which is exact equivalent to BSTC Code No. 7138011 was considered.

1.5.6 In the absence of any published, authentic data regarding distribution of diesel engines by brand/make, type, size, the distribution have been made by the consultant on the basis of findings of market survey and other secondary sources, viz BADC, BRDB & BKB.

1.5.7 The records/data maintained by BADC, BKB and BRDB, the three key Public Institutions for supply of diesel engines in the country are also not adequate to show the number of engines by brand, type, size etc. Besides the stock position of BADC, BRDB, BKB has overlapping in case

of DTW engines. Till now BADC install DTW solely for irrigation purpose. Therefore, the inventory of BADC is considered as the total picture of DTW diesel engines.

1.5.8 The price analysis is difficult for the different brand of diesel engines in context to user preference for DTW & STW engines. Because, till now BADC supplies the engines along with complete set of pumps and accessories at a subsidized price. At present to market one DTW it cost more than Tk. 500,000.00 but supplied to users by BADC at a price of Tk. 175,000.00 only. This price is set irrespective of the cost of engines, electric motors.

1.5.9 The import of diesel engines by private importers was restricted and allowed with 15% CDST upto 1987. Afterwards the private importers are enjoying no CDST on diesel engines below the capacity of 20 HP. As a policy, any one can import engines under Wage Earner Scheme or Free Market Exchange (FME). There is no consolidated importers list available at any source. At the same time the record of private import position by brand size etc. are also not available. Effort has been given to conduct a market survey with retailers to identify major importers, their respective brand, type, size of engines. But information provided by the importers are also found to be incomplete in many respect.

CHAPTER - TWO

DEFINITION AND CLASSIFICATION OF DIESEL ENGINES

2.1.1 Definition :

2.1.1 The diesel engines are used as prime movers of equipment, vehicles and machineries. Its definition vary widely from the point of its use, application and trade coding system. There is no generalized definition and classification available.

2.1.2 To avoid contradiction or/and duplication the definition of diesel engines for this study has been considered from the International Harmonized System of coding (HS) No.8408.90.1 which is exactly equivalent to the Bangladesh Standard Trade Coding (BSTC) No.7138011 and describes as:

"Diesel Internal combustion piston engines,compressed ignition excluding air craft."

2.1.3 Other categories of diesel engines are not considered under this study as they either describe a different type or contradict with the conversion between HS and BSTC code. An approach, therefore, is done to classify the small diesel engines based on the use and application in the country.

2.2.0 Classification OF Diesel Engines

2.2.1 The classification of small diesel engines can be considered in many ways.Since this study is executed for Bangladesh Diesel Plant Ltd. which has been manufacturing diesel engine mainly upto 34 H.P. this study is kept limited to diesel engines upto 40 H.P. Another important criterion for classification of diesel engines is the use and application of the same in the country. This has been considered for classification in this study. Subsequently the engines upto 120 HP were also considered after discussion with BDP authorities.

2.2.2 Bangladesh predominantly is an agricultural country. The major use of diesel engines are found in operating the irrigation pumps and agricultural machineries, and country boats. The engines produced by BDP are also considered mainly for irrigation purpose.

2.2.3 The major use of diesel engines are for:

1. Irrigation pumps
2. Mechanized country boats, fishing boats
3. Farm machineries viz tractors, trawllers

2.2.4 Other uses:

1. Construction equipment viz Vibrator, Mixer Machines etc.
2. Paddy husking
3. Mechanized vehicles, viz Bus, Truck, Jeep etc.
4. Marine viz Ferry, Launches, Cargo vessels etc.
5. Generating sets.
6. Industrial use
7. Others.

2.1.5 Of many pattern of uses the study was concentrated on the main uses of small diesel engines such as :

A. Irrigation -

1. For operating Low lift Pump (LLP)
2. For operating Shallow Tubewell (STW)
3. For operating Deep Tubewell (DTW)

B. Country boats, small fishing boats,

C. Other uses, viz, vibrators, mixer machines, small rice mills, paddy husking, small generating sets etc.

2.2.6 For the above purposes small diesel engines with horse power ranging from 3 to 40 are mainly required and used. Other uses of diesel engines were not considered because of the reasons explained below :

2.2.7 Road Transport Equipments:

2.2.8 Road transport equipment viz bus, trucks, jeeps are imported either in CKD or CBU condition in the country. Each of these are supplied by the manufacturer with the specified engine mounted on the body. There is no manufacturer of transport equipment in the country who can create a demand for diesel engines. The total number of different vehicles in the country and their yearwise addition (import) is shown in the table 2.1.

Table 2.1

Yearwise number of
Transport Vehicles on Road

	1984-85	1985-86		1986-87		1987-88		1988-89	
	Total	Total	Addi.	Total	Addi.	Total	Addi.	Total	Addi.
Bus	16473	17297	824	18162	865	19048	886	21540	2492
Truck	24258	24986	728	25736	750	26517	781	29707	3190
Jeep	5222	5484	262	5757	273	6071	314	6917	846
Tractors	1695	1980	285	2038	58	2142	104	2466	324
Trawlers	769	792	23	816	24	848	32	961	113

Source : Bangladesh Statistical Yearbook. BBS. 1990.

2.2.9 From the table it can be seen that the total number of these vehicles can not create a demand for manufacturing diesel engines with the horse power ranges required for the transport vehicles in the country. Moreover all these vehicles are imported from different manufacturers with different size, power and type of engines. There is no reason to consider that BDF could supply engines for transport vehicles through locally manufacturing process.

2.2.10 Marine Transport

2.2.11 The different marine transport vehicles and their total numbers in the country is shown in the table 2.2.

Table 2.2

Total number of Marine
Vessels in Operation

Type	Year				
	1984-85	1985-86	1986-87	1987-88	1988-89
Ocean Going Vessel	21	21	21	20	21
BIWTA Transport Vehicles	533	524	484	430	396
Private Cargo	644	761	881	960	N.A
Passenger Cargo	1399	1453	1506	1552	N.A
Total :	2597	2759	2892	2962	-

Source : Bangladesh Statistical Yearbook.BBS. 1990

2.1.12 Each of the above types of marine vessels uses engines of different brand, model and horse power range. The increase rate in each year is too low. Besides the marine engines are normally of high power range and specially designed by the manufacturers. The total requirement of any single brand engine cannot create a demand for manufacturing locally.

2.1.13 Other equipments viz. railway locomotives, big generators, tractors, road rollers, cranes etc. use special type of diesel engines of very high range of powers. They cannot create a demand for local manufacturing.

2.1.14 Based on the pattern of major uses the small diesel engines were classified for this study on the basis of:

1. Horse power
2. Revolution per minute (RPM)
3. Number of cylinders
4. Cooling systems

2.1.15 Horse Power range

2.1.16 The range of horse power were grouped into 4 classes :

Class A : 5 H.P. to 12 H.P.
Class B : 12 H.P. to 23 H.P.
Class C : 23 H.P. to 40 H.P.
Class D : 46 H.P. to 120 H.P.

2.1.17 RPM

2.1.18 The use of small diesel engines varies depending upon power (HP) as well as revaluation per minute (RPM) of the engines. Two classes were considered for RPM.

Class I : 1500 RPM
Class II : 2200 RPM
Class III : 2800 - 3000 RPM

2.1.19 Number of Cylinders :

2.1.20 For this study diesel engines upto 2 cylinders has been mainly considered. There is direct relationship between H.P. range and RPM.

2.1.21 Cooling System

2.1.22 The other classification for the diesel engines considered is based upon the cooling system. Two types were considered :

Type A - Water Cooled
Type B - Air Cooled

2.1.23 The use and classification of engines vary widely. A comparison between the use and classification of engines is given below showing the range of HP and alternative RPM. Detail of model, brand and specification with use pattern is given in annexure 13.

USE	H.P.	RPM	Cylinder	Types
Low Lift Pump				
Upto 1 Cusec	5HP- 7 HP	1500/2200	1	AC/WC
2 Cusec	12HP-20HP	1500/2200	1	AC/WC
Shallow Tubewell	5HP-12HP	1500/2200	1	AC/WC
Deep Tubewells	21.5HP-40HP	1500/2200	2.3	AC/WC
Med. Country Boats	12-30HP	1500/2200	2.3	AC/WC
Small Countr. Boats	4.5HP-12HP	1500/2200	1	AC
Coastal Fishing Boats	12 -30HP	1500/2200	2.3	AC
Paddy Husking	5.5 HP-12 HP	1500/2200	1	AC/WC
Small Rice Mills	6 HP - 35 HP	1500/2200	1.2	AC/WC
Small Generator	6 HP - 12 HP	2200	1	AC

CHAPTER - THREE

CURRENT INVENTORY OF SMALL DIESEL ENGINES

3.0.0 Analysis of Diesel Engines Inventory

3.0.1 The inventory of diesel engines in Bangladesh has piled up as a result of import and local manufacturing or assembly. In the field of import BADC is the main party. BKE, BRDB and private importers are the other components of imports.

3.0.2 The BADC inventory position since its inception till 1989-90 has been shown in TAble -3. It is seen from the table that for the years under consideration, BADC inventory amounts to 293.796 pieces of diesel engines of different brands makes and models.

3.0.3 The analysis of BADC inventory position indicates that the BADC diesel engines population is comprise of 19 brands and 49 models. But it is worth mentioning that Yanmar followed by Deutz and Mitsubishi brands have the largest shares. They together account for about 63% of the total inventory.

3.0.4 The actual present inventory of BADC supplied diesel engines will be much lower than 293.796 pieces because of the fact that many diesel engines have already become inoperational because of their normal wear and tear. Thus the current inventory position of BADC diesel engines since 1980-81 to 1989-90 amounts to 180.608 prices.

3.0.5 The current inventory of BADC is formed of 140,826 pieces of imported and 39,782 pieces of locally manufactured/assembled engines. Over the period since 1980-81 till 1989-90 BADC procured 13.310 engines manufactured by BDP and 26.472 engines manufactured by BMTF.

3.0.6 Due to lack of proper data and information the current inventory of diesel engines by brand and models could not be assessed. However, the consolidated inventory has been worked out. As stated earlier, the current inventory of diesel engines in the country has been estimated by summing up the imported diesel engines and the locally manufactured/assembled ones for 1980-81 to 1989-90.

TABLE 3.1
BADC Inventory Position

BRAND	MODEL	Upto 1973-74	74-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. COOPER	SVC-E	-	-	3000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3000
2. YANMAR	TS 150C	-	-	-	9380	-	475	4500	-	-	-	7272	11300	-	-	-	520	-	33447
	TS 220C	-	-	-	-	-	-	5535	3800	2000	-	-	-	-	-	-	-	-	11335
	TS 80C	-	-	-	-	-	-	3139	-	-	-	-	-	-	-	-	-	-	3139
	TS 70C	-	-	-	-	-	-	7122	12807	-	11700	8156	-	-	-	-	-	-	39785
	TS 60B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4500	4500
	TF 105C	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	50
	TS 180C	1910	3750	-	-	-	-	600	-	-	-	-	-	1200	-	-	600	1000	9060
	TS 190R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	100
	TS 230R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130	130
	60B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	-	500
3. MITSU-BISHI	MM 90	-	-	-	-	-	475	2820	-	-	-	5600	6900	-	-	3000	2844	-	21639
	MM 75	-	-	-	-	-	-	6000	-	-	8128	-	-	-	-	-	-	-	14128
	MM 10	-	-	-	-	-	-	-	3500	-	-	-	-	300	-	-	596	-	4396
4. ERILOS-KAR	AV 1	-	-	-	-	-	200	550	-	-	-	-	-	-	-	-	-	150	900
	AV 2	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250
5. SLAVIA	-	4518	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4518
6. GDR	-	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500
7. DEUTZ	F3L912	2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2000
	F1L210D	-	-	-	-	-	450	1350	600	-	-	-	1500	-	-	-	2000	-	5900
	F2L912	-	5005	-	2000	172	8	-	-	-	-	1800	-	2000	-	1800	-	865	13650
	F1L208D	-	-	-	-	1000	-	4150	-	-	-	-	-	-	-	-	-	-	5150
	F1L812	1492	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1492
	F2L712	1800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1800
	F2L812	11622	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11622
8. DAEDONG	ND 80	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-		3500	3800
	ND 85	-	-	-	-	-	-	600	-	-	3000	-	-	-	-	-	3000	-	6600
9. LISTER	ST-1	-	-	-	-	-	-	-	-	-	2000	-	-	-	-	-	-	-	2000
	ST-2	-	-	-	-	-	-	540	-	1000	-	-	-	-	-	-	-	400	1940
	TR-2	-	-	-	-	-	-	-	-	-	-	-	500	-	-	-	1390	-	1890
	HR-4	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	30

TABLE 3.1 (CONTD.)

BRAND	MODEL	Upto 1973-74	74-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10. KUBOTA	CA-90	-	-	-	-	-	475	2200	-	-	-	2200	-	-	-	-	-	-	4875
	ER-600N	-	-	-	-	-	-	-	-	-	2300	3495	-	-	-	-	-	-	5795
	ER-900N	-	-	-	-	-	-	-	-	-	-	-	6600	-	-	-	-	-	6600
	ER-2200N	-	-	-	-	-	-	-	955	4100	-	-	-	-	-	-	-	4000	9055
	ER-1900	-	-	-	-	-	-	-	3200	500	-	-	-	-	-	-	1565	1000	6265
	RK-60N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	-	500
11. CHUBESE	185N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4695	3305	8000
-EMEI																			
-CNMAC		-	-	-	-	-	-	-	-	-	-	-	1750	-	-	-	-	-	1750
12. DONGFENG	D185N1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9500	9500
13. ICCID	105C	-	-	-	-	-	-	3000	-	-	-	-	-	-	-	-	-	-	3000
14. USHA	500D	-	-	-	-	-	-	605	-	-	-	-	-	-	-	-	-	-	605
15. BATLIBOI	GF-2/B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000	1000
16. GRIEVES	CCW-50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000	1000
17. EASTERN	S1850	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000	1000
18. RUSTON	1YWA	955	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	4050
	2YWA	15550	-	-	-	-	-	60	-	-	-	-	-	-	-	-	-	-	15610
	INDIAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3500	3500
19. VM	ITALY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2485	2485
TOTAL :		43597	8755	3000	11380	1202	2383	42871	24862	7600	27128	28523	28550	3500	-	4800	18310	37335	293796

TABLE 3.1A

BRDB INVENTORY OF DIESEL ENGINES (NO.)

YEAR	DTW * 21 - 35 HP	STW 5 - 7 HP	LLP 12 - 31 HP
1979-80	210	3861	-
1980-81	284	4327	905
1981-82	313	7020	1001
1982-83	717	7569	-
1983-84	899	6516	-
1984-85	3910	4411	540
1985-86	2045	2240	460
1986-87	1088	928	450
1987-88	1066	1620	571
1988-89	776	1510	250
1989-90	1272	-	-
TOTAL:	12.580	40.002	4.177

Source : BRDB.

* All the diesel engines were considered with BADC inventory as DTW are installed jointly with BADC.

The position of BKB is not available as they suspended their own import since 1982-83. BKB extend loan facilities to the farmers for purchasing diesel engine and pumps with predetermined price agreed upon with the private importers, dealers, BDP etc. and BKB.

TABLE 3.2

Locally manufactured/assembled Diesel Engines during 1980-81 TO 1989-90

Sources / Years	BDP	BMTF	MILNARS	TOTAL
1980-81	2700	5808	-	8508
1981-82	779	600	-	1379
1982-83	1247	11008	-	12255
1983-84	1636	2352	-	3988
1984-85	2045	3438	-	5483
1985-86	973	3412	310	4695
1986-87	1683	569	440	2692
1987-88	1324	-	480	1704
1988-89	2089	-	420	2509
1989-90	677	-	-	677
TOTAL:	15053	27187	1650	43890

Source : BDP, BMTF & BOI

TABLE 3.3

Total Inventory of Diesel Engines for the period 1980-81 TO 1989-90

YEARS	TOTAL IMPORT	TOTAL LOCAL MANU-FACTURING/ASSEMBLY	TOTAL
1980-81	43.154	8.508	51.662
1981-82	32.892	1.379	34.271
1982-83	50.113	12.255	62.368
1983-84	65.563	3.988	69.551
1984-85	32.362	5.483	37.845
1985-86	19.774	4.695	24.469
1986-87	59.869	2.692	62.561
1987-88	8.180	1.704	9.884
1988-89	52.881	2.509	55.390
1989-90	86.813	677	87.490
TOTAL:	451.601	43.890	495.491

Source : BBS publications and BDP,BMTF, BOI information.

