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DP/ID/SER.A/413
25 October 1978
English

LINKAGE STUDIES IN ENGINEERING INDUSTRIES

DP/BGD/75/002

BANGLADESH

(R) Technical report: Pre-feasibility report on local production of textile machinery (simple power looms)

Prepared for the Government of Bangladesh
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Adam Kolczynski, expert on textile machinery manufacture, in co-operation with Cronje Ed. Baeck, project manager

United Nations Industrial Development Organization
Vienna

id. 78-7529

Explanatory notes

References to dollars ($) are to United States dollars.

The monetary unit of Bangladesh is the taka. During the period covered by the present report, the value of the taka in relation to the United States dollar was $1 = taka 15.

A slash between dates (e.g. 1970/71) indicates a fiscal year.

A hyphen between dates (e.g. 1975-1979) indicates the full period involved, including the beginning and end years.

A full stop (.) is used to indicate decimals.

A coma (,) is used to distinguish thousand and millions.

References to "tons" are to metric tons unless otherwise stated.

In tables a dash (-) indicates that the amount is nil or negligible.

Besides the common abbreviations, symbols and terms, the following have been used in this report:

Equivalents

1 lakh = 100,000

1 crore = 10,000,000

1 pound (lb) = 0.4536 kg

1 mound = 82.28 lb (37.3 kg)

1 square yard (yd^2) = 0.836 square metres (m^2)

1 inch (in.) = 25.4 millimetre (mm)

Organizations

BHB	Bangladesh Handloom Board
BMTF	Bangladesh Machine Tools Factory
BREB	Bangladesh Rural Electrification Board
BSEC	Bangladesh Steel and Engineering Corporation
BSIC	Bangladesh Small Industries Corporation
BTIC	Bangladesh Textile Industry Corporation
BTMC	Bangladesh Textile Mills Corporation
CDB	Cotton Development Board
DEW	Dockyard Engineering Works
GEMF	General Electric Manufacturing Plant
HCS	Handloom Co-operative Society

IML	Ispanhani Marshall Ltd.
KSY	Khulna Shipyard
MIS	Mohammedi Iron and Steel
QIS	Quality Iron and Steel

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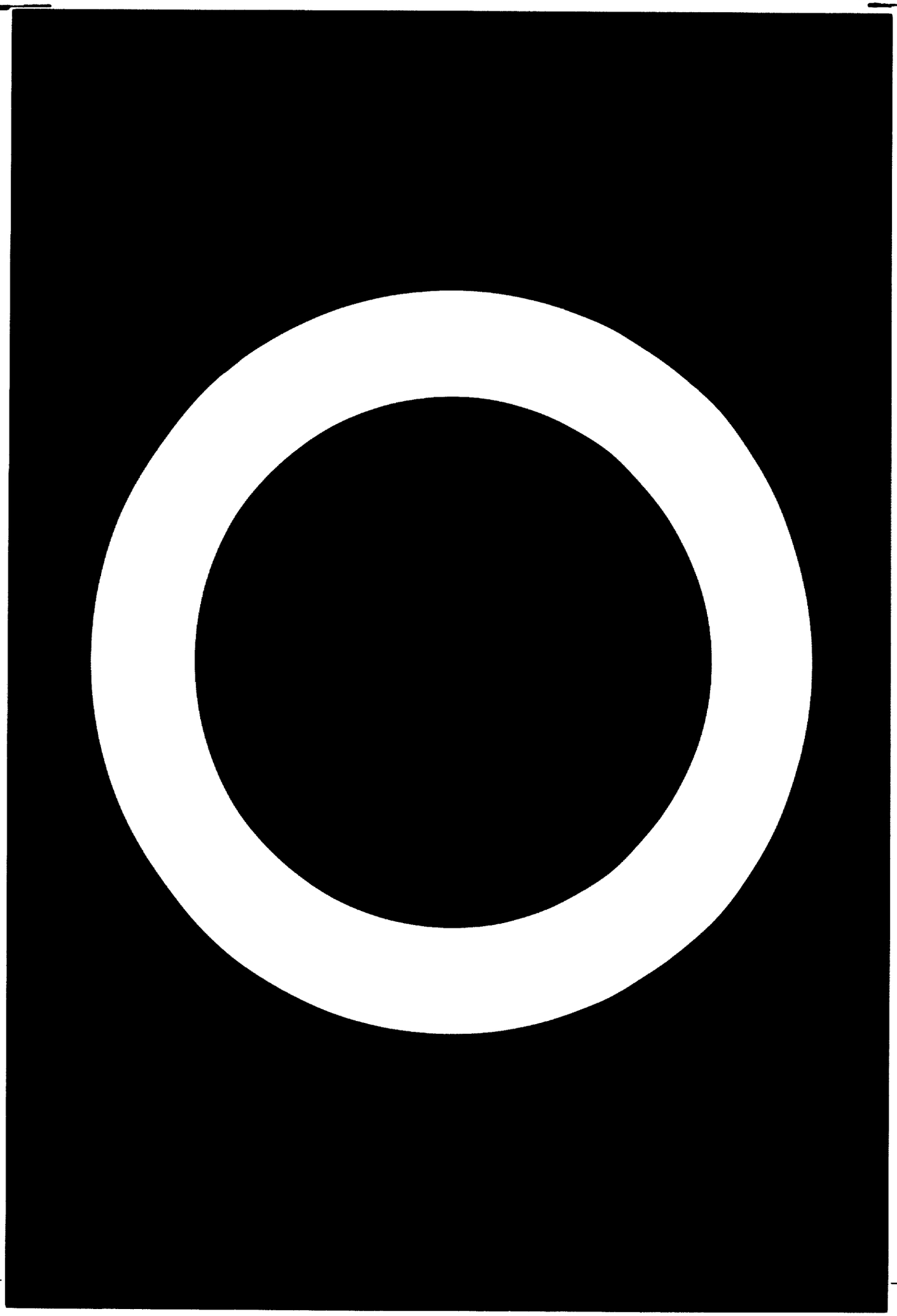

ABSTRACT

With a population of about 84.7 million, Bangladesh has a very low per capita consumption of cloth. The current rate is estimated to be approximately 6 yd^2 (5 m^2). The current level of cloth consumption in the countries of South-East Asia is 20 yd^2 (16.7 m^2) per capita per annum.

The annual requirement of cloth at the current rate of consumption for 84.7 million people is 508 million yd^2. If the population continues to grow at 2.8 per cent per annum, it will be 121.50 million by the year 1990. If the consumption level per capita is to increase to the extent of 12 yd^2 by the year 1990, Bangladesh will require 1,458 million yd^2 of cloth.

The hand-loom industry plays an important role as regards the supply of cloth in Bangladesh. About 70 per cent of the domestically available cloth comes from cottage hand looms, and 15 per cent from Bangladesh Textile Mills Corporation (BTMC) weaving mills, and the rest from imports. The major function of BTMC is spinning; it has no programme to expand its weaving. The task of weaving cloth will therefore depend on the hand-loom cottage industry. With the growing demand for cloth, the existing hand looms will be unable to cope.

In view of the growing need for cloth, there must be some technological changes in the traditional hand loom. Considering the present low level of productivity, it is clear that only the introduction of power looms can fulfil the growing demand for cloth. From an analysis of the different aspects of the country's problems and potentialities, the desirability of the gradual introduction of simple power looms has been established both from the technological and economic points of view.

The power loom should gradually replace the hand looms. The scheduling of such replacement should be such that 50 per cent of the existing hand looms be replaced by power looms by 1990. The proposed power looms should be domestically produced by utilizing the country's existing installed capacity. After detailed study of the technological aspects of different Bangladesh Steel and Engineering Corporation (BSEC) enterprises, it is recommended that Ispahani Marshall Ltd. (IML) take the lead in manufacturing simple power looms. One should be designed and developed so that trial production could start in 1981 and the optimal production volume of 2,000 units could be reached by 1986.

The estimated cost of production of a typical simple power loom is about taka 81,000 ($2,000). The price of a locally produced loom, as compared with

that of the imported one, would be much less in view of the low cost of labour in this country. If the loom were to be produced locally, it would create employment for about 420 people of different categories.

An adequate supply of yarn is a prerequisite for the weaving industry. Although the production of yarn is the main responsibility of BTMC, its present spinning machinery is insufficient. The situation in future will be much more difficult unless the spinning capacity of BMTC is expanded.

Analysis of the installed capacity and the extent of its utilization in BSEC enterprises reveals that 40 per cent of installed capacity of all the factories remain unutilized. Out of all the enterprises, Bangladesh Machine Tools Factory (BMTF) and the General Electric Manufacturing Plant (GEMP) are worth mentioning. BMTF is particularly capable of manufacturing high-precision spare parts. So the production of some spares will definately help in the utilization of the spare capacity and save a substantial amount of foreign exchange now going for imports.

The maintenance of BMTC mills is very poor, largely attributable to the unavailability of spare parts. At any given time, out of the installed spindles (about 1 million) approximately 25 per cent are operative, mostly owing to the lack of spare parts. Considering future demand, spinning capacity will have to be trebled. For the proper maintenance of the existing as well as future spindles, a smooth supply of necessary spare parts will have to be assured. Therefore, the production of some selected spare parts in economic quantities seems to be both technically possible and economically feasible.

The production of simple power looms will not require any substantial new investment; it would be possible with the existing facilities of IML in collaboration with GEMP and Mohammadi Iron and Steel (MIS). However, to achieve the final production programme, the expansion of IML would be necessary, which would require an investment of approximately taka 45 million ($3 million).

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INTRODUCTION

Background

Bangladesh, with a population of about 85 million people in an area of 55,000 square miles, has a *per capita* consumption of cloth (approximately 6 square yards ($5m^2$)) which is one of the lowest in the world. The bulk (about 70 per cent) of the locally produced cloth is supplied by the traditional hand-loom sector. Large-scale industrial production of spun yarn and textile fabrics is carried on by 54 textile industry establishments, all of which are in the public sector and under the control of the Bangladesh Textile Mills Corporation (BTMC). This corporation is under the Ministry of Textiles, which was set up in July 1977 with the overall responsibility for maximizing the production of cloth for domestic consumption.

The large-scale spinning and composite textile mills operate at low levels of production and efficiency, largely owing to the unavailability of spare parts and inadequate maintenance. However, Bangladesh has a small but modern engineering industrial sector, but a major portion of its installed capacity remains idle. Most of the engineering industrial units are under the control of Bangladesh Steel and Engineering Corporation (BSEC).

In view of the above situation, the present project "Linkage studies in Engineering industries" (DP/BGD/75/002) was set up to utilize the spare capacity of the BSEC units. The project "Pre-feasibility study of local manufacturing of simple power looms, textile machinery and spare parts", which forms the subject matter of the present report.

The study was conducted by a team of four, led by the UNIDO Project Manager, with the BSEC comprising the following persons:

Cronje Hj. Baeck, UNIDO	Project Manager
Adam Kolczynski	UNIDO expert in textile machinery manufacture
Mohammed Sirajul Islam	Engineering counterpart
Nurul Ameen	Economic counterpart

Assistance in establishing the necessary contacts and provision of essential information was given by:

B. Ahmed	Director (Planning and Development) BSEC
Nazemuddin Ahmed	Director (Production and Engineering) BSEC

A.S.M. Shahid	Director (Planning and Development) BTMC
Sabih Uddin Ahmed	Chairman, Bangladesh Rural Electrification Board (BREB)
Mujibur Rahman	General Manager (Planning) BSEC
A.M.S. Hameed	General Manager (Implementation) BSEC
Murad Waiz	Member (Planning) Bangladesh Handloom Board (BHB)
S.N.H. Aurangzeb	Executive Director, Cotton Development Board (CDB)

Purpose and scope of the report

The aim of the present report is to present to the Government of Bangladesh the materials and information necessary to assess the techno-economic feasibility of local production of simple power looms and other simple textile machinery and spare parts for them.

The duties of the experts, as in the job description, were to:

(a) Review of the country's requirements in looms, including concise specifications;

(b) Assess the techno-economic feasibility of producing the looms defined above;

(c) Suggest a possible joint venture with international manufacturer for the above purpose;

(d) Elaborate a detailed programme for possible local production of spare parts for the textile industry.

Method of elaborating the report

The report on techno-economic feasibility of local production of a simple power loom, textile machinery and spare parts takes into account the existing situation and prospects for engineering industries as well as textile industry in Bangladesh.

In view of the objectives of the report, the team investigated the existing production potential of BSEC enterprises. To this end, it visited the major enterprises of BSEC, existing and under construction, in order to determine the following:

The number and types of installed machine tools

Plans for expansion

Present level of operational efficiency and extent of capacity utilization

Present range of products and plans for new ones

The team then examined the existing production potential of the textile industry in Bangladesh. To this end the team visited the selected textile mills under the control of BTMC and determined the number and type of installed textile machines used for cotton processing, including simple looms and the degree of their utilization (annex I).

As locally produced simple power looms will gradually be used to replace the hand looms, the team made all-out efforts to get socio-economic and technical information concerning the hand-loom industry in Bangladesh.

On the basis of available statistical data, the team estimated the present and future annual requirements of cotton fabrics in Bangladesh to the year 1990. The annual requirements of spare parts for existing and new textile machinery were also estimated and an analysis of the technical level and production capacity of the existing workshops of the individual textile mills was made.

On the basis of its findings the team presented:

A production programme for power looms with an aim of gradually replacing hand looms

A production programme for spare parts

A techno-economic analysis of the two foregoing production programmes

The team drew up various forms and tables to obtain information from BSEC and BTMC enterprises.

In the course of gathering the required information, the team had meetings and consultations with officials of the following agencies:

Bangladesh Steel and Engineering Corporation (BSEC)
Bangladesh Textile Mills Corporation (BTMC)
Bangladesh Handloom Board (BHB)
Bangladesh Rural Electrification Board (BREB)
Handloom Co-operative Society (HCS)
Cotton Development Board (CDB)
Ministry of Textiles

In collecting the statistical data and information presented in this report, the team regrets that it must state that it got very little help from the various sources concerned. Since very few primary data were available, the team was obliged to make tentative estimates on the basis of the scarce available information.

I. ASSESSMENT OF THE TEXTILE INDUSTRY IN BANGLADESH

Bangladesh Textile Mills Corporation (BTMC)

After independence, as part of its policy for public ownership of large-scale industry, the Government nationalized all textile mills and placed them under the control of the Bangladesh Textile Industry Corporation (BTIC) in 1972. This corporation has been renamed the Bangladesh Textile Mills Corporation (BTMC). Prior to July 1977, when a separate Textile Ministry was formed, BTMC was under the administrative control of the Ministry of Industries.

There are 65 textile enterprises under the control of BTMC. These include 10 spinning mills under construction and 1 specialized enterprise. A classification of those enterprises, along with the looms and spindles is shown in table 1, and a consolidated statement giving vital information regarding the textile mills is shown in annex II.

Table 1. Textile mills under BTMC control

Particulars	Number	Spindles	Looms
Existing mills			
Spinning only	24	346 500	
Spinning and weaving	25	584 256	7 982
Specialized textile mills	5	4 582	65
Mills under construction			
Spinning mills	10	237 500	-
Specialized textile mill	1	-	-

From table 1 it is clear that BTMC places great emphasis on spinning. It is of interest that of the 11 mills under construction, 10 are pure spinning units. When all of them go into production, the installed number of spindles will be 1,172,938.