3.0.7 As revealed by Table 3.2, a total of 43,890 pieces of diesel engines have been manufactured /assembled locally by BDP, BMTF and Milnars over the years 1980-81 to 1989-90.

3.0.8 The consolidated current inventory imported and locally manufactured/assembled engines has been presented in Table 3.3. As revealed this table a total number of 451,601 pieces of diesel engines have been imported and 43,890 pieces manufactured/assembled locally during the last ten years. Thus the total current inventory of diesel engines in the country amounts to 495,491 pieces by adding together the total imported quantity and locally manufactured quantity.

3.0.9 The main sources of fund for import by public sector institutions till 1989 were credits and grants offered by IDA/World Bank, Yen Credit and Barters. The private imports, however, were financed through WES (currently renamed as Free Exchange Market). The local manufacturing/assembling activities were financed through Cash Foreign Exchange and Supplier's credit.

3.0.10 Estimated Current Inventory of Diesel Engines(46-120 HP).

3.10.1 A careful estimate of current inventory of diesel engines of the range 46 - 120 HP has been made for other users as per request of the BDP based on BSS figures and the study "Market Survey of Diesel engines", conducted by Prokausali Sangsad Limited in 1983 and given below.

Item	Total No. in 1988-89	App. % use 46-120 HP engines	Estimated nos. of 46-120 HP engines
Truck	29707	88.83%	26395
Bus	21540	63.49%	13675
Tractors	2466	51.19%	1262
Marine Vessel	3272	24.00%	785
Fishing Boats	2768	2.08%	78
Generating Set	5600	15.00%	840
Total :		..	43,035

CHAPTER - FOUR

FINDINGS OF SURVEYS

4.0.0 INTRODUCTION

4.0.1 In course of the conduct of the study, three separate sample surveys were undertaken - one for the users of small diesel engines, one for the survey of channels of distribution of small diesel engines and the other for BRDB & BADC officials at the upazila level. The objectives of the first two survey were three fold:

1. to identify brand popularity and customer acceptance of different brands

2. customer familiarity with the BDP brands and model

3. to identify factors influencing for customer choice

4.0.2 The objective of the survey of BADC & BRDB officials of the upazila level was primarily to validate the findings of the other two surveys.

4.0.3 Sample was selected on stratified random and purposive sampling basis. Initially 46 or 10% of the upazilas were selected for survey. However, afterwards an additional 12 upazilas were included as per request from BDP. The selection was based on two criteria :

1. 70% of upazilas where irrigation schemes are in vogue
2. 30% where irrigation schemes are not very popular

4.0.4 It was decided that a total of 10 farmers would be selected from each of the selected upazilas. Similarly 2 boatman of mechanized boats and 2 other users from the same upazila would be interviewed. BADC and BRDB officials of the same upazilas would be iterviewed and information collected from them.

4.0.5 Thus the total sample size as determined was as follows :

Number of Upazila	= 46
Total Number of Farmers @ 10 in each upazila	= 460
Total number of Boatman @ 2 in each upazila	= 92
Total number of other users @ 2 in each Upazila	
BADC Upazila Official	= 46
BRDB Upazila Official	= 46

4.0.6 However in the course of actual conduct of the survey the sample size came to :

Number of Upazila	= 58
Total number of Farmers	= 610
Total number of Boatmen	= 106
Total number of other users	= 67
BAE upazila Officers	= 47
BRDB upazila Officer(URIO)	= 47

4.1.0 FINDINGS OF USER SURVEY

4.1.1 Some of the major findings of the survey of users of small diesel engines are summarized below.

4.1.2 As can be seen from table 4.1 Yanmar with 26% of the total market share is the most popular brand. Dongfeng with 104 and 13% is the second most popular brand. Deutz with 12% is a close third.

4.1.3 Japanese engines accounted for 43% or 333 engines of the total while Chinese engines accounted for 193 or 24% of the total.

Table 4.1
Distribution of engines by brand & country of origin

MAKE/BRAND	COUNTRY OF ORIGIN	NO.OF ENGINES	% OF TOTAL
DEUTZ	BD/GERMANY	95	12
RUSTON	U.K.	86	11
LISTER	U.K.	47	6
YANMAR	JAPAN	205	26
DONGFENG	CHINA	104	13
DAEDONG	KOREA	17	2
KIRLOSKER	INDIA	13	2
KUBOTA	JAPAN	52	7
MITSUBISHI	JAPAN	76	10
OTHERS(MAINLY FROM CHINA)		89	11
TOTAL :		783	100

4.1.4 It is pertinent to mention here that most of the respondents purchased diesel engines for operating pumps prior to 1987. Since 1988, when the business of minor irrigation equipment was deregulated and liberalised, market share of Deutz engines have been declining and that of Dongfeng and other Chinese engines have been sharply increasing primarily because of price advantage. It should also be borne in mind that till recently BAIC was doing exclusive business in minor irrigation equipments and whatever brand was purchased by BAIC was made available in the market during that particular season.

4.1.5 Table 4.2 below shows the distribution of diesel engines by brands and their Horse Power range, RPM and Cylinder.

Table 4.2

Distribution of diesel engines by brand, horse power, RPM & cylinder

(In No.)

MAKE/BRAND	HORSE POWER			RPM		CYLINDER		
	5 -12HP	12-23HP	23-40HP	1500	1600-3000	1	2	3
DEUTZ	30	8	57	25	70	30	63	2
RUSTON	14	36	36	57	29	21	35	30
LISTER	3	3	41	34	13	3	21	23
YANMAR	162	31	12	90	115	186	11	8
DONGFENG	64	38	2	10	94	98	3	3
DAEDONG	16	0	1	4	13	16	0	1
KIRLOSKER	8	4	0	5	7	8	4	0
KUBOTA	45	7	0	19	33	51	1	0
MITSUBISHI	65	3	8	38	38	70	2	4
OTHERS	52	9	28	33	56	52	13	24
TOTAL :	459	139	185	315	468	535	153	95

4.1.6 5% or 60% of the Deutz engines are of higher horse power i.e. 21-40 HP range. 55 engines or 58% are of 2 or more cylinders. This justifies the use of Deutz for DTW purposes. Yanmar and Dongfeng on the otherhand between them have 49% of the market share for engines of 6-12 HP range. While in terms of RPM, they are high .in terms of cylinder they are mostly of 1 cylinder. Thus Yanmar and Dongfeng engines are light and easily movable and this justifies their preponderance in multiple use.

4.1.7 Demand for Deutz engines has been showing a more or less declining trend over the period 1984 to 1990. The market share of Deutz has gone down from 13% in 1984 to 8% in 1990. On the contrary share of Dongfeng has risen sharply during 1989 and 1990 with 22% & 29% of the market share respectively. Yanmar has maintained a steady market share of around 24% though fluctuating from 20% in 1984 to 40% in 1986. Market share for other engines which comprise mostly of engines of Chinese origin has increased its share tremendously. This is substantiated by the current market trend which shows that Chinese engines, light, versatile, cheap and economic are increasingly in demand particularly following deregulation of minor irrigation business since 1988. Table 4.3 below shows the distribution by brand over the last seven years.

Table 4.3
Brand and Yearwise percentage of purchase

MAKE/BRAND	1984		1985		1986		1987		1988		1989		1990	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
DEUTZ	26	13	13	19	11	22	6	9	10	10	15	14	14	8
RUSTON	35	17	7	10	5	10	11	16	8	8	8	7	12	7
LISTER	15	7	3	4	0	0	4	6	10	10	8	7	7	4
YANMAR	41	20	22	31	20	40	20	29	33	32	31	26	38	22
DONGFENG	2	1	0	0	1	2	7	10	18	17	26	22	50	29
DAEDONG	1	0	4	6	1	2	1	1	4	4	3	2	3	2
KIRLOSKER	6	3	0	0	1	2	1	1	3	2	1	1	0	0
KUBOTA	21	10	9	13	4	8	7	10	3	3	3	2	5	3
MITSUBISHI	32	16	9	13	5	10	9	13	9	9	10	9	2	1
OTHERS	22	11	3	4	2	4	3	4	5	5	12	10	42	24

4.1.8 As can be seen from Table 4.4 Deutz engines are mostly used for DTW, followed by use in LLPs. In both these, engines of higher Horse power range and greater cylinder are required. Deutz have a share of 24% and 19% respectively of DTW and LLP markets.

Table 4.4
Number and percentage of diesel engines used for different purposes by brand.

MAKE BRAND	DTW		STW		LLP		BOAT		OTHERS		MULTIPLE	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
DEUTZ	57	24	8	3	22	19	2	1	3	3	5	5
RUSTON	41	17	0	0	35	30	1	1	13	13	4	4
LISTER	41	17	2	1	4	3	1	1	5	5	6	6
YANMAR	48	20	112	38	17	15	44	33	26	26	34	34
DONGFENG	8	3	41	14	12	10	51	39	21	21	27	27
DAEDONG	2	1	10	3	1	1	5	4	2	2	4	4
KIRLOSKER	1	0	9	3	1	1	2	1	1	1	3	3
KUBOTA	0	0	33	11	13	11	5	4	3	3	6	6
MITSUBISHI	12	5	53	18	5	4	10	8	4	4	7	7
OTHERS	30	13	26	9	7	6	10	8	21	21	4	4
TOTAL	240		296		117		131		99		100	100

4.1.9 According to the respondents to the survey Yanmar is the second most popular brand being used for DTW with a market share of 20%. Lister and Ruston have market share of 17% each.

4.1.10 Yanmar is the most used brand in STW with a share of 38%. Mitsubishi with 18% comes next. Dongfeng has 14% of the market share.

4.1.11 Most of the engines used in Boats belong either to Yanmar or Dongfeng with market share of 33% and 39% respectively. Similarly for use for other purposes viz rice howlers, oil mills etc. Yanmar and Dongfeng have the greatest market share.

4.1.12 As regards engines that are put to multiple use, Yanmar engines comes first with a share of 34% and Dongfeng next with 27%. This substantiates the popularity of these two brands. Both these engines are small, light and easy to move. Satisfaction of customers as indicated from table 3.6 is also the highest for these two brands.

4.1.13 Most of the respondents indicated that Brand name was an important factor in the selection of Diesel engines. This was followed by 49% responses each for Durability and Service facility. Country of origin was important to 27% respondents while price was important factor for 26%. The

distribution of responses obviously do not show any clear pattern to indicate any possible marketing strategy. Table 4.5 below shows the percentage responses for different influencing factors.

Table 4.5
Factors Influencing Choice of
Diesel Engines

FACTORS	FREQUENCY (IN %)*
BRAND	68
DURABILITY	49
SERVICE FACILITY	49
LOW PRICE	26
HORSE POWER	30
MULTIPLE USE	7
RPM	8
COUNTRY OF ORIGIN	27

* Multiple answers

4.1.14 It should be borne in mind that till recently business in minor irrigation equipment was regulated and the availability of brands and prices of engines were conditioned by what BADC made available. It is still true for DTW which the BADC sells at a very highly subsidized rate and the customers have very little choice in the selection of brands and the prices do not necessarily reflect the influence of open market mechanism.

4.1.15 User satisfaction, as indicated in Table 4.6 is the highest for Yanmar with 191 or 93% expressing their satisfaction with the performance of the engine. Yanmar is closely followed by Dongfeng with 87%. Chinese engines in general as shown from the others category is satisfactory with 83% of the users expressing satisfaction.

Table 4.6
Percentage-wise Customer Satisfaction by Brand

	Number Satisfied	Total Respondent	% Satisfied
DEUTZ	59	95	62
RUSTON	76	86	88
LISTER	41	47	87
YANMAR	191	205	93
DONGFENG	90	104	87
DAEDONG	14	17	82
KIRLOSKER	11	12	92
KUBOTA	45	52	87
MITSUBISHI	61	76	80
OTHERS	74	89	83
Total :	662	783	85%

4.1.16 Satisfaction with the use of Deutz engines, however is the lowest with only 62% responding favorable.

4.1.17 Response to the question on availability of service facility indicate a very satisfactory position. 86% of the respondents indicated that servicing was no problem. 77% of the respondents get their servicing done through the private mechanics while the rest through BADC. It indicates that the programmes of various governmental agencies like BADC, BRDB BDP and NGO's in training up of local unemployed youth in the trade of mechanic for repair and maintenance of agricultural implements are paying off. According to BRDB, 106,407 members of the Irrigation Management Program (IMP) implementation team were trained on Instituional & Technical and Agronomy subject areas. Besides, BRDB provided 1 day training to 189,934 farmers on IMP.

4.1.18 73% of the respondents were familiar with the name of Deutz. However, only 95 or 12% actually purchased it. Of these 95, 57 engines or 60% of the total Deutz population was used for DTW which is sold by BADC at a highly subsidized rate.

4.1.19 Some of the major negative factors for BDP engines as brought out by the survey are shown in Table 4.7.

Table 4.7
Negative factors of BDP Engines

FACTORS	FREQUENCY * (in % of response)
HIGH PRICE	33
NO SERVICE FACILITY	12
NO DEALER	35
HIGH MAINTENANCE COST	25
POOR QUALITY	14
NOT SUITABLE	15

* Multiple answers

4.1.20 Of the 106 respondents who are using small diesel engines for operating their boats none have any gear box. 74% of them indicated willingness to install gear box should they be made available. The breakdown of respondents willing to pay different prices for gear box is as under:

Price range of Gear Box	Frequency (in % of response)
Upto Tk. 10,000	89
Tk. 10001 - 15,000	6
Above 15,000	0
No response	5

4.1.21 81% of the respondents indicated that they would convert to electricity driven motors rather than currently diesel run engines, should smooth and regular supply of electricity be ensured. The percentage of response is as high as 95% for DTWs since these are static and cannot be used for other purposes and fuel consumption is also high. Thus it is obvious that the potential of conversion to electricity of small diesel engines is very high and this may very adversely affect the future market for small diesel engines.

4.2.0 FINDINGS : CHANNEL SURVEY

4.2.1 A total of 20 big dealers, wholesalers and retailers of diesel engines were surveyed. The major findings of the survey are summarized below.

4.2.2 Most of the dealers sale small diesel engines of Chinese origin. Only two dealers were found who sell Yanmar diesel engines. Both the air-cooled and water cooled engines are available. The horse power range from 3 to 30 HP. The distribution of responses in terms of HP range and price brand is given in Table 4.8.

Table 4.8
Brand of Engines

Brand	% of Response	H.P. Range	Price range(Tk.)
Jinma	83%	12 - 18	10,500 - 12,400
Dongfeng	75%	8 - 18	9,000 - 11,500
Saifeng	66%	12 - 16	9,000 - 13,100
Wanely	50%	12 - 16	9,000 - 11,600
CMC	33%	8 - 18	8,000 - 10,300
XIAN	33%	6	6,900 - 7,000
3 CIRCLE	25%	3	5,300 - 5,400

4.2.3 None of the dealers extend credit. However, 50% responded that they extend credit with cash down payment. 50% of the dealers sell only on cash term.

4.2.4 Only 8% of the dealer provide after sale service. 100% of the dealers assure availability of spares. The most highly demanded brand among Chinese engines is found to be Dongfeng. The other brands are not well known to the buyer. The demand pattern of different models of Chinese engines is given below :

Dongfeng - 30%
Saifeng - 25%
Jinma - 15%

4.2.5 According to the dealers .the choice of buying a diesel engine depend on different factors. The distribution of response by different factors influencing customer choice is shown below.

Price	60%
Country	50%
Brand	30%
Service Facility	30%
Multiple use	20%

4.2.6 Horse power, durability etc. has little influence in the choice of an engine. Distribution of classification of buyers by use, as per the dealers are :

Irrigation	40%
Boat	30%
Small rice mill	20%
Construction Equipment & water pumps	10%

4.2.7 Prices of small diesel engines in the open market is fixed by the importers. For Chinese engines, price is determined by the operation of open market mechanism as the same brands and model of engines are imported by many importers.

4.2.8 The commission of the retailer/dealer vary between 5-10% for selling the engines. None of the dealers carry locally manufactured diesel engines.