Production

The production of yarn during the fiscal year 1976/77 was 82.4 million lb (37.4 million kg) and the production of cloth for the same period was 68.1 million square yards (56.9 m^2). The yarn produced by the spinning mills varies from 20 counts to 30 counts. The cloth manufactured is usually medium and coarse material for the use of the rural population. The BTMC weaving mill uses only 15 per cent of the yarn manufactured by its 51 existing mills; the

rest is used by the hand-loom industry, which is spread over the whole of rural Bangladesh. Their performance as regards spinning and weaving in 1976/77 is shown in annex III.

Employment

In terms of industrial employment, the cotton textile industry is second only to the jute industry. The labour force of the cotton textile mills and BTMC head office and zonal office is shown in table 2.

Table 2. Labour force of BTMC as of 30 June 1977

Classifications	Textile mills	Specialized textile mills	BTMC head office	BTMC zonal office	Mills under counstruction	Total
Officers	1 027	55	177	11	86	1 356
Staff	8 610	265	322	54	521	9 772
Sub total	9 637	320	499	65	607	11 128
Skilled workers	21 279	681	-	-	-	21 960
Semi-skilled	19 636	152	-	-	696	20 484
Unskilled	11 642	232	-	-	-	11 874
Sub total	52 557	1 065			696	54 318
Grand total	62 194	1 385	499	65	1 303	65 446

The hand-loom industry

Traditional hand looms operated by rural artisans are the major source of domestically-produced cloth. These consume more than 80 per cent of the yarn manufactured by the spinning mills and supply approximately 70 per cent of the domestically available cotton cloth. The hand-loom sector contributed 60 per cent, 68 per cent, 72 per cent and 67 per cent of the domestically available cloth during 1967/68, 1968/69, 1972/73 and 1973/74, respectively. Despite the overwhelming importance of this industry, it is difficult to find the actual number of hand looms now operating; there has been no comprehensive survey in the recent past. However, a survey conducted by Bangladesh Small Industries Corporation (BSIC) in 1962/63 concluded that there were 250,000 hand looms in operation at that time, but industry sources believe that there may be as many as 400,000. It should be noted that the productivity of these looms is very low: only about 1.5 yd^2 (1.3 m^2) hour. A recent figure obtainable from the Joint Registrar of Weavers' Co-operatives Societies Ltd showed that 228,804 were under its control.

The existing hand looms are mainly of two types, commonly known as the pit-loom (a very old and primitive type) and the Chittaranjan loom, which is much more productive. The hand looms are spread all over the country; this geographical distribution is shown in table 3.

Table 3. Geographical distribution of hand looms under the control of Weavers' Co-operative Societies

District	Number of hand looms		
	Pit looms	Chittaranjan	Total
Dacca	48 758	57 764	106 522
Tangail	26 877	11 010	37 877
Comilla	22 681	1 695	24 376
Pabna	23 191	23 168	46 359
Kushtia	13 315	335	13 670
Total	134 822	93 972	228 304

These hand looms supply the bulk of the country's cotton cloth and provide employment for very many men and women.

Bangladesh Handloom Board (BHB)

In order to protect the interests of this traditional industry, the Government has recently set up an organization entitled the Bangladesh Handloom Board (BHB), under the control of the Textile Ministry. This board has undertaken a comparative survey of the hand looms in Bangladesh. The result of the survey should be available by the end of September 1978.

Findings

The primary findings of the study were:

(a) The country's major production of cotton cloth (approximately 70 per cent) comes from rural hand looms;

(b) The modern textile mills of Bangladesh concentrate mainly on spinning yarn for use by these hand looms;

(c) Despite its important role in the economy of Bangladesh, the handloom industry is largely unorganized and does not receive the attention it deserves.

Raw material for spinning: cotton

While cotton is the basic raw material for spinning yarn in Bangladesh, sythetic yarns spun from short staple fibres are being used increasingly, alone or in blends. Bangladesh is currently conducting experiments on the possibility of cultivating cotton. At present, all requirements are imported.

On the basis of the present installed spindle capacity (935,438) of BTMC about 300,000 bales (400 lb or 180 kg = 1 bale) of raw cotton would be needed to feed the spinning machines in the 49 mills. When the ten new mills of BTMC, with their 500 spindles, come into production the additional requirements for raw cotton will be approximately 100,000 bales by 1982. The entire present demand for cotton is met by imports at a cost of approximately taka 150 crore, that is, 1,500 million taka ($100 million). The cotton is now being imported mainly from Egypt, Pakistan, Turkey, Union of Soviet Socialist Republic and United States of America.

To satisfy the growing demand for cloth resulting from population growth, the number of spindles must be increased over the years, and eventually the demand for raw cotton by the textile industry will be much higher. It is estimated from the foregoing factors that the expected increase of spindles will be approximately triple the present number, and that the country will need about 900,000 bales of raw cotton by 1990.

The demand for raw cotton will increase markedly over the years, but the price of raw cotton is also rising every year in the international market. The future development of the textile industry will therefore depend largely on the availability of domestically grown cotton. The CDB and various press reports indicate that the cultivation of cotton in Bangladesh shows every promise of success.

With the success in recent experimental production, CDB has launched a three-year pilot project for the intensive cultivation of cotton on 3,500 acres (1,400 ha) of land during 1977/78, 6,000 acres (2,400 ha) during the fiscal year 1978/79 and 9,000 acres (3,600 ha) by 1980.

Last year's production of about 30,000 maunds (1,100,000 kg) of seed cotton, which is about 12,000 (450,000 kg or 2,500 bales) of cotton indicates good possibilities in the coming years. Moreover, in the opinion of the Directorate of Soil Survey of Bangladesh, cotton can be grown on 9.2 lakhs acres (372,600 ha) of land in different areas of the country, which would give a possible production of 92 lakh maunds (340 million kg) of seed cotton, giving about 750,000 bales of raw cotton.

Findings

From the above figures it seems that, if everything goes according to plan, the country will be able to supply about 80 per cent of the total raw cotton

demand of the spinning mills in the near future, that is, by the year 1990. The prospects for the development of the textile industry in the country are consequently very bright.

II. PROSPECTS FOR THE DEVELOPMENT OF THE TEXTILE INDUSTRY

The need for clothing, and thus for cloth, is second only to that for food. Indeed, the standard of living of a country can be ascertained by the per capita consumption of cloth by its population. Although it is quite difficult to obtain these figures, they have been estimated in several studies as follows: 1966/67, 6.9 yd^2; 1967/68, 6.3 yd^2; 1968/69, 6.3 yd^2; 1972/73, 5.0 yd^2; and 1973/74, 5.6 yd^2.[1/]

Bangladesh ranks as one of the least developed countries as regards clothing consumption. The consumption level is under 6 yd^2 per person/year compared with about 20 yd^2 per person/year in other countries of South Asia. There is thus a large unsatisfied and increasing demand for cloth that will require substantial expansion of the textile sector as regards both spinning and weaving.

No marked increase in the level of textile consumption in Bangladesh can be expected in the near future owing to the scarcity of foreign currency available for imports. Even if the annual consumption level were to be only 8 yd^2 per person in 1982, the cloth requirement would be approximately 778 million yd^2. In this connection it is estimated that consumption in other South Asian countries is presently 20 yd^2 per person. Even if Bangladesh were to make available 12 yd^2 per person in 1990, it would have to make available 1,458 million yd^2 of cloth for 121.5 million people.

Spinning: The Bangladesh Textile Mills Corporation

In view of the projected increase in demand for cloth, the spinning capacity of the country must also be increased. Of the existing 921,298 installed spindles, only 685,238 are in operation, producing 82.4 million lb of yarn in absolute terms during 1976/77. With all of the yarn produced by BTMC mills, only 339 million yd^2 can be manufactured. (In general, 1 lb yarn = 4 yd^2 of cloth.) As has been noted, this is far below the present requirements of the country. In recent years, domestic spinning mills have been able to supply 80 per cent to 90 per cent of the yarn requirements; the balance was imported.