4.2.9 All the dealers sell diesel engines as one of the items along with other business like electric motors, grinders, water pumps and other hardware items. The average annual sell of Chinese engines estimated to be around 30,000 - 40,000 according to the dealers.

4.3.0 FINDINGS : BADC AND BRDB RESPONDENTS

4.3.1 The summary of the findings of the survey conducted for BRDB and BADC officers at 58 upazilas are summarized below.

4.3.2 Responses from 49 BADC officers and 51 BRDB officials were received. The rest were not available.

4.3.3 There are huge stock of diesel engines for DTW,STW, LLP with BADC 50% of which are unserviceable due to old age. About 10% of engines of 1970s are still in operation. BADC had supplied varieties of engines to the users. The sale of old engines are still going on at subsidized rate.

4.3.4 The distribution pattern of DTW and STW vary widely from place to place. In 21 upazila out of 58 the number of DTW exceeds 100. In 8 upazilas this number is less than 10. Due to underground water level this DTW are more concentrated in some upazilas. STW are popular in all the upazilas LLP schemes are gradually declining importance compared to STW irrigation schemes.

4.3.5 While BRDB own some DTWs the actual implementation of supply source is BADC for all DTWs in the country.

4.3.6 The current estimated number of electric motor driven irrigation schemes as revealed from the selected upazila, would be around 10% of all irrigation schemes.

4.3.7 The main concentration of diesel engines lies between the 5.5 HP to 12 HP. The next level is upto 27 HP. Only a few engines are over 27 HP.

4.3.8 The cooling system of the engines are almost equally distributed. The Japanese and Chinese engines are operated mainly on water cooling, which is gaining more market share.

4.3.9 Only two speed of engines are being used which are 1500 RPM and 3250 RPM.

4.3.10 The average life of engines as described by the respondents vary between 5 to 10 years.

4.3.11 As regards the factors that influence the customer choice of small diesel engines, the survey reveals that Brand, Service facility and price are the most important.

4.4.0 FINDINGS FOR OTHER USERS (46-120 HP):

4.4.1 Subsequent interviews were conducted with Bus and Truck owners, BRTC Officials, BIWTC Officials. During the discussion several information were collected which are summarized below.

4.4.2 Average life of Bus and Truck (both engine & chasiss) is considered as 15 years with the life of chasiss with several times overhauling of engines & body repairing. Approximately 10% owners will be interested to buy local BDP engines if they are cheaper and compatible to the Chasiss and gear box. In all cases they prefer to have spares and accessories from the original engine manufacturers. The cost of spares and accessories are increasing each year and the maintenance cost. The life period of marine engines and other users also estimated to be 15 years.

4.4.3 Most of the interviewees are not aware about the possibility of having locally manufactured compatible diesel engines. As such 90% showed interest for import of the required brand and make of diesel engines. BRTC officials expressed their positive responses for installation of BDP engines on their buses & trucks.

CHAPTER - FIVE

IMPORT ANALYSIS

5.0.0 IMPORT STATISTICS

5.0.1 Imports of Diesel Engines both in quantity and value over the last 10(ten) years have been shown in Table 5.1. This table has been quoted from Bangladesh Bureau of Statistics Publications. The quantity figure in 1987-88 seems to be abnormally low. Such variations may be explained in the following manner :

i) From the beginning of the 1986-87 financial year, CIST on diesel engines were relieved by a government order. May be this change lead to huge LC opening and accordingly resulted to a sizable import (in terms of quantity) of 59,869 pieces as shown against 1986-87 in the BBS Publications.

ii) The value implications of the huge import in 1986-87 got its reflection in 1987-88 when the imports physically took place. It is found from analysis of 1986-87 and 1987-88 figures that the average C&F price of a diesel engine in 1986-87 amounted to approximately Tk. 3000/- (which is too low), whereas in 1987-88 to about Tk.17,000 (which is much high). The imports in 1986-87 came down to 8,180 pieces, may be due to big imports in 1986-87 and piling up of unsold stock over the past years. Import statistics based on HP, RPM etc. were not available. Approximately 90% of the engines imported were below 20 HP.

Table 5.1
Total number of diesel engines imported

Year	No. of Engines	Value in Mill Taka
1980-81	43.154	602.78
1981-82	32.892	527.46
1982-83	50.113	827.15
1983-84	65.563	542.99
1984-85	32.362	567.99
1985-86	19.774	297.20
1986-87	59.869	184.50
1987-88	8.180	146.68
1988-89	52.881	536.90
1989-90	86.813	1011.69
Total :	451.601	5.245.19

Source : Bangladesh Bureau of Statistics (BBS).

5.0.2 As Table 5.1 reveals a total number of 451.801 pieces of different types of diesel engines were imported during the last 10 years which involved a huge sum of foreign exchange equivalent to 5.245.19 million taka.

5.0.3 It was found that imports were being made mainly from six countries. The import quantity from this six countries since 1985-86 till 1987-88 have been demonstrated in Table 5.2.

Table 5.2
Import Statistics of Diesel Engines
from selected countries

COUNTRIES	YEAR			TOTAL
	1985-86	1986-87	1987-88	
China	2763	2499	2836	8098
U.K.	9008	1117	1201	11326
Japan	6130	52828	3093	62054
India	808	535	299	1642
Germany	50	2542	252	2844
Korea	18	16	180	214
TOTAL :	18.777	59.537	7.861	86.175

Source : BKB, BADC.

5.0.4 The situation at present is characterized with some basic changes like rapid increase of imports from China, Korea and India.

5.0.5 The major problem in representing imports of last years by brands, makes and models is unavailability of necessary data and information. Relevant institutions like Customs Department, Controller of Imports & Exports, BBS, BKB etc. were contacted. But none maintains information regarding imports of diesel engines by brands and models.

5.0.6 Some major private importer/dealers of diesel engines were also contacted in a view to collect required information. They too could not provide adequate information regarding model-wise import over the last years. However, data collected from them have been presented in Table 5.3. Information supplied by them do not tally with the BBS import statistics. As for example, total imports shown in BBS statistics (Table 5.1) against 1987-88 is 8180 pieces whereas according to data supplied by the major private importers, it figures to 19.500 pieces for 1987-88.

Table 5.3
Import by some major importers/dealers

Years / Importers	1991-92	1992-93	1993-94	1994-95	1985-86	1986-87	1987-98	1988-89	1989-90	Total
1. Purabi Syndicate (Eastern)	-	-	-	-	-	-	-	2000	2000	4000
2. BAITCO (Yanmar)	-	5000	2000	-	-	-	-	40	59	7099
3. Subarna Trade Intnl. (Daedong)	-	-	-	-	3500	2000	4500	5000	1000	16000
4. Eastern Electrical (Lister)	-	-	-	-	-	1958	2000	4000	4000	12958
5. Farmland (Kubota)	5000	5000	5000	5000	4000	15000	4000	9165	4676	55841
6. M/S. Dhaka Fibres (Kirloskar)	-	-	-	-	-	-	-	2000	2000	4000
7. Samson Pvt. Ltd.(Dongfeng)	-	-	-	500	1000	3000	8000	12000	24000	48500
Total :	5000	10000	7000	5500	7500	22958	19500	34205	37726	149389

Source : Survey Results

5.0.7 As all the probable sources of information proved to be not in a position to supply required data, a complete table of imports during the last ten years according to brands and models could not be worked out.

5.0.8 The yearwise unit C&F prices of some diesel engines with Horse Power ranging from 3 to 7 have been presented in Table 5.4.

Table 5.4
Yearwise unit C&F prices (in Taka)

Brands	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
1. KUBOTA	10256	12372	14932	17348	17348	17348	-	-
2. MITSUBISHI	10256	13096	15334	16338	16338	16339	-	-
3. YANMAR								
Model 80	-	-	12921	12921	15973	15973	-	-
Model 105	-	-	16429	20450	20450	20450	-	-
4. DAEDONG	9405	10735	16500	16500	16500	17737	17737	21042
5. USHA	-	-	13611	-	9318	-	-	-
6. KIRLOSKAR	-	-	-	14462	14462	15885	17321	17274
7. DEUTZ Model 2100	13446	13098	13098	14000	15400	16500	20000	27500

Source : BKB.

5.0.9 As reveals Table 5.4. over the 8 years C&F price of Daedong and Duetz engines under consideration had the greatest increases of 124% and 123% respectively. Over the last 6 years C&F price of Kubota and Mitsubishi increased respectively by 69% and 59%. C&r price of Yanmar models raised on an average by 25% during the last 4 years. Though the table is incomplete, the Duetz C&F price for 1989-90 seems to be very high in relation to other brands of the same power.

5.0.10 Price comparisons among different brands by horse power have been presented on Tables 5.5 and 5.6.

Table 5.5
Price comparison (as on 16.8.89)(Quoted)

Horse Power Brand/Model	22.5	31.5	35	40
1. YANMAR	138.967	195.428	171.258	-
2. LISTER(UK)	110.821	126.567	192.622	220.000
3. VM(Italy)	-	97.675	-	124.619
4. KRILOSKER (INDIA)	86.984	-	95.335	131.766
5. XIAM(China)	27.340	-	-	75.608
6. RUSTON(India)	69.330	84.056	84.056	143.869
7. KUBOTA	58.413	120.464	-	-
8. BDP	163.000	-	-	220.000
9. PANC. TURKEY	86.240	-	-	-
10.ESCORT(INDIA)	98.159	-	114.314	130.911
11.SIMPSON(")	-	73.622	73.622	-
12.LOMBARDINI (ITALY)	102.836	117.391	114.314	-

Source : BDP, BADC.

Table 5.6
Price comparisons (as on 20.6.89)

Horse Power	4.5 - 5	7 - 9	16 -19
Brand/Model			
1. Dongfeng			
185D	8.634	8.220	12.816
185SN	-	12.917	-
175N	-	-	19.546
2. Daedong			
DN80	-	21.133	-
ND110	-	21.657	-
3. Yanmar			
DA60	21.479	-	-
DM90D	-	26.453	-
TS190R	-	-	42.732
T230R	-	-	45.446
4. Kubota			
RK60N	21.434	-	-
D900N	-	32.125	-
RK95-2N	-	26.453	42.732
5. Lister			
LT1(UK)	29.393	39.244	55.461
6. Deutz(BDP)	-	27.500	-
7. Mitsubishi (BMTF)	-	27.988	-

Source: BDP, BADC.

5.0.11 As seen from Tables above , the prices of Dongfeng and other Chinese models are astonishingly low if compared with other engines. The price of Deutz engines ranging within 7-9 HP seems to be reasonable in comparison to other brands except Dongfeng. But Deutz engines proves to have the highest price among all, in the case of 40 HP engines.

CHAPTER - SIX

LOCAL MANUFACTURING/ASSEMBLING CAPABILITIES

6.0.1 Currently, there are eight enterprises - two in the public sector and six in the private sector that have been sanctioned for manufacturing/assembling of diesel engines in Bangladesh. Six of these have been approved to manufacture/assemble diesel engines for irrigation purposes while the other two have been approved to manufacture/assemble marine diesel engines.

6.0.2 Detailed information regarding, their location, sanctioned capacity, year of sanction, year of going into production is shown in table 6.1.

Table 6.1
Sanctioned local industries

Name and Address of of the Enterprises the Enterprise	Sanctioned capacity	Year of Sanction	Date of going into commercial prod.	Present Status
1. Bangladesh Diesel Plant Ltd. Joydevpur, Ghazipur	8000	1968	1980	Manufacture
2. Bangladesh Machine Tools Factory, Joydevpur, Ghazipur	10,000	1967	1981	No Manufacture
3. Bangladesh Diesel Engine Co. Ltd. a. Office: 6 Motijheel C/A,Dhaka. b. Factory : Joydevpur,Ghazipur	6000	1983	N.A.	Import and Partial assembling
4. Farm Land Heavy Engineering Ltd. 58/1 Puranapaltan, Dhaka.	3000	1984	N.A.	-do-
5. Swedish Motors Ltd. a) Office : 95 Motijheel C/A, Dhaka. b) Factory: Islampur, Nayarhat, Dhaka.	1100	1977	N.A.	-do-
6. Lister Diesel(BD) Ltd. a. Office : 122/124 Motijheel C/A, Dhaka. b. Factory : Edralpur, Fatullah, Narayanganj.	6600	1978	N.A.	-do-
7. Milnare Engineering Complex Factory :70 Tongi I/A, Tongi,Ghazipur	6000	1980	1985	Partial Manufacture
8. H.S. Enterprise Ltd.35/1 Indira Road, Dhaka.	2500	1984	N.A.	Import & partial assembling

Source : Board of Investment (BOI)
Report on Progressive Manufacturing of Locally Produced Diesel Engines.

6.0.3 Of the sanctioned enterprises only the following have been manufacturing/assembling diesel engines on regular basis.

1. Bangladesh Diesel Plant
2. Bangladesh Machine Tools Factory
3. Milnars Engineers Complex

6.0.4 The yearwise actual production of these units are shown in Table 6.2 through Table 6.4.

Table 6.2

Yearwise Production of Diesel Engines of different sizes and models by Bangladesh Diesel Plant for the period 1980-81 TO 1989-90

YEAR	DEUTZ F1L 208 (3-7HP)	DEUTZ F1L 210 (6-12HP)	DEUTZ F2L 912 (23-34HP)	DEUTZ F3L 912 (34-52HP)	DEUTZ F4L 912 (46-80HP)	DEUTZ F6L 912 ( )	TOTAL
1980-81	2504	196	-	-	-	-	2700
1981-82	297	305	1	175	1	-	779
1982-83	-	222	810	213	2	-	1247
1983-84	9	417	1065	142	1	2	1636
1984-85	5	509	1528	-	2	1	2045
1985-86	8	368	590	4	2	1	973
1986-87	-	223	1458	-	-	2	1683
1987-88	-	861	360	2	-	1	1224
1988-89	-	2078	11	-	-	-	2089
1989-90	-	11	666	-	-	-	677
Total No.	2823	5190	6489	536	8	7	15053
Cylinder	2823	5190	12978	1608	32	42	22673
% total	12.45	22.09	57.24	7.09	0.14	0.19	100

Source : BDP.

Table 6.3

Yearwise Production of
Bangladesh Machine Tools Factory (BMTF)
For the period 1980-81 to 1989-90

YEAR	* PRODUCTION
1980-81	5808
1981-82	600
1982-83	11008
1983-84	2352
1984-85	3438
1985-86	3412
1986-87	569
1987-88	-
1988-89	-
1989-90	-
Total :	27187

Source : BMTF

* BMTF have assembled only Mitsubishi Diesel Engines of 7-9 HP range and 2200 RPM.

Table 6.4

Yearwise Production of
Milnars Engineering Complex
For the period 1985-86 to 1988-89

YEAR	PRODUCTION
1985-86	310
1986-87	440
1987-88	480
1988-89	420
TOTAL	1650

Source : Report on Progressive Manufacturing of Locally Produced Diesel Engines.

CHAPTER - SEVEN

DEMAND ANALYSIS

7.1.0 CURRENT DEMAND OF DIESEL ENGINES

7.1.1 The detailed pattern of diesel engine use has been discussed in the earlier Chapter. The small diesel engines with horse power range from 3 to 40 HP are mostly used for irrigation pumps, country boats, small mechanized fishing boats and some other equipments. The current demand for diesel engines which are compatable to BDPs production are discussed in this chapter.

7.1.2 Irrigation Pumps :

7.1.3 Mechanized irrigation started in this country since 1961 when BADC procured approximately 3000 engines for low lift pumps. The Deep Tubewell Irrigation started in 1970-71. The Shallow Tubewell Irrigation Scheme started subsequently. The three different types of irrigation pumps are still mostly operated and managed by BADC. Two other organizations.the BRDB & BKB, are also engaged in functions related to irrigation management. The total number of irrigation pumps in operation (upto 1990) is given below :

	DTW	STW	LLP
Bench Mark Survey 1990 (No.)	25.000	278.000	78.3000
Irrigated Land(Hector)	500.000	125.000	783.000

Source : Bangladesh Economic Survey 1989-90.

7.1.4 The range of diesel engines used for operating the irrigation pumps vary from 2 to 40 HP. The average command area per system with the range HP of engines is given below :

System	Horse Power	Command Area
DTW :	21 - 40 HP	22
STW :	5 - 12 HP	5
LLP :	5 - 20 HP	10

7.1.5 Deep Tubewell

7.1.6 Deep tubewell irrigation scheme is very costly and till now is solely handled by BADC. The total cost of installation ranges from Tk. 300,000 to Tk. 700,000. However, BADC supplies the whole DTW system at a subsidized rate of Tk. 175,000 only irrespective of the cost of engines. On an average 22-25 hectors of land can be irrigated by one DTW.

7.1.7 Most of the BDPs F2L812 & 912 engines (along with Deutz engines supplied initially from Germany) are being used for DTW. Other than BDP supply, BADC requirement of DTW engines is covered through imports under different aid, grants and credit programs. The average annual addition of DTW is only 1250. Of them 10% is replacement demand due to aging.

7.1.8 Another important factor to be considered is the type of DTW. The estimated electric motor operated DTW is 2750, which is about 11% of the total DTW. The current average demand of DTW diesel engines excluding provisions for 20% electric motors is 1000 per year.

7.1.9 Shallow Tubewell:

7.1.10 The shallow tubewell schemes are found most suitable due to low installation cost, availability of underground water in majority parts of the country and small farm size of less than a hector on an average.

7.1.11 5-12 HP Engines are used for shallow tubewell pumps. One STW can irrigate 4 - 6 acres of land. Few farmers can join together to install a STW to irrigate their land. During the last 10 years, STW, are introduced at a higher rate each year. STWs are implemented through BADC, BRDB, BKB and private sectors.

7.1.12 The estimated quantity of STW in operation is 278,000 out of which approximately 30,500 are electrically operated. The average annual increment of STW is 23166. Excluding a provision of 20% for electric motor provision the average annual demand of diesel engines of STW stands at about 18,500 per year. BDPs F1L 208 & 210D Models are being used for shallow tubewell.

7.1.13 Low lift pumps:

7.1.14 Low lift pumps are used for surface water irrigation schemes. Inspite of being the oldest mechanized irrigation system LLP did not get much increase compared to STW because of scarcity of surface water in the dry

season. Various range of pumps ranging from 1/2 cusec to 5 cusec are used for LLP. The major types are 1 cusec and 2 cusec pumps. 1 cusec pumps require 5-7 HP engines and 2 cusec needs upto 20HP engines depending on the head. length of the system. The average command area per LLP is 10 hectares.

7.1.15 BDPs engines with higher RPM are being used for operating both types of pumps. The total number of LLPs is estimated to be 78.300. The annual growth rate an average is 3915. Considering an electrification provision of 10%. the net annual demand of LLP diesel engines stands at 3523. The electrification provision is less and considered 10% because most of the LLPs are used seasonally at the bank of available rivers. canals etc. and in most cases they are placed in different places as required and found suitable.

7.1.16 The annual requirement of diesel engines for different types of irrigation schemes has found on the trend of past 20 years is shown below :

Irrigation Type	Quantity	Horse Power
DTW	1000	23-40
STW	18500	5 -12
LLP	3523	5 -20
Total :	23023	

7.1.17 Country Boats

7.1.18 Country boats were categorized as unorganized river transport sector. There is no published data available for number of country boats using engines of different brands. However. from the survey it was revealed that quite a number of boats are using small diesel engines.

7.1.19 The use of diesel engines in boats is a recent development in the country. All of these have been installed in private sector. The technology is also simple. The engine is mounted at the rear end of the boat with the fan shaft coupled to the rotor directly. There is no transmission gear and no gearbox found in the boats. This is not permissible under marine laws which is another reason for getting no published documents. The use of diesel engines in boats are increasing rapidly. The survey of dealers/retailers also shows that about 30% of their sales is for use in boats.

7.1.20 The number of boats and the yearwise position is shown in Table 7.1.

Table 7.1
Yearwise Country Boats Position

Types of Boat	Number of Boats				
	1984-85	1985-86	1986-87	1987-88	1988-90
Cargo	209000	217000	226000	236000	246000
Passenger	389000	404000	421000	437000	456000

Source : Statistical Year Book. 1990.

7.1.21 According to a survey conducted in 1974 by BUET these country boats can be classified into 4 groups. The different groups of boats and their distribution as in 1989 with required engine horse power range is given Table 7.2.

Table 7.2
Capacity of Country Boats
and required Horse Power

Type	Capacity	Total No.	% of total	Engine Size HP
Cargo	Upto 11 tons	147,000	21%	5 - 12
	11 - 18 tons	49,000	7%	12 - 23
	18 tons and above	49,000	7%	23 - 40
Passenger boats		456,000	65%	5 - 12
		Total : 701,000		

7.1.22 From table it can be seen that most of the boats (86%) require engines of 5 -12 HP range. The other 14% needs engines of 12-40 HP range.

7.1.23 The key points identified during the survey is that almost all the current user prefer to have small engines fitted with gear box. That would help them to maneuver the boat more easily. There undoubtedly exist a big demand for low cost diesel engines with gear box.

7.1.24 Marine Engines

7.1.25 Marine Engines are normally used for inland water transport vessels and fishing boats. The total number of these vessels as in 1989 is given Table 7.3.

Table 7.3
Organized Marine Transport and Percentage engines horse power

Type	No. of Vessels	% of vessel use diesel engine	
		5-20 HP	20-45 HP
BIWTA Vessel	430	-	-
Cargo Vessel	940	-	20%
Passenger Launch	1552	10%	20%
Ferry(R&H)	150	-	-
Fishing Vessels	3317	35%	35%
Trawler	52	-	-
Total :	6461		

Source : Statistical Yearbook 1990.

7.1.26 These vessels are categorized as organized water transport. Of them BIWTA vessels and Ferry of Roads and Highways Department (R&H) uses engines of over 100 HP. A total of 3150 Cargo Vessels, Passenger Launches and Fishing Vessels use diesel engines of 5 to 45 HP range.

7.1.27 All these engines are imported from abroad. The type, brand and horse power vary widely from vessel to vessel. The quantity demanded is too low and is approximately 300 engines a year of 5-40 Horse Power range.

7.1.28 Other Uses :

7.1.29 Other uses of small diesel engines are found in

- Generating sets
- Vibrators
- Mixer machines
- Threshers

7.1.30 However, many of the equipments cited above, use smaller diesel engines of 6-12 HP range. There is no statistics available for these equipments. The survey of dealers reveal that the total annual requirement for these purposes is about 300 engines. The survey of the users also has shown that 67 of them employ diesel engines for purposes stated above.

7.1.31 Other Uses of 46-120 HP Engines:

7.1.32 The current demand of diesel engines between the range 46 -120 HP has been calculated based on the life period of the engines (average 15 years) and with the assumption that 10% transport equipment going out of service in each year will have replacement demand. This estimate was expressed by the owners of different equipments.

TABLE 7.3A

CURRENT DEMAND OF DIESEL ENGINES 46-120 HP

Item	Total No.	No. of Engines out of service	Replacement demand per yr.
Truck	26388	1759	176
Bus	13675	911	91
Tractors	1257	126	13
Power Tillers	3334	333	33
Marine	785	6	1
Fishing boat	77	5	-
Generating Set	851	56	6
Total :	46,367	3,196	320

7.2.0 FUTURE DEMAND

7.2.1 As has repeatedly been pointed out by the consultants, the range of Diesel Engines that are within the purview of this study, is mostly used for minor irrigation purposes. Amongst the other users, mechanized boats and Grain Threshing mills (Paddy Husking Mills, Flour mills etc.) are prominent.

7.2.2 While for purposes of estimation or projection of future demand for small diesel engines for use in Grain Threshing mills or mechanization of country boats, application of different forecasting techniques may be possible, for projection of demand for small diesel engines for use in minor irrigation projects it is not. For the latter the policies, programs and incentive schemes of the government are very important and pertinent. Thus, in order to arrive at a rational projection of future demand for small diesel engines in the country, the consultants have made a thorough study of the government policies and programs for minor irrigation projects envisaged for the Fourth Five Year Plan (FFYP) for the period 1990-95.

7.2.3 It has been the avowed policy of every government since the liberation of Bangladesh in 1971 to increase agricultural productivity so as to attain self sufficiency in food grain production. To this end emphasis have been placed on more effective use of land, use of modern technology and of HYV of seeds. While there has been a very significant increase in food grain production during the last two decades, Bangladesh is still a food deficit area and on an average about 2 million tons of food grain is imported every year.

7.2.4 During the Fourth Five Year Plan period also agricultural sector have been given the top most priority. The desired objective is to at least attain self sufficiency in food grain if not turn Bangladesh into a food surplus country by the financial year 1994-95. In order to meet this objective, the strategies formulated include among others, i) More effecicent use of limited land resources through bringing greater hectreage under minor irrigation ii) use of High yielding variety of seeds iii) More effective use of currently cultivated land.

7.2.5 The net area of cultivable land in the country is around 9.03 million hectors of which 7.56 million are suitable for irrigation. However it is estimated that about 6.90 million hectors could be developed for irrigation given the hydro-logical conditions of the country.

7.2.6 In order to achieve the objectives of the agriculture sector of achieving a sustained annual growth rate of 3.6 percent, it has been planned to bring 4.8 million hector under irrigation by the terminal year of the Fourth Five Year Plan. The estimated area irrigated during the terminal year of the Fourth Plan would, therefore, be about 53 percent of total cultivable area and about 70 percent of the potential area of irrigation.

7.2.7 In order to attain the objectives, Targets for Irrigation and Flood Control for the Fourth Five Year Plan is shown in Table 7.4.

Table 7.4

Irrigation and Flood Control
Achievement and Target
(Cumulative) 1989-90 and 1994-95

(Area in 1,000 ha)

Name of Program	Actual (1987-88)	Target for TFYP (1989-90)	Est. Benchmark (1989-90)	Target for FFYP (1994-95)
Irrigation :				
A. Surface Water Irrigation				
i. Gravity Flow	115	605	212	500
ii. LLP(incl.Floating pumps)	527	850	783	1088
iii.Traditional Methods	238	324	300	200
Sub-Total :	880	1919	1295	1788
B. Ground Water Irrigation:				
i. STW	870	1012	1251	2200
ii. DTW	555	728	500	700
iii.HTW	44	55	54	54
iv. FMTW	-	-	-	63
Sub-Total	1469	1795	1805	3017
C. Others	-	190	-	-
Total(A+B+C) :	2349	3904	3100	4805
2. Flood Control and Drainage	3166	3354	3239	3644

Source : Draft Fourth Five Year Plan.

7.2.8 Some of the specific targets requiring the use of diesel engines of the horse power range under review is briefly discussed below :

7.2.9 LLP

7.2.10 It is envisaged that the capacity of LLPs (including floating pumps) will be in operation for irrigating 1.088 mill ha by 1994-95 against actual area of 0.527 mil ha in 1987-88 and benchmark area of 0.783 mill ha in 1989-90.

7.2.11 STW

7.2.12 A total of 500,000 STWs are expected to be under operation to irrigate 2.2 mill ha by 1994-95 against the operation of 278,000 STWs irrigating 1.251 mill ha in 1989-90.

7.2.13 DTW

7.2.14 It has been planned to bring an additional 200 thousand ha under irrigation through increasing the number of DTWs in operation to 35,000 by 1994-95. This will irrigate 700,000 ha of land as against actual area of 500,000 ha in 1989-90 through operation of 25,000 DTWs. Deep Tubewell schemes are executed by BADC, BRDB. However, BRDB has one on going scheme to sink and operate 960 DTWs under Irrigation Management Program (IMP) jointly with BADC.

7.2.15 For the purpose of implementing the programs of minor irrigation development in the private sector the FFYP has made a substantial increase in Agricultural Credit Program vis-a-vis Irrigation equipment as shown below:

3rd Five Year Plan	:	Tk. 490 million or 5% of total agricultural credit
4th Five Year Plan	:	Tk.1500 million or 7.5% of total agricultural credit.

7.2.16 Planned outlay for BADC for the plan period is given in table 7.5.

Table 7.5
Allocation for BADC during the FFYP
(at 1989-90 prices)

(in million taka)

	Financial Outlay		Gross Total	Net excluding recovery
	Non-recurring	Recurring		
i) On going projects	4100	-	4100	2550
ii) New projects	15990	-	15990	9990
Total (B):	20090	-	20090	12540

Source : Draft Fourth Five Year Plan.

7.2.17 In the backdrop of above, the projected incremental demand for the different types of irrigation equipment for the FFYP period would be as under :

LLP : 25.000
STW : 222.000
DTW : 10.000

7.2.18 While the number of STWs and DTWs have been categorically mentioned in the plan, the demand for LLPs have been calculated on the basis of number of LLPs required to cover an additional area of 0.205 million hectors assuming an average coverage of around 8.2 hectors per LLP with an average of 1.86 cusec per pump.

7.2.19 The following table shows the number of engines that would be required to operate the different types of irrigation pumps :

LLP : 25.000 engines
STW : 222.000 engines
DTW : 10.000 engines

7.2.20 Based on the findings of the market survey as well as expert opinion the horse power range of engines required for different types of irrigation equipment is as under :

For LLPs : 5 - 12/ 12-23 HP
For STW : 5 - 12 HP
For DTW : 23- 40 HP

20% of LLPs use 1 cusec pumps for which diesel engine of 5-12 HP range is suitable.

7.2.21 Thus the total requirement of engines for the FFYP period by different horse power range for different types of irrigation schemes would be as under :

Range of Diesel Engines (In HP)	Number
5 - 12	227,000
12 - 23	20,000
23 - 40	10,000

7.2.22 These being cumulative projected demand for the five year period (1990-95) of the FFYP, the consultants have divided the same by straight method to forecast yearly incremental demand for engines during the period 1990-95. Table 7.6 shows the requirement of different types of engines for different years of the FFYP.

Table 7.6
Yearwise Requirement for Engines of Different Sizes for Minor Irrigation Projects for the period 1990-95 in numbers

Range/Year	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	45400	45400	45400	45400	45400
12-23 HP	4000	4000	4000	4000	4000
23-40 HP	2000	2000	2000	2000	2000

7.2.23 Replacement demand for engines for minor irrigation schemes for the period 1990-95 is shown in Table 7.7.

Table 7.7
Replacement Demand for Small Diesel Engines for Minor Irrigation Projects for the period 1990-95 in Nos.

Range/Year	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	13923	4256	15972	15972	15148
12-23 HP	5967	1824	6510	6846	6492
23-40 HP	4972	1520	5426	5705	5410
TOTAL :	24862	7600	27128	28523	27050

7.2.24 Replacement demand has been calculated on the basis of assumed life of 10 years for engines. Thus the consolidated demand for different sizes of engines for minor irrigation schemes for the period 1990-95 is as shown in Table 7.8.

Table 7.8
Consolidated Demand for Small Diesel Engines by different Horse Power range for the period 1990-95 in Nos.

Range/Year	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	59323	49656	60592	61372	60548
12-23 HP	9967	5824	10510	10846	10492
23-40 HP	6972	3520	7426	7705	7410
TOTAL :	76262	58998	78428	79923	78440

7.2.25 The demand forecast for diesel engines as shown in Table 7.8 is highly optimistic given the past trend. The implementation of minor irrigation projects, to a large extent, depends on the availability and level of under ground water. Thus, the consultants feel that in view of the past implementation performance, a 20% shortfall in performance is a very likely proposition.

7.2.26 The resultant demand forecast, by making allowance for shortfall in the implementation of minor irrigation projects, is a shown in Table 7.9.

Table 7.9
Modified Demand Forecast for Small Diesel Engines for Minor Irrigation Project in Nos.

	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	47458	39725	48474	49098	48438
12-23 HP	7974	4659	8408	8677	8294
23-40 HP	5578	2816	5941	6164	5928
TOTAL :	61010	47200	62823	63939	62760

7.2.27 Rural Electrification : its impact on forecast of Demand for Small Diesel Engines :

7.2.28 With the rapid expansion of rural electrification programs through REB, a number of engines under the different minor irrigation schemes are operated by electricity rather than diesel. Connections provided by REB till date to different types of irrigation schemes is given in Table 7.10.

Table 7.10
Yearwise Connections Provided by REB to
Different Types of Minor Irrigation Projects in Nos.