The number of spindles required in the coming years will depend on the expected level of cloth consumption per capita per year. Comparative figures are given in table 4.

1/ Source of data for 1966/67 to 1968/69 was A.Z. Muslim's Market Report of Cotton Industry in East Pakistan (Dacca, EPIDC Planning Division, November 1969), p. 18 and for 1972/73 and 1973/74 from "Bangladesh survey of the jute and cotton textile industries", World Bank Survey, 25 September 1975, p. 5, table 2.

Table 4. Number of spindles[a] required at various levels of cloth consumption (millions)

Years	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Population[b] / Consumption (yards)	19.07	94.65	97.30	100.02	102.60	105.68	108.68	111.68	114.80	118.19	121.5
(square yards/year)											
6	0.98	1.01	1.04	1.07	1.10	1.13	1.16	1.19	1.23	1.26	[illegible]
7	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.39	1.43	1.47	.51
8	-	1.35	1.39	1.42	1.46	1.50	1.55	1.59	1.64	1.68	.73
10	-	1.69	1.73	1.78	1.83	1.88	1.94	1.99	1.05	2.11	.16
12	-	2.02	2.08	2.14	2.19	2.26	2.32	2.39	2.46	2.52	.63

Note: a/ Average annual production of a spindle is 140 lb (63.5 kg) of yarn.

b/ Rate of population growth, 2.8 per cent (1974/75 base estimate, 77.40 million).

The gradual change in the consumption pattern from 8 yards in 1981 to 12 yards in 1990 is shown in figure I.

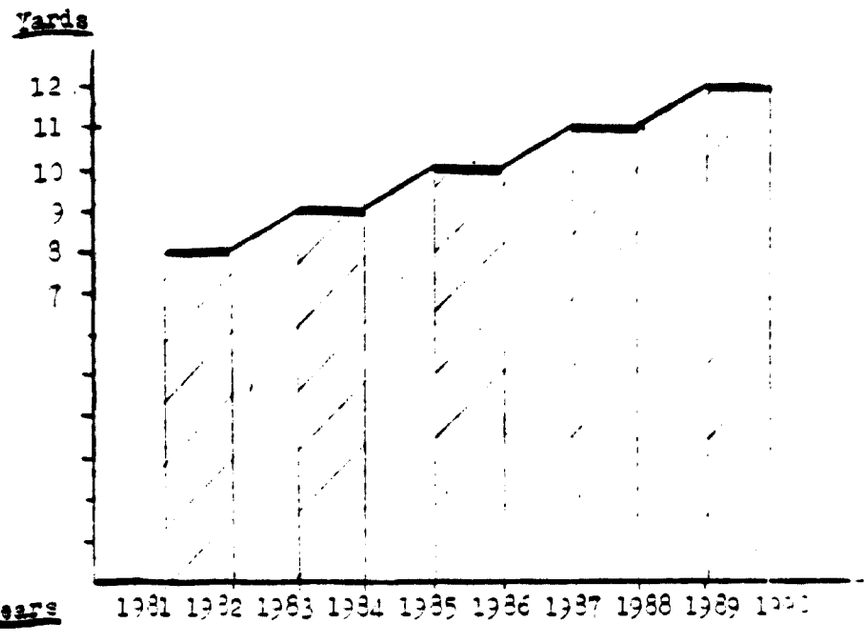


Figure I. Changes in the pattern of cloth consumption (1981-1990)

Given the situation depicted in figure I the required quantity of yarn and the corresponding number of spindles will be as shown in table 5.

Table 5. Requirements (millions) of spindles for corresponding quantities (lb/million) of yarn (1981-1990)

Year Consumption (yd^2)	1981	1983	1985	1987	1989	1990
8						
Yarn	189	200	211	223	236	243
Spindles	1.39	1.42	1.50	1.59	1.68	1.73
10						
Yarn	236	250	264	279	295	304
Spindles	1.69	1.78	1.88	1.99	2.11	2.16
11						
Yarn	260	275	290	307	325	334
Spindles	1.85	2.01	2.07	2.19	2.32	2.38
12						
Yarn	283	300	317	336	354	364
Spindles	2.02	2.14	2.26	2.39	2.52	2.60

Although it has been assumed that the productive capacity of the installed spindles will be 100 per cent, this is highly improbable when one considers that the current productivity of BTMC spindles is between 75 per cent and 80 per cent. Ordinary yarn will have to be imported apart from the special-quality yarns which will always be required for certain textiles.

There are 7,359 installed looms in BTMC mills, of which only 6,388 are operable. It also appears that BTMC plans no increase in its looms. Consequently the bulk of the required cloth must come from the cottage hand loom sector, that is, from the private sector.

Supplying future requirements for cotton cloth

It would appear very unlikely for the hand-loom industry, as presently constituted, will be able to meet the country's demand for cloth in the years to come. If, as shown in table 4, the per capita consumption of cotton cloth will reach 12 yd^2 (10 m^2) in 1990, the total required for the projected population of 121.5 million would be 1,458 million yd^2. This would be about triple the present quantity available. Consequently, the future role of hand looms should be considered carefully. The question arises whether their number should be increased or whether simple power looms should be introduced gradually.

Findings

1. The present per capita annual consumption of cloth at the rate of 6 yd^2 is very low in comparison to other South Asian countries.

2. The annual rate of population growth is 2.3 per cent, one of the highest in the world.

3. Both the spinning and weaving capacities of the country will have to be expanded substantially to meet the requirements of this growing population.

4. In view of future requirements, it must be decided whether new and modern technologies should be introduced into the rural weaving sector.

III. SPARE PARTS

Under the present circumstances, spare parts are required for the rehabilitation or renovation of inoperative machinery and for routine replacements.

During the visits of the team to selected BTMC mills, it was noted from discussions with the local managements that the non-availability of sufficient spare parts causes disturbances in production, resulting in lower product quality.

In almost all cases some machines were cannibalized; that is, dismantled to supply parts to keep other machines running. This severe lack of spare parts is probably the explanation of the divergencies in the figures for installed spindles as compared with spindles in operation given in table 6.

Table 6. Analysis of the technical condition of installed spinning and weaving machinery

A. Spinning machinery

Year	Installed spindles	Operational spindles (thousands)	Inoperative spindles	Percent of inoperative spindles
1966	654	573	81	12
1967	661	555	106	16
1968	668	569	99	15
1969	731	646	85	11
1970	750	660	90	12
1971	836	650	186	22
1972	836	650	186	22
1973	846	626	220	26
1974	858	657	201	23
1975	890	692	198	22
1976	906	660	246	27
1977	921	685	236	26

B. Weaving machinery

Year	Installed looms	Workable looms	Loom in operation
1973/74	7,375	6,375	4,315
1974/75	7,563	6,563	4,792
1975/76	7,636	6,165	4,847
1976/77	7,359	6,389	4,531

Determination of requirements for spare parts for STMC, 1978-1990

Assumed method

The range of demand for spare parts was determined on the following bases:

Analysis of spare parts consumption in the existing conditions specified in annex V

Analysis of the technical condition of installed machines given in table 6

Growth of spare parts demand resulting from development of existing textile mills

Range of indispensable imports estimated for basic machines, eliminating high-precision spare parts manufactured by specialized firms

Included in this type are:

Impression arms

Card sheathings and saw wires

Other accessories requiring very high precision achieved by mass production

Heddles, reeds, shuttles and ring travellers

To formulate a demand programme, an analysis of spare parts consumption in selected mills was carried out.

The findings are given in figure II.