	LLP	STW	DTW	Total	Cumulative Total
1987-88	NA	NA	NA	10753	10753
1988-89	NA	NA	NA	4379	14379
1989-90	200	1289	804	2293	16793
1990-91	511	3747	1428	5686	22479

Source : Fourth Five Year Plan

7.2.29 While the above table shows the actual connection for engines so far executed, the facility created by REB till 1990 is as under :

LLP	STW	DTW	Total
7928	25908	4297	38043

7.2.30 The following table shows the programs for REB during the FFYP period.

Table 7.11
Target for REB During the FFYP

	Bench Mark 1989-90	Target 1990-95	Cumulative
Distribution Line	32602 Km	47888 Km	83490 Km
Electrified Village nos.	8930	14880	23810
Consumer Connections nos.	484465	798000	1282465

Source : Draft Fourth Five Year Plan.

7.2.31 In order to achieve the target, the following Investment outlay is envisaged for REB during the FFYP.

Local Currency	:	Tk. 3,480 million
Foreign Currency	:	Tk. 7,070 million
Total	:	Tk.10,550 million

7.2.32 The REB has indicated to the consultants that they plan to give 5,000 new connections every year for LLP/STW/DTW. To that extent, demand for diesel engines for irrigation purposes would be reduced. Based on the average connections provided to different types of irrigation schemes, the distribution of projected connections by different types of irrigation schemes per year for the duration of the FFYP would be is as under :

For LLP	:	450
For STW	:	3,150
For DTW	:	1,400

7.2.33 The total number of diesel engines operated irrigation schemes that would be replaced by electric motor driven equipment by different horse power range for the FFYP period would be as under :

Table 7.12
Replacement Target by electric motors in nos.

	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	3240	3240	3240	3240	3240
12-23 HP	360	360	360	360	360
23-40 HP	1400	1400	1400	1400	1400
TOTAL :	5000	5000	5000	5000	5000

7.2.34 The effective demand for small diesel engines net of conversion to electricity operated motor is presented in Table 7.13.

Table 7.13
Demand Forecast for Small Diesel Engines by different HP range net of Electric Connections in nos.

	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	44218	36485	45234	45858	45198
12-23 HP	7614	4299	8048	8317	8034
23-40 HP	3978	1416	4541	4764	4528
Total :	55810	42200	57823	58939	57760

7.2.35 In view of the overhelming majority of the respondents to the market survey (8%) indicating their willingness to switch over to electricity operated engines, the consultants feel that the future plan of the REB is very conservative. They feel that at least another 10% of the small diesel engine users would decide to switch over to electrocute should it be made available. On the basis of this assumption the consultants have worked out the future demand of small diesel engines as are within the purview of the current study, for the purpose of minor irrigation project. This shown in Table 7.14 below.

Table 7.14
Modified Yearly Demand Forecast for Small Diesel Engines of different sizes for the period 1990-95

Range/Year	1990-91	1991-92	1992-93	1993-94	1994-95
5 -12 HP	39796	32837	40711	41272	40678
12-23 HP	6853	3869	7243	7485	7240
23-40 HP	3580	1274	4087	4288	4075
TOTAL :	50229	37980	52041	53045	51993

7.2.36 Demand Forecast for other Users :

7.2.37 Country Boats

7.2.38 As has already been stated, in the recent years, country boats used for carrying of cargoes, fishing and ferrying purposes have started using small diesel engines. However the current usage is unauthorized and hazardous to safety as most of these do not have even gear box. For this reason they are not registered with the concerned authorities who are suppose to provide them with certification for plying. Thus the consultants were unable to identify any data on mechanized boat plying on different riverways.

7.2.39 According to 1989 statistics, there are a total of 7,02,000 country boats plying on the different waterways. These have been classified as unorganized River transport. The breakdown of the boats is as under :

Boats carrying Passengers	:	240,000
Boats carrying Cargo	:	456,000

Source: Bangladesh Statistical Year Book 1990

7.2.40 According to a survey conducted by the Artitecture and Naval Artitecture Department of the Bangladesh University of Engineering and Technology in 1974 it was estimated that the breakdown of boats by load carrying capacity - passenger or cargo - were as under :

Upto 11 tons	:	80%
11 tons to 18 tons	:	30%
18 tons and above	:	20%

7.2.41 Based on the above finding, the composition of current boat population as per the classification is as under :

Upto 11 tons capacity	:	421,200
11 - 18 tons	:	140,400
Over 18 tons	:	140,400

7.2.42 According to experts, for boats with load capacity of upto 11 tons, it is advisable that they use diesel engines of 5-12 HP range while for boats with load capacity of between 11 -18 tons engine between 12-23 HP range is suitable. Similarly for boats carrying between 18 and 25 tons small diesel engines of between 23-40 HP range is advisable.

7.2.43 In the backdrop of the above it is estimated that in order to mechanize the current stock of country boats a total of 7,02,000 diesel engines would be required. The demand by various Horse Power range is given below.

6 - 12 HP	:	421,200
12- 15 HP	:	140,400
15 - 23 HP	:	140,000
Total	:	702,000

7.2.44 In the absence of any data on the number of mechanized boats, let alone trend of mechanization, the consultants have assumed that 1% of boats would be mechanized each year for the duration of Fourth Five Year Plan Period (1990-1995). Thus the demand for small diesel engines of different sizes on account of mechanized boats is shown in table 7.15.

Table 7.15
Demand for Small Diesel Engines of Different Horse Power Range for Boats

Range/Year	1990-91	1991-92	1992-93	1993-94	1994-95
6 - 12	4212	4212	4212	4212	4212
12- 15	1404	1404	1404	1404	1404
15 -25	1404	1404	1404	1404	1404

7.2.45 Other Users

7.2.46 In terms of current usage, Rice Mills, Flour mills etc. are the prominent amongst the other users of small diesel engines. However, for this sub sector also there is very little statistical data that is authentic and realistic. That apart, it is the educated guess of the consultants that current users of small diesel engines for the purpose of running grain threshing mills on commercial basis, would switch over to electricity driven motors whenever opportunity arises. Thus the consultants have not considered the future demand for small diesel engines for the purpose of operating grain threshing mills.

7.2.47 Consolidated Demand Forecast for Small Diesel Engines

7.2.48 The Consolidated demand forecast for Small Diesel Engines taking into account the demand for minor irrigation projects and to mechanize country boats, by different horse power range is shown in Table 7.16.

Table 7.16
Consolidated Demand Forecast for Small Diesel Engines by different Horse Power Range for the period 1990-95

Horse Power / Year	1990-91	1991-92	1992-93	1993-94	1994-95
5 - 12 HP	44008	37049	44923	45484	44890
12- 23 HP	8257	5273	8647	8889	8644
23- 34 HP	4984	2678	5491	5692	5479
TOTAL :	57249	45000	59061	60065	59013

7.2.49 Consolidated demand forecast for 46-120 HP range.

7.2.50 The consolidated demand forecast for the diesel engines of 46-120 HP range used in different transport vehicles and equipments has been calculated with the estimated annual increment of such equipment for the next 5 years and given below. The current demand of such engine was estimated as 320 per year.

Table 7.17
Consolidated Future Demand for 46-120 HP Diesel Engines

Year	Net demand	Incremental * rate
1990-91	336	5%
1991-92	370	10%
1992-93	425	20%
1993-94	531	25%
1994-95	690	30%
Total :	2352	

* The annual incremental rate has been considered with 5% more demand each year. This was done based on the assumption that once locally manufactured engines are popular the demand would increase at a higher rate.

7.3.0 BDPs POSSIBLE SHARE

7.3.1 The present installed capacity of BDP stands at 8,000 cylinder per year of any product mix on 3-shift operation basis. This number is very insignificant in comparison to the total demand. Analysis shows that over the last 10 years, the average capacity utilization of BDP was 30% equivalent to 2,400 cylinder per year. With the current line of production and at 30% and at 80% capacity utilization the future share of BDP is show in Table 7.17.

Table 7.18
Percentage of BDP share in future market

Years	Total No. of engines	Total No. of cylinder	BDPs share in %	
			at 30% capacity utilisatio	at 80% capacity utilisation
1990-91	57249	62233	3.9	10.3
1991-92	45000	47678	5.0	13.4
1992-93	59061	64552	3.7	9.9
1993-94	60065	65757	3.6	9.7
1994-95	59013	64492	3.7	9.9

* Total number of engines is converted to total number of cylinders by assuming 5 - 23 HP ranges as 1 cylinder & 23-40 HP ranges as 2 cylinder

7.3.2 The above calculations have been worked out based on the present production lines and other relevant factors unchanged. However, BDP may increase its share provided a suitable and realistic strategy in relation to production and marketing is adopted in line with the recommendations and suggestions made in the study.

7.3.3 The market share of the future demand of 46-120 HP entirely depends on the government policy on imports. The key target group of BDP engine lies with the Bus, Truck and generators, which constitute major portion of the demand. Unless import of reconditioned engines are totally restricted, the expected demand for BDP engines for them will not be feasible. BDP may have 100% of the share of this size of engines with the existing production facilities.

7.4.0 EXPORT POTENTIAL OF SMALL DIESEL ENGINES

7.4.1 For a developing country like Bangladesh, increase of export earnings is a sine-qua-non for economic development. At present export earnings are very meager and the balance of payment situation has been deteriorating continuously.

7.4.2 While in the recent past, there has been some diversification of export, the structure of export earnings still indicate a preponderance of traditional items like Jute and Jute goods, Leather and Tea. Judged against this backdrop the need to explore the possibility of export of capital goods like Diesel Engines can not be overemphasized.

7.4.3 The importance of export is not only limited to foreign exchange earnings. It stimulates the process of innovation and technological development. In order to be able to compete in the highly competitive international market, it arouses consciousness regarding cost reduction and productivity increase. It also provide access to various priceless information diffused through the process of export marketing.

7.4.4 The consultants have given thoughtful consideration to the prospect of export of small diesel engines assembled/manufactured in Bangladesh. Considering the current state of technology, production capability and state of affairs vis-a-vis small diesel engines, in the opinion of the consultants, the idea of exporting of small diesel engines from Bangladesh is very premature not only at this point of time but also in the forcible future.

7.4.5 Only one enterprise - the Bangladesh Diesel Plant (BDP) - has been doing some amount of manufacturing - around 300% of components for their model FDL 912 and 300% for F1L 210D. Even BDP only assembles the other brands. The other enterprises - Bangladesh Machine Tools Factory and the Milnars Engineering Complex have only been doing assembly work.

7.4.6 The current state of technology for manufacturing of small diesel engines as are available in Bangladesh is totally outdated, skills low and experience poor. Diesel engines - big or small - are hardly, excepting for minor irrigation projects - end in themselves. In most cases they form components of bigger machineries like motorized vehicles,ships, agricultural machineries like power tillers,tractors, generator sets ,vibrators etc.. However to be used as components in these machineries and equipments, diesel engines must conform to the specifications and requirements of the same. Manufacturers of these machineries and equipments change their models frequently which calls for flexibility and experience of the diesel engine manufacturers to meet the requirements of their clients. The experience that the current manufacturers/assemblers have, the state of their technology do not permit such flexibility. Thus the consultants feel that it would not be possible for Bangladesh to export diesel engines in the foreseeable future.

7.4.7 However the possibility of working as sub-contractors on Joint Venture, of any big and reputed machinery manufacturer where diesel engines form a component,could be explored. Any enterprise, preferably BDP, could produce for such machinery manufacturer under licensing agreement with them. However, in such instances also, buy back agreement with the machinery/equipment manufacturer has to be ensured so that marketing pose no problem. This would help the Bangladeshi manufacturer in three ways : 1) they would have an ensured market 2) they would gather the experience and technology required to compete in the highly competitive market for diesel engines and 3) initial investments would be low.

7.4.8 Machinery manufacturing is relatively labour intensive and Bangladesh has an abundant supply of moderately educated and cheap labour force. As such Bangladesh enjoys a comparative advantage thereof and should exploit the advantage.

7.4.9 However, machinery manufacturing activities in the country is still at an embryonic stage. Productive efficiency and technological competence in the manufacture of capital goods such as diesel engines, need to be greatly improved in order to make a headway in the competitive export market.

7.4.10 Import substitution has been the underlying theme of the industrial development specially for the capital goods sector. In order to be able to make a breakthrough in the export of diesel engines.it will require hard and determined effort from Bangladesh. Export of capital goods is a complex affair and need considerable skill and efficiency not only in production but also in export trade. Export of capital goods like diesel engines require more comprehensive arrangement and organization concerning

- Market intelligence
- Strict quality control
- Wider range of products
- Research back up to incorporate up to date technological development and customer need

7.4.11 The countries like Singapore, Thailand, Nepal, Srilanka, Malyasia, Middle East are the possible market for BDP engines who do not have diesel engines of their own and depend mainly on import. But all the countries are economically far better than Bangladesh who can afford to import like German Engines. Nepal is likely to be more dependent on India for political and economic reasons.

7.4.12 However, attempts can be made to explore the market for BDP engines in those countries through the embassy's/consulates. Strong linkage & persuasion with the governments may open up an opportunity in the export market.

CHAPTER - EIGHT

IMPEDING FACTORS IN MARKETING BDP ENGINES

8.0.0 The consultants have made a thorough and in-depth study of the factors that are impeding the marketing of products of Bangladesh Diesel Plant (BDP). Having given due consideration to these factors, the consultants feel that they may be classified into two broad categories :

A. Impeding Factors internal to BDP
B. Impeding factors external to BDP

8.1.0 IMPEDING FACTORS INTERNAL TO BDP :

8.1.1 The consultants have identified the following factors that are internal to BDP as being major constraints to marketing of BDP products. These are briefly discussed below :

i) Absence of comprehensive marketing strategy

a) High price

* High Cost of Production
* High Cost of Raw material
* Low rate of production
* Long delay in the implementation of the project

b) Lack of market orientation

c) Total dependence on BADC

d) Poor quality of some products

e) High cost and non-availability of spare parts

8.1.2 Absence of Comprehensive Marketing Strategy :

8.1.3 The current product mix of BDP, their pricing policy, lack of promotional campaign and absence of any organized distribution channel all point to a total absence of any marketing strategy. One should bear in mind the basic premise of setting of BDP which was to cater to the needs of BADC for the implementation of national irrigation programs. Thus BDP could afford not to formulate a comprehensive marketing strategy. However, under the current changed circumstances, it has become imperative that BDP formulate a comprehensive marketing strategy to direct their concerted effort at creating a niche for their products.

8.1.4 High Price of Products :

8.1.5 The single most important impeding factor for marketing of BDP products is their price incompetitiveness. Price of BDP's products are amongst the highest in the country. While the minimum price of BDP is around Taka 40,000 similar imported brands are available within a price range of Tk. 6,000 to 30,000. There are, however, some genuine reasons for prices of BDP products some of which have been discussed below. The engines of above 40 HP are competitive but few buyers are in the open market.

8.1.6 High Cost of Production :

8.1.7 Cost of production is one of the major impeding factors for marketing BDP products. The cost break up as shown in the Break Even analysis worked out by the enterprise for the two models of engines of BDP is given in table 8.1.

Table 8.1
Break Even Analysis

Cost/Model	F1L 210D	F2L 912
Total Fixed Cost	Tk.29,596,000	Tk.29,596,000
Variable cost/unit	Tk. 31,100	Tk. 130,000
Material	70%	86%
Power & Fuel	5%	2%
Wages	3%	1%
Factory Overhead	6%	2%
Administrative Overhead	6%	2%
Selling Expenses	1%	1%
Financial Expenses	9%	6%
Sales Price/Unit	Tk. 39,600	163,000
Break Even Qnty.	3,482	919
Break Even Value	Tk.137,856,000	149,797,000

8.1.8 The fixed cost was too high as the whole unit was capital intensive. The average production per year of F1L210D engine during the period 1980-81 to 1989-90 was only 538. Break even quantity for this model was 3482. Similarly the average production of F2L912 for the same period was 653. The Break even quantity was 919. Thus losses were being accumulated over the years and net liabilities had increased. BDP can reach break even point utilizing 44% of its installed capacity keeping all other things unchanged for F1L210D model.The break even capacity utilization for the other model was 23% .With the existing fund position full capacity utilization would also be problem bound.

8.1.9 High Cost of Raw Material :

8.1.10 The major variable cost was for the raw materials which accounts for 70% of total variable cost for F1L 210D and 84% for F2L 912 engines. Most of the materials are imported. For F2L 912 the import dependence is still 70% of total materials required. The position of F1210D is better as the dependence is only 30% on imported items. It is difficult for BDP to reduce the variable cost as the items are import based and supplied by the German Deutz Company. Higher exchange rates and Government policies also increased the cost of materials. The high cost will be more dominant for higher HP engines with 3-6 cylinders and 46 - 120 HP.

8.1.11 Low Rate of Production :

8.1.12 Production statistics of BDP for the last 10 years show very poor performance. The average capacity utilization was only 28.03%. A capital intensive unit like BDP can not compete in the market with such utilization rate. Poor capacity utilization has very adversely affected financial solvency of BDP.

8.1.13 Long Delay in Project Implementation :

8.1.14 The original time schedule for implementation of the project was 2 years (1968-70) and BDP was suppose to go into commercial production in 1970. Because of several reasons it went into commercial production in 1981. The net effect of this inordinate delay were increased investment costs, higher production costs, change in design specification of engines by the users and popularity of imported engines. All these have contributed to the present dismal situation of BDP.

8.1.15 Lack of Market Orientation :

8.1.16 The current product mix of BDP is not at all market oriented rather it is production oriented. Production is limited to two models,viz F1L 210D of 6 to 12 HP range and F2L 912 of 23-34 HP range.These models are suitable for LLP and DTW irrigation pumps. The main problem faced with this production line is the absence of flexibility for producing smaller engines between 5-7 HP which had the highest demand for STW irrigation and small country boats. The range of 12-23 HP engine required for medium range country boats and fishing boats are not in BDP production line.

8.1.17 The lowest HP range of BDP engine cost about Tk. 40,000 (F1L210D). Imported engines of same horse power range are

available in the market at a lower price ranging from Tk. 4500 to Tk. 30,000. Due to high price variation in the open market BDP was not able to compete with other brands available in the market. The varieties of engines demanded for irrigation not necessarily should be of 6-12 HP & 28-34 HP range. Any horse power ranging from 3 to 30 HP can be used for LLP, STW, country boats and fishing boats. As such the standard production of 6-12 HP range of engines did not attract the users particularly in the open market. The marketing was mainly done through BADC.

8.1.18 Total Dependence on BADC :

8.1.19 The very premise of setting up of BDP was to cater to the need of BADC vis-a-vis irrigation schemes. BDP planned its line of production based on the need of BADC's specification. Before BDP had started its commercial production, BADC changed their engine specification at different times. Any slight change in specification needed a relevant increase of investment costs.

8.1.20 The present poor capacity utilization of BDP may be explained by the decrease in BADC indent placed to BDP.Availability of alternative low priced engines and other factors viz, the government policy, donors etc. created problem in selling BDP products to BADC.

8.1.21 Poor Quality of Engines :

8.1.22 The Deutz Engine is one of the best brand of engines. During the survey it was found that a good number of 20 year old German made Deutz engines of 712 & 812 series are still in use . Thus Deutz has a good reputation among the users. However, complaints were made about some of the locally made F1L210D model engines. The complaints were about high consumption of lubricants and fuel, cracks in the body, defective plungers and fuel pumps etc. as responded during the survey. This may not be the true representation as the sample size of BDP was only 12%.

8.1.23 As mentioned earlier, due to total dependence on BADC, BDP did not device any comprehensive marketing policy for exploiting the current need of diesel engines in the country. The selling cost for BDP diesel engines is estimated to be only 1% of total cost. Practically no attention was given to the key issues of market promotion, marketing channels and market research. No single dealer/retailer was found who deals with BDP engines.

8.1.24 High Cost and non availability of Spares :

8.1.25 BDP started two service centers one at Cox's Bazar and the other at Bogra long ago. Recently they opened two new service centers at Jessore and Mymensingh respectively.

8.1.26 This centers definitely would contribute to client satisfaction through providing after sales service. However, the key problem mentioned by the users was not the shortage of technicians, rather availability and cost of spares parts in other areas of the country. The user cannot bring the engine to the service center for servicing unless it is easy to transport.

8.2.0 IMPEDING FACTORS EXTERNAL TO BDP :

8.2.1 Amongst the impeding factors external to BDP, the followings are important :

- Government policies
- Rural electrification programs
- Multiple brand of diesel engines
- Price of diesel engines
- Project agreement with donors
- The role of private agents & dealers

8.2.2 Government Policies:

8.2.3 The basic objective of setting up of BDP was to cater to the needs of diesel engines in the country for irrigation pumps, which in turn was based on the requirements of BADC. But because of the preconditions given by the donors and due to some inconsistent government policies, BADC could not make best use of BDP capabilities for meeting its requirements.

8.2.4 The indiscriminate application of open market economy and "privatization" policies contributed to large imports of hundreds of varieties of diesel engines. Many of them are of poor quality and not upto the required specification. But free import policy and withdrawal of CDST for engines below 20 HP, created a huge market for such engines because of their nominal price. Similarly allowing import of reconditioned engines for Bus, Trucks, etc. in the past created no market demand of BDP's 46-120 HP engines.

8.2.5 The evaluation of tender documents on the basis of quoted C&F price for international purchase is another problem for BDP. The C&F price does not include other costs viz, carrying, clearing ,bank charges .In some cases C&F price

and these other costs, if considered together may exceed BDP ex-factory price. Even then the lowest C&F bidder gets the offer. In case of tied grants and aids the purchase is being conditioned by the donors. The 15% price benefit for the local manufacturer is not enough to compete with the foreign brands. BDP need to pay CDST for its components imported.

8.2.6 Decision Making Problems of Public Sector Enterprise :

8.2.7 As a public sector enterprise BDP is managed under the rules and regulations of the government. There is lack of adequate flexibility for BDP management to make decisions on business concept. Any program implementation takes unduly long time and by that time the original situation changes. Furthermore little/no assessment has been done for utilization of the available capability of the public sector industries to meet requirement of national demand.

8.2.8 Rural Electrification Program :

8.2.9 Rural Electrification Program is a threat not only to BDP but also for others diesel engines manufacturers . The estimated rate of electrification of irrigation scheme is about 5000 annually. With more expansion of electricity distribution by Rural Electrification Board, that will increase further. The replacement of diesel engines by electric motors is also going on, particularly in the case of DTW. Electric motors are more economic, require less maintenance cost and easy to operate. This is a big threat for F2L912 and higher models of BDP engines.

8.2.10 It is expected that in the next decade more irrigation schemes will be converted to electric motors along with new installations. Approximately 10% of total irrigation pumps are operated by electric motors. Almost all the irrigation pumps of BWDB are already converted to electric motors.

8.2.11 Multiple Brand of Diesel Engines

8.2.12 During the survey, over hundred varieties of different brand and models of engines were found in the market. The current inventory of diesel engines is estimated to be around 500,000, where BDPs contribution is less than 1%.

8.2.13 These brands of diesel engines will require spares and accessories, which needs to be imported and subsequently further engines will be coming to the market. The wide range of different brands of diesel engines makes it difficult to formulate a market strategy.

8.2.14 The price of Chinese engines is much low in the open market. One can procure a 5HP-1 cylinder-2200 RPM engine by Tk. 5000 only. Therefore if the quality is not good a farmer can replace the old engine whenever necessary with a new one. In some cases, average annual maintenance cost of BDP engine is more than the price of a new Chinese engine. Because of low price the private sector is entirely dominated by Chinese and Japanese engines.

8.2.15 Project Agreements:

8.2.16 Till 1987, engines were mainly imported under different projects financed by World Bank, IDA, ADB, CIDA, SIDA, ODA. Besides a good number of engines are imported under barter agreement and tied grants.

8.2.17 In many cases the the donor preferences dominate the project agreement clauses and thus instead of encouraging local manufacturing, engines have had to be imported.

8.2.18 Agent & Dealers :

8.2.19 The role of agents, dealers and importers can also be considered as an impediment for BDP and local manufacturers. For earning easy commission, they prefer to import engines and accordingly influence government policies. Thus the preponderance of engines of different makes and models irrespective of the quality and specification, and suitability in the local environment.

8.2.20 As private parties the dealers and agents have the scope of manipulating the figures related to price, horse power, RPM, which cannot be evaluated properly by a common user.

8.2.21 Problems with higher HP Engines(46 -120 HP)

8.2.22 Most of the problems described for small diesel engines upto 40 HP range also prevail for the higher range of engines (46 - 120 HP). In addition specific problems that may be encountered in marketing diesel engines for Bus, Truck, marine etc. are :

a) Import policy : If the government allows import of reconditioned engines of the brands suitable for the target group little scope will prevail for BDP to sale their engines.

b) The cost of BDP 6 cylinder engines as estimated in 1987 amounted to Tk.389,000 which was perceived by the customer as too high. Because the imported reconditioned engines are available in the open

market with a price below Tk. 100,000. Moreover 80-90% of the BDP engines components are import based. The cost for 46-120 HP engines of BDP, therefore, would be much higher with currency fluctuation and additional increase in CDST for component, even if BDP succeed to maintain overhead cost at present level.

c) The customer preference will remain high for the imported brand of engines if they are allowed. They would like to install the same brand of engine as was originally fitted with the chassis. Thus the replacement demand of BDP engines would be very much limited. The replacement demand also depends on the condition of the chassis or body which has same life time as the engines.

d) The present practice of remodeling the engines with sleeves and replacing spares is very popular. Many of the transport vehicles are operating on roads with 30 years old engines through this process. A good number skilled technicians and workshop are already available throughout the country under private sector.

e) In the last Ten years BDP managed to sell only 7 engines of 6 cylinder. The replacement demand was prevailing in the country before the inception of BDP. No engines could be sold to the potential customer/user in the past. With the same situation in future the chance of marketing BDP engines for Bus, Truck, etc. is very low, particularly in free market economy.

f) There are several brands and makes of Bus, truck, marine engines available in the country. Technically BDP may not be able to manufacture 6 cylinder engines which will be compatable to all varieties of the vehicles. Thus a production line with high range of engines will not be feasible in the future.

CHAPTER - NINE

MARKET STRATEGY FOR BDP

9.1.1 For developing a comprehensive future marketing strategy for BDP engines basic considerations to be given on:

1. Selection of Target group for BDP products.

2. Determination of suitable products as required by the target group.

3. Setting right price for the product for the selected target group.

4. Design appropriate promotion campaign for motivation of the target group.

A checklist for market strategy is given in Table 9.1.

9.1.2 From the study it was found that huge demand exist for small diesel engines in the country and that will increase each year for the engines upto 5-12 HP range. The next higher demand is for 12-23 HP and 23-34 HP. For 46-120 HP the average annual demand is only 470 in the next five years. The target group for different BDP products are STW users, country boat owners, LLP and DTW owners. Inland marine transport, Road vehicles and the diesel engine owners for quality services.

9.1.3 BDP may set product strategy/product mix in the future out of the following 6 alternative products/services.

1. Manufacturing 5-7 HP range small and cheaper engines for irrigation and other and users.

2. Manufacturing 5-7 HP marine engines with small gear box and accessories for country boats.

3. Manufacturing of 12-40 HP engines of Deutz brands at different RPM for DTW, LLP on demand basis.

4. Manufacturing additional gear box and accessories for use in marine transport, Generator, Tractors, Power Tillers, Bus, Trucs, Mini Bus etc.

5. Manufacturing of 4-6 cylinder 46-120 HP engines with required RPM for Bus, Truck, Marine transport on limited number till market demand is high.

6. Manufacturing spares/accessories and components for other engines.

7. Extension of service facilities for any brand of diesel engines throughout the country on competitive charge in the open market.

9.1.4 The price strategy for the above products to be determined within the following ranges to make it competitive in the open market.

Product/Service	Price range in Tk.
1. 5 - 7 HP Engines	Tk. 10,000 - 15,000
2. 5 - 7 HP Engine+ Gear Box	Tk. 15,000 - 25,000
3. (a) 12-20 HP	Tk. 30,000 - 35,000
(b) 21-40 HP	Tk.100,000- 160,000
4. (a) 12-20 HP with Gear Box	Tk. 42,000 - 45,000
(b) 21-40 HP with Gear Box	Tk.120,000 -180,000
5. 80-120 HP	Tk.180,000 -220,000
80-120 HP with Gear Box	Tk.200,000 -250,000

6. The spares/accessories and components for other engines the price needs to be competitive with the open market.

7. The charges for service facility to be offered must be competitive with those in the private sector.

9.1.5 No product could be marketed unless appropriate promotion strategies are determined. Specific promotion strategy to be determined for specific target group out of the following promotional techniques.

1. Advertisement program

2. Appointment of distributor, agents, dealers, with attractive commission.

3. Guarantee for reasonable period

4. Service facility with dealers and at own centers

5. Discount allowance

6. Credit sales

7. Training facilities

8. Motivation campaign for private mechanics/motor garage.

Determination of a comprehensive marketing strategy also depends on many factor which are not covered under this study viz: the actual variable cost per unit, the total overhead cost for that product including the interest on the borrowings, liabilities. It also depends on the conditions of available machinery and equipments, their life time, maintenance and replacement cost etc. All the factors including Market Components are to be carefully analyzed for preparing a practical and realistic market strategy out of many alternatives.

Table 9.1
Checklist for Market Strategy of
BDP Product and Service

USER/ Target Group	PRODUCT/SERVICE DEMANDED	EXPECTED PRICE	PROMOTION NEEDED
1. Irrigation :			
STW	5-7 HP	10,000- 15,000	Appointment of Dealers
LLP	5-7 HP	10,000- 15,000	Agents
	17-20 HP	30,000 -35,000	Distributors
DTW	21-40 HP	100,000 -135,000	Guarantee about quality
2. Country Boats	5-7 HP +Gear Box	15,000 - 25,000	Free Servicing Availability of Spares in open market
3. Cargo Vessel	12-20 HP + Gear Box	42,000-50,000	Sales/ Service Center
4. Marine Vessel	21-40 HP + Gear Box	120,000-180,000	Mobile Servicing units
5. Truck/Bus	80-120 HP with Gear Box	200,000-250,000	Commission for distributor
6. Cargo Vessel Inland	80-120 HP with Gear	220,000-270,000	Discount for mode of purchase
7. The Spares/ Component of other engines		Competitive open market	Motivation workshop for private mechanics
8. Service facilities for other engines		Competitive with open market	Advertisement Exhibition Credit Sale

CHAPTER - TEN

CONCLUSION AND RECOMMENDATIONS

10.0.1 The market for small diesel engines of different HP range is vast and would continue to increase in future with the increasing popularity of STW and application in the process of mechanization of small country boats. Mechanization of small country boats provide a unique opportunity for BDP to diversify. The potential of this sector is yet to be tapped even though use of small diesel engines is becoming more popular. This is substantiated by the following table.

Table 10.1

Consolidated future demand of engines

Horse Power	Year 1990-91	1991-92	1992-93	1993-94	1994-95
5 - 12 HP	44008	37049	44923	45484	44890
12- 23 HP	8257	5273	8647	8889	8644
23- 34 HP	4984	2678	5491	5692	5479
TOTAL :	57249	45000	59061	60065	59013
46-120 HP (Replacement for bus ,trucks etc.)	336	380	425	531	690
Total with (46-120 HP)	57585	45380	59486	60596	59703

The table shows the future demand projection of small diesel engines of different sizes.It need be mentioned here that in 5-12 HP range category there are sub categories of which 5-7 HP range accounts for about 90%. These engines are used for STWs which are gaining increasing popularity and are very appropriate in the context of Bangladesh where land holdings are small. The price of these engines are also much less, they are easy to install and operate.

10.0.2 The average demand of 46-120 HP engines per year is only 0.87% of the total demand. It would be of high risk to have a production plan with 4-6 cylinder Deutz engines in this range. However BDP can manufacture limited numbers of such engines for the different target groups if they are competitive and acceptable to the users.

10.0.3 It can not be the policy decision of any government to allow any enterprise to be inefficient. Protection of local manufacture can not continue for indefinite period as that by itself would breed inefficiency and incompetence.

10.0.4 It is time for BDP to make a thorough analysis of its strengths and weaknesses, its opportunities and threats. BDP has to be dynamic to recast its objectives in view of the changing business environment relating to small diesel engines.

10.0.5 BDP should recast its objectives and decide on product policies accordingly. The consultants would strongly recommend that BDP discontinue with the production of F1L 210D model engines of 6-12 HP range. There appears to be very little market for this product and with the existing licensing agreement, the prices are highly incompetitive.