It can be seen that, although more spindles are installed each year, the number in actual operation either remains the same or drops. Table 6 also shows an increasing number of idle spindles. This situation undoubtedly reflects a progressive shortage of spare parts.

There is a tendency to blame much of the difficulties on the take-over of the spinning mills by the public sector in 1972. It would seem fair to say that, with the passage of so much time, mill management should have been able to adapt to public ownership.

There are very real obstacles to the regular and smooth procurement of spare parts. During the visits to the mills, the team got the impression that everyone realizes that the procurement of parts must have a very high priority. A list of the spare parts required is given at annex IV.

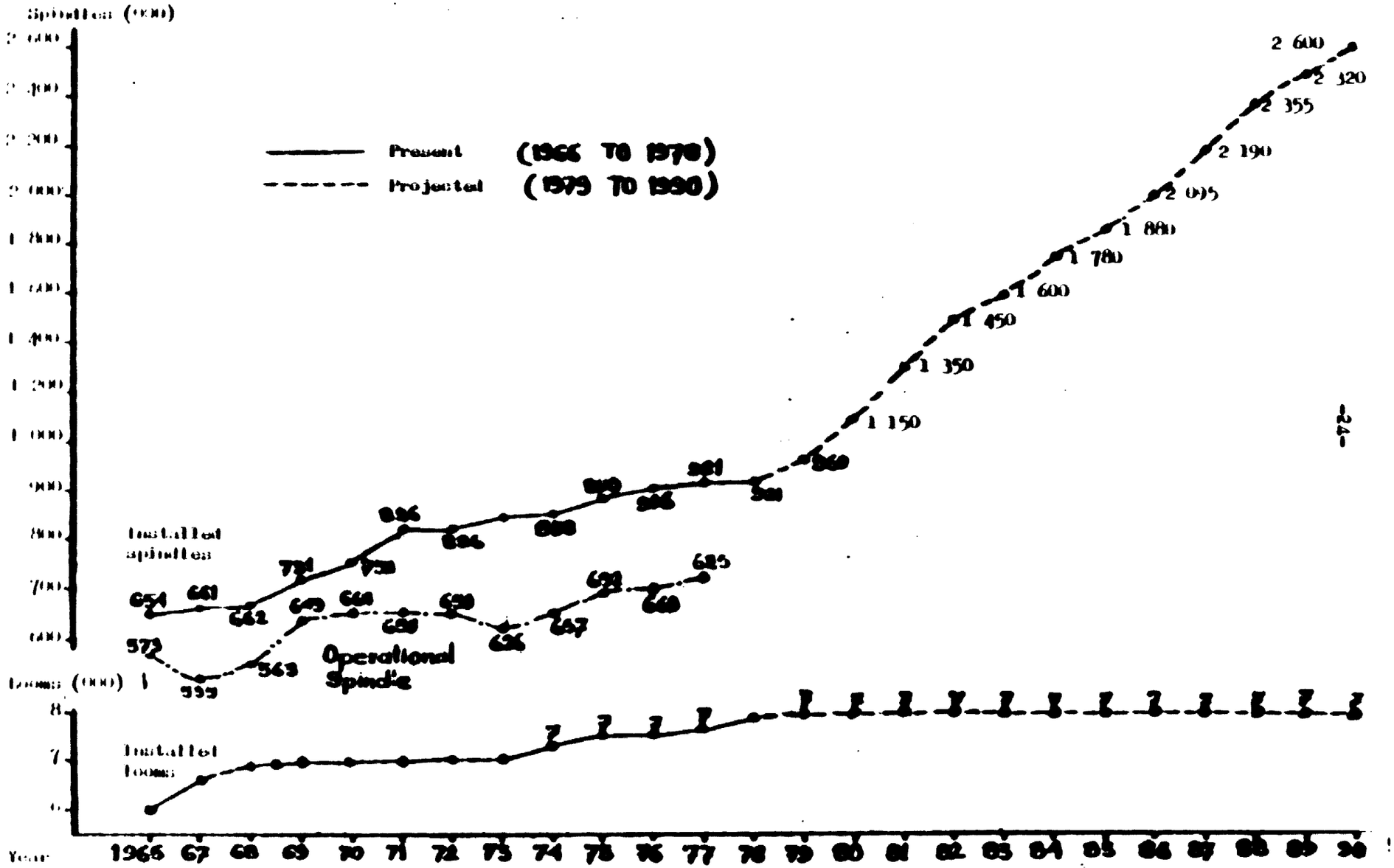


Figure 11. Growth trend of textile machinery in MTMC

The annual requirement of spare parts of all BTMC mills has been estimated, based on a standard composite model mill with 12,500 spindles and 280 looms. In order to estimate the requirement for spare parts, the process of manufacturing yarn and cloth has been divided functionally along with the required number of machines, as shown in figure III. The estimated annual spare parts costs for such a mill are shown in table 7.

Findings

Any increase in the number of operative spindles resulting from the installation of new machines would be much more costly than repairing installed, unserviceable ones; the cost of the latter might be but a fraction of the capital investment in the former. The team also recommended an accurate listing of all parts that are manufactured locally, and the distribution of these lists among the members of BTMC to avoid duplication.

The 1977/78 consumption of textile machinery spare parts and the projected 1990 demand for them are presented graphically in figure IV.

Proper maintenance of the machinery should be ensured. There should be a set maintenance schedule which should be followed strictly.

To help to achieve specialization, the existing mill workshops should be utilized to manufacture certain specific items in bulk instead of manufacturing all items.

Workshops should be established immediately in mills that now have none, and the existing mill workshops should be expanded and modernized.

The size and facilities of such workshops might not be very large but should be well-enough equipped to meet basic preventive maintenance of the mills and to carry out the manufacture of specific items, as mentioned above.