10.0.6 Small diesel engines have the greatest demand for operating the STWs. Diesel engines of 5-7 HP range is sufficient to operate the STWs. The F1L 210D model of BDP has the HP range of 6-12 HP. As a result these engines have excess idle power in relation to requirement of STWs. It involves more fuel and other operational costs. Thus the higher capital outlay in terms of price and high operational costs make F1L 210D model unattractive to the users of STW. On the otherhand for operation of LLPs, higher horse power of between 12-23 HP are required which cannot be met by F1L 210D model.

10.0.7 Under the circumstances, the consultants would recommend that a new line of production for producing small diesel engines of 5-7 HP range be introduced. This would not only facilitate creation of a niche in the STW market but also provide opportunity to tap the yet untapped market of mechanized boat which also use engines of 5-7 HP range.

10.0.8 However, should BDP decide on the introduction of the recommended line, new licensing agreement should be made with a manufacturer whose brands are well known and accepted in Bangladesh, whose engines are of low price and are fuel economic.

10.0.9 BDP should also ensure that spares and accessories of its products are readily available and are priced within reasonable limits as available for other engines in the opened marked.

10.0.10 BDP would require to produce gear boxes for small diesel engines to be used in country boats. While ensuring quality of such gear boxes, due attention should be given to ensure that its price is within Tk. 10,000 preferably even less.

10.0.11 BDP can introduce manufacturing of spares,components for other engines on order basis which will increase the overall productivity .

10.0.12 BDP can utilize its professional and technical skill for offering services to the different engine owners on contract basis.

10.0.13 BDP should appoint dealers for its products throughout the country who should not only be required to carry enough inventory of engines but also spares and accessories thereof. As evident from the study, availability of trained technicians for repair and maintenance of engines is no longer any problem as such BDP need not continue with service centers. The channel should be sufficiently remunerated to motivate them for aggressive sales efforts.

10.0.14 In the interest of the national economy in general and successful implementation of long run minor irrigation projects in particular it is essential that the government reactivate its policy of standardization of small diesel engines. It would not be correct to assume that standardization process would in any way contradict the stated government policy of open market economy.

10.0.15 The government should introduce control through standardization and accordingly set specification of small diesel engines that are used for STW, LLP, DTW, mechanization of country boats etc. Based on this specification 6-8 brands and models of small diesel engines should be selected for different types of use. Some of the major criteria for such selection should be durability, sustainability, fuel consumption rate, availability of spares and accessories, price etc. The recommendations of the standardization committee to be administered strictly.

10.0.16 Currently the market for diesel engines is conspicuous by the presence of hundreds of brands and models. The importers have also to import spares and accessories for these engines. This results in allocation of hard earned foreign exchange for unproductive purposes which a country like Bangladesh can ill afford.

10.0.17 Many of these engines are of extremely low quality and often result in frequent breakdown hampering the activity for which it was purchased. If this situation is allowed to continue, many of the users may give up the idea of mechanization of agriculture or country boat out of sheer frustration. That would very adversely affect the long run economic development of the country.

10.0.18 In the process of standardization especial attention should be given to incorporate provision of options of different price range so as to cater to the needs of the different targets groups.

10.0.19 While in paper, government provides all types of encouragement to local manufacturers, in practice these are hardly ever materialized. Sealed bid pricing basis for making purchase coupled with purchase from the lowest bidder puts the local manufacturers at a disadvantage. The government more often then not succumbs to pressure of donor agencies in relation to purchase of small diesel engines for minor irrigation purposes, most of which are financed by loan, grants, aids of different donor agencies.

10.0.20 The government through its policy formulations and implementation should ensure that quantity to be imported for small diesel engines of any HP range for the different uses, is guided by rational evaluation of availability of local manufacturing capability. Evaluation of bids when small diesel engines are imported should be made on the basis of total cost and not only landed cost. The government should also ensure strict adherence of the different agencies under it, to the government policy stipulation of 15% price advantage to local manufacturers over imported ones.

10.0.21 To start with the government should prohibit the import of 2 cylinder diesel engines for all types of use other than marine engines. Inspite of stated policy of the government on open market operation or privatization of the economy, it is also the responsibility of the government to protect the interest of the local manufacturer through tariff and non-tariff barriers. Otherwise the nascent local industry will not be able to survive and thrive. This is the policy of even some of the highly developed countries like Japan, not to speak of most of the Newly Industrialized Countries. It is the duty of the government to ensure that the local manufacturing capabilities do not die off in the name of open market economy and privatization.

APPENDICES

Annexure-1

Research Investigator	MARKET SURVEY QUESTIONNAIRE FOR DIESEL ENGINE USERS	Farmer
		Boatman
Date : _____		Other user

1. Name : _____

2. Village : _____ Upazila : _____ District: _____

3. Ownership :

1	Individual	2	Group

4.1 Make :

DEUTZ	RUSTON	LISTER	YANMER
1	2	3	4

DONGFENG	OTHERS, PL. SPECIFY
5	6

4.2 Type :

1	Air Cooled	2	Water Cooled

4.3 Origin :

BANGLADESH	UK	GERMANY	INDIA	JAPAN
1	2	3	4	5

CHINA	OTHERS, PL. SPECIFY
5	6

4.4 Rotation Per Minute (RPM) : [ ]

4.5 Horse Power : [ ]

4.6 Number of Cylinder :

1 [ ] 2 [ ] 3 [ ] 4 [ ]

5 [ ] 6 [ ]

4.7 Year of Purchase : [19 _____]

4.8 Price : [Tk.]

4.9 Name of Dealer with address : _____

4.10 Service facility : [1] Available [2] Not available

4.11 If available, service provided by :

[1] Dealer [ ] Private Mechanic

4.12 The Diesel Engine is used for :

4.12.A IRRIGATION

[1] Deep Tube Well [2] Shallow Tube Well [3] Low Lift Pump

4.12.B. BOAT

1	2
Rice Mill	Others, (specify) :_____

4.13 If used for multiple purpose, period of use (in months) :

A. IRRIGATION		MONTHS
B. BOAT		MONTHS
C. OTHERS		MONTHS

5.1 Year of last Overhauling	19 _____
5.2 Yearly Maintenance Cost	Tk.

5.3 Are you satisifed with its performance ?

1	Yes	2	No

6. How many engines are there in your locality :

7. How many additional Engine do you think are required in your locality during the next 5 years ?

	1991	1992	1993	1994	1995
7.1 Irrigation					
7.2 Boat					
7.3 Others					

8.1 Have you heard about DUETZ Engine ?

1	Yes	2	No

8.2 If yes, why did you not buy that engine ?

1	High Price	2	No service facility
3	No Dealer	4	High Maintenance Cost
5	Poor Quality	6	Not Suitable

9. What did you consider most while buying your engine ?

1	Brand	2	Durability
3	Service facility	4	Low Pirce
5	Horse Power	6	Multiple use
7	RPM	8	Country of Origin

10. Would you use Electric Motor if electricity is available ?

1	Yes	2	No

* ADDITIONAL INFORMATION TO BE OBTAINED FROM BOATMAN.

11. Do you like to have an Engine with Gear Box ?

1	Yes
2	No

12. If yes, what price range ?

A. Tk. 10,000 - Tk. 15,000	1
B. Tk. 15,000 - Tk. 20,000	2
C. Tk. 20,000 and above.	3

13. Do you have an Operator for the Engine ?

1	Yes
2	No

14. If yes, how much do you pay per month ?

Tk.

Annexure- 2

QUESTIONNAIRE FOR BADC UPAZILA OFFICER

1. Name and designation of the interviewee :

2. Address :

3. Irrigation Schemes :

No. of Irrigation Schemes			No. of Engines			No. of Electric Motors
LLP	STW	DTW	LLP	STW	DTW	

4. Engine Specifications :

Brand	No. of Engine	Type		Size			Unit price	Average life
		A/C	W/C	HP	RPM	Cylinder		

5. Who install the engines ?

[ ] BADC [ ] Scheme Manager [ ] Others, specify

6. How do you provide after sales service ?

[ ] Own mechanics [ ] Suppliers [ ] Others, pl. specify

7. Do you carry stock of spares/accessories ?

[ ] Yes [ ] No

8. What do the beneficiaries consider most in selecting an engine ?

[ ] Brand [ ] Low price

[ ] Durability [ ] Horse Power

[ ] Service facility [ ] Multiple use

[ ] Country of origin [ ] Others, pl.specify

10. Future projection

Year	No. of Engines						No. of Electric Motor
	LLP	H.P. Range	STW	H.P. Range	DTW	H.P. Range	
1991							
1992							
1993							
1994							
1995							

11. How many Irrigation Schemes are currently using electric motors?

12. How many diesel engines have been replaced by Electric motors in the last year in your upazila?

13. What is your opinion about problems & prospects of locally manufactured diesel engines ?

14. What are the problems you face with BDP diesel engines ?

Annexure-3

QUESTIONNAIRE FOR
RPDB, UCCA

1. Name and designation of the interviewee :

2. Address :

3. UCCA information :

No. of KCSS	No. of Engines For			No. of Electric Motors
	LLP	STW	DTw	

4. Engine Specification :

Brand/ Make	No. of Engine	Type		Size			Unit price	Average life
		A/C	W/C	HP	RPM	Cylinder		

5. Who install the engines ?

[ ] KSS [ ] BRDB [ ] BADC

[ ] Others (Pl. specify)

6. Do you provide after sales service ?

[ ] Yes [ ] No

7. Do you carry stock of spares/accessories ?

[ ] Yes [ ] No

8. What are the problems you face with BDP diesel engines?

9. What does the beneficiaries consider most in selecting an engine ?

[1] Brand [5] Low price

[2] Durability [6] Horse power

[3] Service facility [7] Multiple use

[4] Country of origin [8] Others, pl. specify

10. Future projection

Year	No. of Engines						No. of Electric Motor
	LLP	H.P. range	STW	H.P. range	DTW	H.P. range	
1991							
1992							
1993							
1994							
1995							

11. How many schemes in your upazila are currently using electric motors ?

12. How many diesel engines have been replaced by Electric motors in the last one year in your upazila ?

13. What is your opinion about problems & prospects of locally manufactured diesel engines ?

Annexure-4

CHANNEL SURVEY FOR SMALL DIESEL ENGINES

[ ] Retailer

[ ] Dealer

1. Name and Address of the Firm :

2. Engines Specification :

Brand/ make	C/of origin	Type			Size		Unit price	Average monthly Sales (Number)
		W/C	A/C	HP	RPM	Cylinder		

3. What is your term of Sales ?

[ ] Cash [ ] Credit

4. Do you provide after Sales Service ?

[ ] Yes [ ] No

5. a) If yes in what form

[ ] Spares

[ ] Mechanics

[ ] Both

b) If yes, where

[ ] at Shop

[ ] at Clients place

c) If no, how do the client get the services ?

5. Which brand/make is most highly demanded ?

6. What do the customer consider most in buying an engine ?

[1]	Brand	[2]	Durability
[3]	Serivce facility	[4]	Low price
[5]	Horse power	[6]	Multiple use
[7]	Country of origin	[8]	Others, pl.specify

7. What are the different use of Diesel Engines as percentage of your sales ?

☐	Irrigation ..... %	☐	Boat ..... %
☐	Rice mills..... %	☐	Others, please specify.....%

8. Who fix the price ?

☐ Manufacturer

☐ Importer

☐ Market

Others, pl. specify

9. How much commission do you usually get in percentage ?

Imported engines .....%

Local engines .....%

10. What is your opinion about locally manufactured engines ?

Annexure 5

IMPORT DATA STATISTICS SHEET

Customs

Bureau of
Statistics

Date/ Year	Make/ Brand	No. of Engine	Type		Size		No. of Cylinder	Total C&F rate	Unit C&F	Duty	Sale Tax	Total Landed Cost	Source of Fund	Name of Importer with address	Remarks
			N/C	A/C	H.P.	RPM									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Annexure 6

IMPORT DATA STATISTICS SHEET

Importer

Importer/
Dealer

Date/ Year	Brand No.	No. of Engines	Origin	Type		Size		No. of Cylinder	Cost/Unit	Imported under	Users/Buyers	Remakrs
				W/C	A/C	H.P.	RPM					
1	2	3	4	5	6	7	8	9	10	11	12	13

Annexure 7

INVENTORY DATA STATISTICS SHEET

BADC

BRDB

BKB

OTHERS

Date/ Year	Make/ Brand	No. of Engine	Origin	Type		Size		No. of Cylinder	Unit Price	Source of fund	Use/purpose			Local agent with address	Imported/ Locally procured
				W/C	A/C	H.P.	RPM				ST	BT	LLP		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Annexure-8

LIST OF UPAZILA AND USER SAMPLES

Sl.No.	UPAZILLA	No. of Questionnaire			
		Agr.	Other	Boat	Total
1.	Akhaura	9	2	2	13
2.	Chandina	9	1	2	12
3.	Daudkandi	7	2	1	10
4.	Muktagacha	10	2	2	14
5.	Manikgaonj	10	2	2	14
6.	Mirzapur	10	2	2	14
7.	Sreepur	10	2	2	14
8.	Dhamrai	10	2	2	14
9.	Savar	10	2	2	14
10.	Sonargaon	8	1	2	11
11.	Munshigaonj	8	3	2	13
12.	Araihazar	10	2	2	14
13.	Monohardi	10	2	2	14
14.	Narsingdi	10	2	2	14
15.	Sreenagar	10	2	3	15
16.	Shibpur	11	1	2	14
17.	Harirampur	10	2	2	14
18.	Saturia	10	2	2	14
19.	Iswardi	10	-	-	10
20.	Kumarkhali	9	1	1	11
21.	Alamdanga	10	-	1	11
22.	Serajgonj	10	-	-	10
23.	Serajgonj Sadar	10	2	2	14
24.	Bola	8	2	2	12
25.	Pabna	10	2	2	14
26.	Sujanagar	10	-	2	12
27.	Natore	12	-	2	14
28.	Rajshahi	12	-	2	14
29.	Netroknona	12	0	2	14
30.	Trisal	12	-	2	14
31.	Gaibandha	12	-	2	14
32.	Shibgonj	12	-	2	14
33.	Joypurhat	12	-	2	14
34.	Mirpur	12	-	2	14
35.	Kurigram	12	-	2	14
36.	Syedpur	14	-	-	14
37.	Peergonj	12	-	2	14
38.	Badargonj	14	-	-	14
39.	Biral	14	-	-	14
40.	Lalmonirhat	10	2	2	14
41.	Gabtali	12	-	3	15
42.	Sherpur	12	-	2	14
43.	Daulatpur	10	2	2	14
44.	Razbari Sadar	10	2	2	14

Sl.No.	UPAZILLA	No. of questionnaire			
		Agr.	Other	Non	Total
47.	Narail Sadar	10	2	2	14
48.	Madhukhali,Faridpur	12	2	1	14
49.	Gopalganj	10	3	1	14
50.	Jhenaidha	12		2	14
51.	Gaurnnadi,Barisal	10	2	2	14
52.	Patuakhali	11	2	2	15
53.	Dumuria	10	1	3	14
54.	Khlarea	10	2	2	14
55.	Satkhair	12	1	1	14
56.	Patuya	10	2	2	14
57.	Bo...shali	10	1	3	14
58.	Hatiamari	10	2	2	14
59.	Pe...	11		3	14
60.	Laksham	9	1	1	11
Total		610	67	106	783

Annexure - 9

Questionnaire for survey of manufacturers of Small Diesel Engines

1. Name of the firm :

2. Location :

3. Year of sanction :

4. Year of going into commercial production :

5. Annual Production Capacity :

Model	Horse Power	RPM	Number

6. Do you [ ] manufacture [ ] assemble [ ] both

If both, what is the % composition by different models.

Model	Local Component (in %)	Imported Component (in %)

7. Production and Sales information of last five years.

Year	Number of Engines produced			No. of Engine sold	Price per unit	Cost of Prod. (per unit)
	H.P.	Cylinder	Gnty			

8. How are your products distributed ?

[ ] through dealers [ ] direct

If distribution is made through dearlers, what is the % of commission you give to your dealers ?

9. Do you provide after sales service ?

[ ] Yes [ ] No

If no, who provides,

[ ] Dealers [ ] Others, pl. specify

10. Do you provide guarantee/warranty for your products ?

	Yes		No

If yes, for many years ?

11. Who are your major target groups/ users ?

12. Please give your comments regarding problems and prospects of locally manufactured small diesel engines ?

Annexure-10

LIST OF DIESEL/ENGINE PUMP SETS TESTED AND STANDARISED BY THE NATIONAL STANDARISATION COMMITTEE FOR AGRICULTURAL MACHINERY, MINISTRY OF AGRICULTURE, 1984.