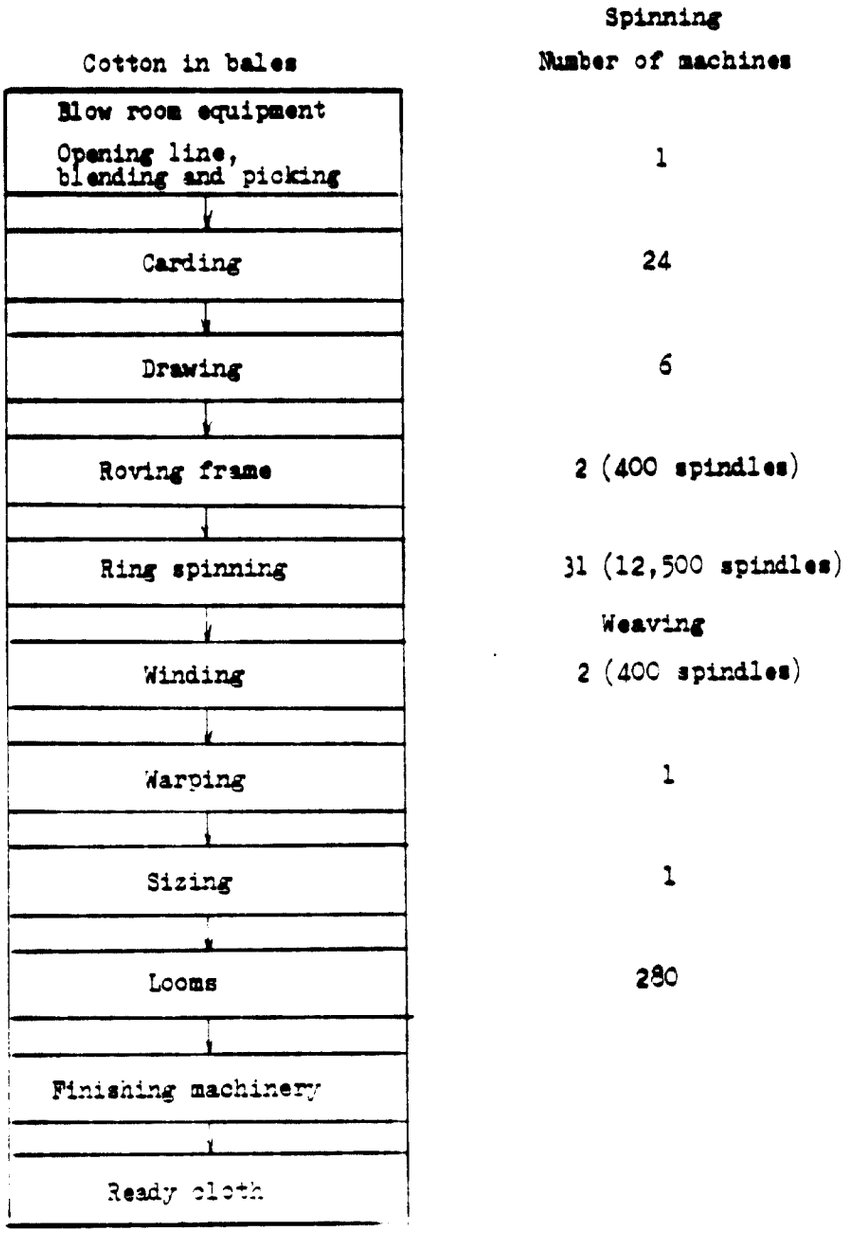


Figure III. Process flow of cotton yarn in a model mill

Table 7. Determination of spare parts requirements

Groups of machinery	Spare parts requirement							
	1979	1980	1981	1982	1983	1984	1985	1986-90
	-			(thousand dollars)			-	
Spinning								
Opening line and blow-room	202.7	239.2	279.8	327.4	350.3	285.4	423.9	2 861.4
Carding with wire	1 668.3	1 956.9	2 289.7	2 678.9	2 866.3	3 153.0	3 468.1	23 411.5
Drawing frame	368.5	434.8	508.8	595.3	636.9	700.7	770.7	5 202.5
Spindles, roving	245.7	289.9	339.2	396.8	424.6	467.1	513.8	3 468.3
Ring spindles	3 142.5	4 327.4	5 062.8	5 923.5	6 338.3	6 671.8	7 669.3	51 765.5
Total	6 142.5	7 248.2	8 480.3	9 921.9	10 616.4	11 678.0	12 845.8	86 709.2
Weaving								
Winding	82.5	82.5	81.0	82.5	85.0	87.5	89.0	445.0
Warping machine	152.4	152.4	150.0	152.0	157.5	161.4	165.5	827.5
Seizing machine	137.5	137.5	134.5	137.0	139.0	143.0	148.5	742.5
Weaving looms	2 381.6	2 381.6	2 334.5	2 295.8	2 065.3	2 054.9	1 970.4	9 138.1
Total	2 754.0	2 754.0	2 700.0	2 655.0	2 548.8	2 446.8	2 373.4	11 153.1
Finishing								
and other	459.0	491.1	535.3	588.9	647.7	712.5	783.7	4 271.6
Grand total	9 355.5	10 493.3	11 715.6	13 165.8	13 812.9	14 837.3	16 002.9	102 133.9
	(10 million taka)							
	14.033	15.73	17.57	19.74	20.73	22.25	24.00	153.19

Consumption (present)	Demand (projected)
1977/78 $ 9.1 million taka 13.65 crore	1990 $ 20.6 million taka 30.9 crore

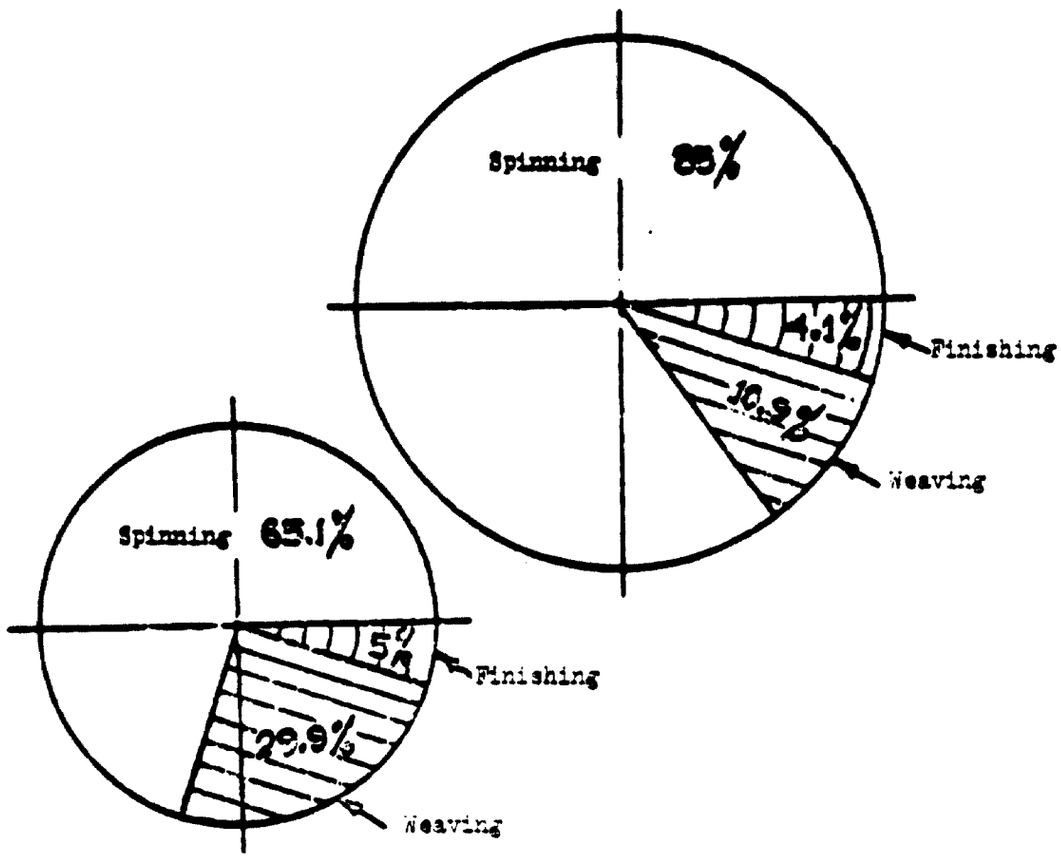


Figure IV. 1977-78 consumption and projected 1990 demand for textile machinery spare parts

IV. DETERMINATION OF THE DEMAND FOR POWER LOOMS

The present per capita annual consumption of textiles in Bangladesh, as shown earlier in the present report, has been estimated at 6 yd^2, and 70 per cent of the yarn used to produce the total available textiles is spun in domestic cotton mills.

In view of the increased requirement for textiles for the increasing population and also because of the anticipated elevation of the quality demanded, it is now time to consider:

(a) Whether the hand-loom cottage industry will be able to continue to supply requirements at the present rate of 70 per cent of the textiles available in the country;

(b) Whether there should be radical technological changes in the existing hand looms to improve their productivity;

(c) Whether simple power looms should be introduced alongside the existing hand looms to ensure satisfaction of the quality and quantity of the textiles demanded.

Why power looms are needed

Analysis of the existing situation brought the team to the view that simple power looms should be introduced by 1980 to permit gradual replacement of hand looms by simple power looms and to meet the increased quantitative and qualitative demand.

The team arrived at the above conclusions in view of the following considerations:

(a) The major activity of BTMC is spinning. This is apparent from its expansion programme;

(b) All BTMC mills under construction are purely spinning units. With their current weaving capacity they can hardly meet 15 per cent of the country's demand;

(c) There appears to be little possibility in bringing any striking change in the productivity of the existing traditional hand looms;

(d) The Government has embarked on a plan to electrify the rural areas of Bangladesh. The introduction of power looms would ensure better utilization of the rural electrification programme;

(e) The introduction of synthetic staple fibres, which has become compulsory in view of the high price of cotton, has adversely affected the operational efficiency of the hand looms;

(f) Certain qualities of fabrics cannot be manufactured on hand looms;

(g) The introduction of simple power looms would not mean the total elimination of the hand loom cotton industry, since certain fabrics can be manufactured only on them:

(h) The apprehension that the introduction of simple power looms would bring unemployment to a good many rural weavers is unfounded. On the contrary, it would require intensive pre-manufacturing and post-manufacturing activities, among them beaming, sizing, dying, marketing, servicing and many other ancillary activities as the demand for cloth increases.

The gap between demand and supply

The replacement of hand looms by simple power looms will be required because of the failure of the traditional hand looms to keep pace with the growing need for textiles. As the consumption level will gradually increase, the gap between the demand for and the quantity of cloth domestically available will also increase. Table 8 below shows the increasing gap under varying assumptions.

Table 8. The gap between the demand and the supply of cloth[a/]

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Population (millions)	94.6	97.3	100.0	102.6	105.6	108.6	111.6	114.8	118.1	121.5
Level of consumption per capita (square yards)		8		9		10		11		12
Total demand (million square yards)	757	778	900	923	1 026	1 086	1 228	1 262	1 418	1 458
Total domestic supply (in million square yards)	630	644	730	746	810	860	959	983	1 106	1 135
Gap (million square yards)	127	134	170	177	208	226	269	279	312	323

a/ The above calculation has been based on the following assumptions:

BTMC will not increase the number of its looms

The number of hand looms continues to multiply in order to be able to supply approximately 70 per cent of the total available textiles

A population growth of 2.8 per cent per annum (1974/75 base figure of 77.40 million)

The consumption level is arbitrary. The increased level is shown keeping in view that the current level of cloth consumption in the South Asian countries is 20 square yards per person/year.

Conditions for introducing power looms

The programme for introducing simple power looms in Bangladesh will involve designing a special type of low-cost simple power loom. It must be produced domestically in order to make it especially suitable to local conditions as well as to ensure the maximum utilization of the installed capacity of the domestic engineering industries.

The replacement of hand looms by simple power looms must be done gradually. This must be done at such an increasing rate so that by 1990 25 per cent of the hand looms will have been replaced. From that time onward, no more hand looms should be installed. Additional demand for cloth must be met only by power looms.

The Government will have to come forward with the following:

(a) Extension of loans on easy terms to the weavers' co-operatives for the procurement of looms;

(b) Ensuring a steady supply of yarn, dyes and electricity and the like;

(c) Extension of facilities by establishing technical support centres to train weavers to use the new looms;

(d) Provision of fiscal benefits such as tax holidays;

(e) Protection of the industry from unequal competition from imported fabrics;

(f) Ensuring marketing facilities as well as the elimination of middlemen in the process as far as practicable.

Rate of replacement

The number of power looms which the country will require is shown in table 9.

Table 9. Schedule for the replacement of hand looms by power looms[a/]

	1981	1982	1983	1984	1985	1986	1987	1988	1989	19[illegible]
Power looms for replacement of hand looms	500	625	750	875	1 000	1 125	1 250	1 375	1 500	1 7[illegible]
Power looms required to meet additional demand	-	-	-	-	137	537	1 477	1 735	1 804	2 1[illegible]
Total	500	625	750	875	1 137	1 662	2 727	3 110	3 304	3 8[illegible]

a/ The calculations were done on the following basis:

The number of operating hand looms in the country is estimated at 250,000

In terms of productivity, one power loom = 4 hand looms

Replacement begins by 1981 at 1 per cent of the total operating looms and increases by 0.25 per cent annually till 1990. This slow rate of replacement is assumed because it will take time to acquire the required efficiency

Additional power looms will be required only from 1985, because in that year the gap between the total requirements for cloth and the domestic supply will increase beyond 15 per cent of the total requirement

Findings

Handlooms of the present productivity will be unable to meet the demand of the growing population and the expected increase in textile consumption.

Power looms should be introduced immediately to replace hand looms.

The introduction of power looms will not create unemployment, as may be feared; rather it will generate employment.

Government agencies will have to take the initiative in introducing power looms.

The introduction of power looms will be of physiological benefit to the workers, since much less physical effort is needed with a power loom than with a hand loom.

V. ASSESSMENT OF THE EXISTING FACILITIES OF BSEC ENTERPRISES

Existing workshop facilities

The assessment of the techno-economic prefeasibility for the production of simple power looms and spare parts in BSEC enterprises are based on extensive review of the spare parts production capacities of the existing BSEC enterprises, and technical conditions of the machinery, taking into account the prospect of future development.

For the purpose of the present study, the 44 BSEC enterprises are considered under the following three groups:

(a) Engineering industries: Responsible for the manufacture of various types of machinery and parts such as machine tools, electrical machinery and appliances, and spare parts for various machines and equipment;

(b) Manufacturing industries: Responsible for producing durable consumer goods and intermediate industrial inputs such as enamelled copper wire, welding electrodes, and cans and containers;

(c) Steel industries: Responsible for the production of raw steel and steel products such as sheets, rods, angles and bars.

The above groupings have been made in order to identify the activities which are to be carried out by the enterprises in the manufacturing of simple textile power looms and spare parts for textile machinery.

Selection of enterprises

For the selection of enterprises for the manufacture of simple power looms and textile machinery spare parts, an analysis was made to see the different aspects of BSEC enterprises (annex V). The team also visited some BSEC enterprises to see the present situation at first hand.

In the selection of enterprises to be visited, the following factors were also considered important:

Type of industry and production programme
Available machinery, equipment and other facilities
Availability of unused capacity
Size and cabilities of the workforce
Infrastructural factors such as electricity, water, fuel, and transport

Type of industry. Of the three main groups of BSEC enterprises, the engineering industries were considered as best suited to take part in the manufacture of power looms and spare parts. From the third group (steel industries) two important casting foundries are selected for the programme.

Size and capabilities of the workforce. This factor was also duly considered in selecting Ispahani Marshall Ltd (IML), Dockyard and Engineering Works (DEW) and the Khulna Shipyard (KSY). Silled manpower and low machine-hour cost are assets of these factories.

Infrastructural factors were also given due importance. The selected enterprises are well connected with each other and with the main cities by road, rail and water.

By analysing the various aspects and existing facilities of the BSEC enterprises and taking into consideration the above-mentioned factors, the following enterprises were selected to co-operate in the manufacture of a simple power loom and some selected textile-machinery spare parts: Bangladesh Machine Tools Factory (BMTF), Quality Iron and Steel (QIS), General Electric Manufacturing Plant (GEMP), Mohammedi Iron and Steel (MIS).

Unused capacity

It has been established from a comparative statement, as shown in 9th column of annex V, that a considerable amount of installed capacity of most of the BSEC enterprises remains unutilized. Moreover, it is expected that a substantial amount of new capacity will be generated, a good portion of which will be sparable, after the completion of the large projects, namely BMTF, GEMP and Chittagong Dry Dock. The real objective of the present study is to find out how to utilize the excess capacities of the BSEC enterprises by introducing new products such as simple power looms and spare parts.

The spare parts capacities of the selected enterprises have been carefully estimated in order to match them with the estimated work-load for the production programme of the specified items, namely looms and spare parts. The assessment of existing workshop facilities and available excess capacities of the selected enterprises are shown in table 10.

Table 10. Assessment of existing workshop facilities of some BSEC enterprises

Name and location of enterprises	Existing workshop facilities[a]
Dacca area	
Bangladesh Machine Tools Factory (BMTF)	All types of facilities (machining, treatment, foundry, forge etc.) available
Dockyard and Engineering Works Ltd. (DEW)	Machining and foundry
Quality Iron and Steel (QIS)	Foundry - quality castings

a/ In addition to enormous capacities available in both BMTF and GEMP, each of the listed enterprises has sufficient capacities that could be utilized for manufacturing textile power looms and spare parts.