Sl. No.	Description of Engines	Name of Principal Manufacturer
A.	Shallow Tubewell Diesel Engines	
1.	Yanmar-TS-105-C BHP 6.3, RPM 1500	M/S. Yanmar Diesel Engine Company Limited 1-11 Marunochi, Chiyoda-KU Tokoyo, Japan.
2.	Yanmar-TS-70-CBHP-6 RPM 2200	Ditto
3.	Mitsubishi N.M. 75 BHP-6, RPM 2200	M/S. Mitsubishi Heavy Industries Co. Ltd. (Assembled locally by M/S. Bangladesh Machines Tools Factory, Joydevpur, Dhaka.]
4.	Mitsubishi NM-90 BHP-5, RPM 1500	M/S. Mitsubishi Heavy Industries Ltd. Tokoyo, Japan.
5.	Kirlosker - AV-1 BHPS, RPM 1500	M/S. Kirlosker Oil Engine Limited. 13, Laxnanarao, Poona 411003, India.
6.	Usha -500 BHP-S RPM 1500	M/S. Shriran Refrigeration Industries Ltd. Banglanagar, Hyderabad 37, India.
7.	DAE-DONG ND-80 BHP 5.5, RPM 1500	M/S. Daedong Industries Co. Limited Yengdong P.O. Box 53 Seoul, Korea
8.	Deutz Mas-SA-F1L-210-D, BHP 6, RPM 1500	M/S. Klockner - Humbolt-Deutz AG, Duetz Mulhener, 5 Cologne 80, P.O. Box 800509, West Germany(assembled locally by M/S. Bangladesh Diesel Plant, Joydevpur, Dhaka.

Sl. No.	Description of Engines	Name of Principal Manufacturer
B.	Low Lift Pumps Diesel Engines	
9.	Yanmar-TS-105-C BHP-9.RPM-2200(1 Cusec)	M/S. Yanmar Diesel Engines Co. Limited. 1-11-1 Marunochi. Chiyoda - Ku- Tokoyo. Japan.
10.	Yanmar-TS-230-R BHP-19.RPM-2200(2 Cusec)	Ditto
11.	Mitsubishi NM-110 BHP-9. RPM-2200 (1 Cusec)	M/S. Mitshubishi Heavy Industries Ltd. Tokoyo. Japan.
12.	Kubota-ER-900N BHP-9.RPM 2200 (1 Cusec)	M/S. Kubota G. Tokoyo. Japan.
13.	Kubota -ER 2200-N BHP-18, RPM 2200 (2 Cusec)	Ditto
14.	DAE-DONG. ND-80 BHP-8. RPM-2200 (1 Cusec)	M/S. Daedong Industires Ltd. Yendong. P.O. Box 53. Seoul Korea.
C.	Deep Tubewell Diesel Engine	
15.	Lister HR-2 BHP-22.5 RPM-1500 (Continuous rating)	M/S. R.A. Lister and Co. Ltd. Dursley, Gloucesterdevic GL/1 4 HS England, U.k.
16.	Lister HR-3 BHP 31.5 RPM-1500 (Continuous rating)	Ditto
17.	Mitsubishi Daiya Diesel Engine Model 3 DE-15B BHP-34. RPM-2250 (Continuous rating)	M/S. Mitsubishi Heavy Industries Ltd. Tokoyo Japan.
18.	Mitsubishi Daiya Diesel Engine Model 2 DE-15B BHP-22.5. RPM-2250 (Continuous rating)	Ditto

Sl. No.	Description of Engines	Name of Principal Manufacturer
19.	FRAYMAN Model -95A(S-10) BHP-22.5, RPM-2250 (Continus rating)	M/S. Briggs and Slralton International Faryman Division P.O. Box No. 100 D-6848 Zampartheerin West Germany
20.	Kubota-V-1502-BC BHP-22.5 RPM-2250	M/S. Kubota G. Tokoyo, Japan.
21.	Ford, Model-2722-50 BHP 31.5 RPM-1500	Hendy Lennox (Fud. Engine) Ltd. U.K.
22.	VM Diesel Engine Model VM-1052 SU BHP 31.5 RPM-2250	Stabilimeri Meccanice VP SPA, 44042 Centre(FE) Via Ferrarese-29 Cas Post 31 Italy.
23.	Ruston 2YWA SP BHP 29.2, RPM-2250	Ruston and Housby(India) Ltd. Chinchward Pune 411019, India.
24.	Petter Diesel Engine Model PJ-27 BHP-22.5, RPM-2250	Petters Limited Staines, Middlesex, TW18 3AR England
25.	Petter Diesel Engine Model PJ 3R BHP 33.8, RPM 2250	Ditto
26.	BDP -DUETZ Diesel Engine Model F2L-912 BHP 27 RPM-2250 (with standard Deutz fuel pump components and fittings)	M/S. Klochner-Humbolt-Deutz AG, Deutz Mulhenir, S.Cologene 80, P.O. Box No. 800509 West Germany(assembled by M/S. Bangladesh Diesel Plant Joydevpur, Dhaka.
27.	BDP -DUETZ Diesel Engine Model F2L-912, BHP 51.5 RPM 2250 (with Bosch make fuel pumps parts No. 2232781) (Not engine can shaft mounted can driven modified Lub. Oil filter and casing part No. 3371963.)	Ditto

Annexure-11

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
CHIEF MARTIAL LAW ADMINISTOR'S SECRETARIAT
CABINET DIVISION

NO. NEC(Policy)-23/CD-30- Dated : April 9,1982

OFFICE MEMORANDUM

The undersigned is directed to say that the country's import bill is going up every year without matching export earnings while existing industries of the country met up at great expense are languishing. The predominatly import-oriented economy has to be redirected to that of production oriented one. Although some steps have been then in this regard on an ad-hoc basis at different times yet it was felt that there was an urgent need to lay down a comprehensive body of guide lines.

2. This subject was considered at various levels of the Government and at various fora. The Government have now decided to issue the following policy directives :-

a) Where goods produced in the country are sufficient to meet country's needs, all imports of these items should be banned, after careful examination of the level of country's demand.

b) Import of goods into this country should be so regulated as to ensure that similar goods of local origin are not priced out of market. Both the fiscal policy and the quantum of imports will have to be coordinated with the level of local production so that no shortage is created within the country.

c) Procurement agencies of the Government/Autonomous bodies will obtain the first right of refusal from the Ministry of Industries before they place orders for their requirements with the foreign suppliers.

d) Where supplies of locally manufactured goods, due to inadequate installed capacities, fall short of country's requirements, additional capacities should be set up on priority basis. These items should to indentified for necessary follow-up action.

e) In terms of price, quality and specifications, the locally produced goods must endeavour to be competative and acceptable to the procurement agencies.

f) Stringent specifications, even where lesser ones can serve the purpose, are often designed to disqualify

locally produced goods, limiting thereby the sources of procurement. All procurement agencies of the Government will be requested henceforth to prepare specification in a manner which will enable local products to qualify.

g) Where it is proved that duties and taxes levied on imported finished goods are lower than those levied on imported eaw materials, components and spare parts required for same and similar finished goods, then these should be rationalised so as to bring them at par with or below these levied on the imported finished goods.

h) While negotiating aids, loans and grants for projects/commodiities, no provision should be kept for import of these goods and services which are produced/available in adequate volume to meet the domestic demands, or for which capacities exist in the country. Instead of procuring finished products, built-in provisions should also be kept in the agreements/contracts to permit utilization of aids/loans and grants for procurement of raw materials, sapres, consumables, etc. for local fabrication.

Sd/- N.N. Chowdhury
Joint Secretary

Distribution :

All Secretaries, for favour of information and taking immediate necessary action.

Annexure-12

STRATEGIES OF THE INDUSTRIAL POLICY

The objectives of the INDUSTRIAL POLICY are to be achieved through adoption, among others, of the following strategies :

(1) encourage optimum utilization of existing capacity including measures for balancing, modernization, rehabilitation and replacement (BMR) and expansion of existing industries on merit;

(2) encourage investment in efficient intermediate and basic manufactures through appropriate incentives;

(3) assist and promote local industries with comparative advantage through tariff rationalization and appropriate fiscal measures;

(4) promote export through appropriate export promotion measures particularly for non-traditional it ms and also for firms participating in international tenders against foreign exchange;

(5) continually review and adopt appropriate measures for sick industries case by case;

(6) improve the efficiency of the public sector enterprise by allowing increased operational freedom, setting target, monitoring and evaluation of performances or by converting them into public limited companies and the Corporation into holding companies in appropriate cases;

(7) promote development of small and cottage industries sector through a package of special incentives;

(8) encourage growth of linkage industries and sub-contracting;

(9) provide infrastructural facilities for rapid geographical dispersal of industries;

(10) strengthen handloom and sericulture sectors by providing special incnetives and focusing on research, productivity and marketing:

(11) adopt suitable labour policies to maximise production through linkage of wages with productivity and labour welfare;

(12) encourage R&D and promote acquisition and transfer of appropriate technology;

(13) undertake comprehensive training programmes for skill development with participation of the private sector;

(14) provide fiscal incentives and other ncessary facilities for importing equipments and service materials for the hotels/motels for promotion of tourism; and

(15) policy on development and promotion of industries be esentially linked with policy on development and promotion of agriculture.

Source : Industrial Policy 1986.

Annexure-13

LIST OF AVAILABLE SMALL DIESEL ENGINES

BRAND, MODEL & TYPES

Sl. No.	Make/Brand	Country of Origin	Model	Horse Power	RPM	No. of Cylinder & Use
1.	KUBOTA	JAPAN	ER600N	6.5	2200	1 STW
			ER900N	9.0	2200	1 STW/LLP
			ER1900N	18	2200	1 LLP/B
			ER2200N	18	2200	1 LLP/B
			CA 90	7.5	1500	1 STW/B
			RK 60N	6.5	1500	1
2.	YAMNAR	JAPAN	TS105C	6.3	1500	1 STW/LLP
			TS150	6.5	1500	1 STW/B
			TS70C	6.13	2200	1 STW
			TS180C	6.5	1500	1 STW
			TF60B	7	1500	1 LLP/B
			TF90B	7	1500	1 LLP/B
			TS190R	7	2200	1 LLP
			TS230R	19	2200	2 LLP/B
			TS220C	18	2200	1 LLP/B
			2TLE	18	1500	2 DTW
			3TLE	18	1500	3 DTW
3.	MITSHUBISHI	JAPAN	NM70	6.5	1500	1 STW
			NM75	6.5	1500	1 STW
			NM90	7.5	2200	1 LLP/B
			NM110	9.0	2200	1 LLP/B
			2DE-15B	22.5	2250	2 DTW/B
			3DE-15B	34.0	2250	3 DTW
			D2700	22.5	2250	2 DTW
4.	LISTER	UK	HR3	31.5	1500	3 DTW
			HR2	22.5	1500	2 DTW
			ST1	18.0	2200	2 LLP
5.	DUETZ	GERMANY/ BDP	F1L 210D	6-12	1500	1 LLP
			F1L 208D	3-7	2200	1 LLP
			F1L 712	6	1500	1 STW
			F1L 812	6	1500	1 STW
			F2L 712	27-32	1500	2 DTW
			F2L 812	27	2250	2 DTW
			F2L 912	31.5	2200	2 DTW
			F3L 912	34-52	1500	3 LLP

Sl No.	Make/Brand	Country of Origin	Model	Horse Power	RPM	No. of Cylinder & use
6.	RUSTON	UK	1YWA	9.5	1500	1 LLP
		INDIA	2YWA	29	2200	2 DTW
			3YWA	41	1500	3 DTW
7.	DAEDONG	KOREA	ND80	5.5	1500	1 STW
			ND85	8	2200	1 STW
			ND110	12	2200	1 LLP
			ND112	8.5	2200	1 LLP
8.	KIRLOSKAR	INDIA	TAF/1	8	1500	1 STW
			AV-1	5	1500	1 STW
			AV-2	16.5	2200	2 LLP
9.	COOPER	USA	SVC.5	6	1800	1 STW
10.	ROE	USSR		22-29	2250	3 DTW
11.	VM	ITALY	1052SU	31.5	2250	3 DTW
12.	NWM			20	1500	2 LLP
13.	ICC		KD105C	6	1800	1 STW
14.	BECO	PAK/BD		12	1500	1 LLP
15.	USHA	INDIA	500D	8.0	1500	1 STW
16.	GRIEVES	UK	CCW50	5.5	1500	1 STW
17.	BATLIBOY		GF2/B2	6	1500	1 STW
18.	EASTERN	CHINA	S1902	6	1500	1 STW
			IS850	6	1500	1 STW
			195	8.5	2200	1 STW
19.	DONGFENG	CHINA	D-185N1	6.5	1500	1 STW
				12	2250	1 LLP
				18	2250	2 DTW
20.	WANELY	"		6.0	1500	1 STW
21.	RUDONG	"		12	2200	1 LLP
22.	SAIFENG	"		6 -12	1500	1 STW
23.	EMI	"	185N	7.5	1500	1 STW
		"	K3951	31-37	2250	3 DTW
			185N	8	2200	1 LLP
24.	ZHINGAFU	"		6	1500	1 I/B
25.	DOLPHIN	"		6	1500	1 "
26.	LD	"		6	2000	1 "
28.	JINMA	"		12-18	2200	1 "
29.	CMCC	"		6-8	2200	1 "
30.	3 HOURS	"	165F	3.3	2400	1 "
31.	X1AN					
32.	SWOUNGMOW	"	-	-	-	-
33.	3 CIRCLE	"	170	4	2200	1 "
34.	DOUBLE BIRD	"	165	3	2200	1 "
			165F	3	1500	1 "
35.	NATIONAL	"	-	5	2000	1 "
36.	PLANET	"	-	5	1500	1 "
37.	XIANFONG	"	-	5	1500	1 "

I=Irrigation B=Boat

BANGLADESH DIESEL PLANT LTD.
Present Product and Potential Users

Description of BDP Products/Services	Max. Capacity HP	Max. Capacity RPM	Field of Application	Prospective Customers	Future Customer/Market
F1L 210D (1 Cyl. Engine)	12	3000	LLP.STW pump set. Marine. Auto Temp. rice husking M/C. Gen. set concrete mixture.	BADC. BKB. BRDB. Private Parties.	Private customer in market
F2L 912 (2 Cyl. Engine)	38	2800	STW. pump set. LLP. 2 cusec pumpset. marine. Gen. set. etc.	BADC. Gramin Bank. fisheries. Different Institutional buyers	Institutional buyers. private
F3L 912 (3 Cyl. Engine)	56	2800	STW. Pump set. LLP 3 cusec pump set. marine. Gen. set etc.	BADC. Gramin Bank. Fisheries. Institutional buyers	Private open market
F4L 912 (4 Cyl. Engine)	80	2800	LLP 5 cusec pump set. marine. Gen. set. Mini-bus. Truck. Tractor	BADC. Fisheries. Progoti Industries. BMTF. Any private chasiss manufacturer	Private No Chasiss Manufacturer
F6L 912 (6 Cyl. Engine)	120	2800	Bus. Truck. Marine. Gen. Set Re-engining work	Progoti Industries Ltd. BMTF. BRTC. Fisheries. Railway	No Chasiss manufacturer Tender Participation
Low Cost (1 Cyl. Engine)	8	2200	STW. Pump set. Gen. Set Marine	Private party.	Open market/Tender
Low Cost (2 Cyl. Engine)	33	2250	LLP pump set. Gen. Set Marine Auto-Tempo, Rice husking	Foreign Credit Private party.	Open market/Tender
Front & Rear Hub			Mishuk & Honda Motor Cycle Suzuki Motor Cycle etc.	Atlas Bangladesh Ltd. Suzuki Company	Order/Tender basis
Rear Axle Mishuk			Mishuk of Atlas Bangladesh Ltd.	Atlas Bangladesh Ltd.	Order/Tender basis
Sprocket hardening			Mishuk of Atlas Bangladesh	Atlas Bangladesh Ltd.	Order/Tender basis
Al-casting & precision machining			Al-Casting & precision machining	Private engine manufacturer. Private Company	Order basis
Engine Repair			Repair of BDP engines and and engines of other model & make in the field	Reparing of engines under foreign grand	Orders/Tender basis