Chittagong area	
Ispahani Marshall Ltd. (IML)	Foundry, machining
General Electric Manufacturing Plant (GEMP)	Machining and heat treatment
Mohammedi Iron and Steel Works Ltd. (MIS)	Steel casting (nodular cast iron) and ordinary casting available
Khulna area	
Khulna Shipyard Ltd (KSY)	Foundry, machining and stamping facilities available

The future development programme in respect of some BSEC enterprises as shown in annexure V have also been taken into consideration.

It is expected that the necessary expansion will take place on the basis of future developments and requirements. It would thus be quite premature to estimate anything at this time.

Findings

From the analysis of the existing workshop facilities of the selected BSEC enterprises, it has been established that the production of simple power looms is quite possible technologically. Even without adding any new machinery to any of the selected enterprises, it would be possible to manufacture the complete loom by collaboration among the concerned enterprises. This linkage system is shown in table 10.

If it is decided to utilize the experience and skill of IML in machine manufacturing, the factory will need some balancing and modernization.

As regards textile spare parts, it would be possible to produce many of them with the existing facilities. However, with respect of two important selected spare parts, namely the spindle and bolster (complete) and the ring cup, it would be necessary to seek collaboration or the purchase of technical know-how, as these items require a high standard of technical skill to produce. The annual requirements of these parts are very high.

VI. TECHNICAL DESCRIPTION OF THE PROPOSED POWER LOOM

Power looms are designed to produce light cloth up to an approximate weight of 250 g/m^2 of cotton and natural and artificial silk (rayon).

Freedom from vibration and stable operation at high picking speeds are ensured by side frames with tube fastenings. The power loom is capable of weaving a wide range of ordinary fabrics, thin to thick, simple to delicate, from cotton, synthetic and blended yarns.

The power loom consists of ten major components as shown below, totalling to approximately 300 parts:

Frame and elements
Picking
Sley
Cloth take-up
Crank-shaft control arrangement
Shuttle boxes
Warp take-up mechanisms
Metre wheel and clutch and break arrangement
All gears and cams
Commercial elements such as pins, nuts, bolts, rings and washers

A simple power loom can be installed with dobby, Jacquard or various twill-motion apparatus as required.

Table 11 shows the different aspects of typical power looms compared with automatic rapier looms.

Advantages of the power loom

Until fairly recently, over 80 per cent of all looms produced by European machine-building firms were shuttle power looms.

Power looms have only one ordinary system in weft-yarn feeding, are superior to any conventional automatic loom and have a number of advantages to satisfy the current needs of the cottage industry. Textiles of many kinds can be produced because of the wide versatility of loom operation, with specific features such as the following:

High efficiency for high-quality cloth
Great stability in operation
A large assortment of produced fabrics

Table 11. Technical data on various types of power looms

Model / Specification	Power looms			Automatic loom Saurer (Switzerland) 100 WT	Rapier loom SACM (France) MAV
	IWOMA (Japan) MBP	TSUDAKOMA (Japan) LK	HIRANO (Japan) D8		
Reed length (mm)	1 600 (63 in.)	1 600 (63 in.)	1 600 (63 in.)	1 600 (63 in.)	1 600 (63 in.)
Shuttle box	1x1, 2x1, 4x1	1x1, 2x1, 4x1	1x1	1x1, 2x1, 4x1, 4x4	-
Drawing method	Individual motor drive	Individual motor drive	Individual motor drive	Individual motor drive	Individual motor drive
Take-up	Pickles	Pickles	Pickles	Pickles and various	Pickles and various
Motor required	1 kW	1 kW	0.9 kW	1.7 kW	2 kW
Attachable accessories	Dobby, Jacquard	Dobby, Jacquard	Dobby, Jacquard	Dobby, Jacquard, external cam mechanism	Dobby, Jacquard, various twill motions
Adaptation for manufacturing	Easy	Easy	Easy	Difficult	Very difficult
Expected rate of output per hour (per cent of rated capacity)	60	65	65	100	180
Number of main parts	300	300	350	2 000	3 000
Maintenance	Easy	Easy	Easy	Good	Complicated
Approximate import price per unit c.i.f. Chittagong ($)	3 000	3 500	4 000	7 000	23 000

Convenience in maintenance, owing to minimum maintenance cost

Low cost of equipment

More labour effective than hand loom

Low production cost with consequent reduction of fabrics

The technological level for the production of simple power looms is not very much higher than for hand looms

Features and advantages of power looms as regards to production and maintenance

The main unit of the power loom is a four-link middle-pick motion with a steel picking shaft and noses. The design and materials used for manufacturing the picking motion should ensure reliable and precise loom operation.

All principal running parts of the power loom are provided with bronze bearings, while power bushings have been adopted throughout for bearings that are not easily accessible for lubrication. As a result, the smooth running of the loom is ensured and maintenance greatly reduced.

Simplified construction makes the power loom easy to operate, while accurate machining minimizes the wear of parts and, consequently, the cost of maintenance.

All important parts are made from selected materials, machined within specified tolerances and to the surface finish by means of special-purpose machine tools, jigs, fixtures, and gauges to ensure interchangability, which facilitates installation of the loom parts.

Production programme for power looms and spare parts

The subject of the programme is the production of simple power looms and spare parts for textile machinery, under the control of the BTMC mills.

Assumptions for the programme

The fundamental assumption for determination of the production programme was the requirement of textile weaving looms, specified in chapter IV, "Determination of the demand for power looms".

After analysis of the report, the team made the following proposals with regard to starting the production of textile machinery:

Simple power looms	2 000/year
Spare parts for textile machinery require a high standard technical efficiency	Approximate value $1.5 million/year

The quantity of power looms suggested is considered optimal for production purposes. Collaboration between the manufactuers of specialized elements such as bearings for spindles is necessary for the success of the scheme.

To achieve a better result, it is recommended that the optimum quantity of power looms to be produced should be 2,000. The stages of production are presented later in the present report.

Final production programme

Based on the needs as established in chapter IV, the final production programmes have been worked out as shown in table 12.

Table 12. Final production programme for power looms

Description	Number	Weight (tons)		Work load (thousand hours)		Value (thousand $)	
		Unit	Programme	Unit	Programme	Unit	Programme
Power looms	2 000	0.8	1 600	0.29	580	2	4 000
Spare parts							
Spindles	150 000	-	105	-	300	-	1 050
Rings	150 000	-	9	-	105	-	225
Tension shafts	36 000	-	40	-	61	-	72
Roller stands	36 000	-	40	-	47	-	126
Gears and others	20 000	-	12	-	14	-	50
Sub total			206		527		1 523
Grand total			1 806		1 107		5 523

(= taka 8.28 crore)

VII. PROJECT IMPLEMENTATION

Technical assumptions

For elaboration of the technical data on power looms and spares, the following factors deemed to be essential were given due consideration.

The enterprises listed in table 10 would execute the final production programme of:

Power looms	2,000/year
Spare parts for textile machinery	Spindles, rings and others 206 tons by weight (table 12)

The schedule of production of power looms and spare parts as shown in figure V and figure VI.

The production programme for a five-year period commencing 1980 is shown in table 13.

The BSEC enterprises will collaborate in the manner shown below in order to manufacture power looms and textile spare parts.

Selected BSEC enterprises taking part in the execution of the production programme

Dacca area	Chittagong area
BMTF	IML (Leader for loom manufacture) Spare parts: not recommended
Spare parts: complete manufacturing (especially spindles and ring cups)	Looms: casting of major part assemblies
DEW, Narayanganj	MIS
Spare parts: not recommended	Spare parts: steel, castings, good-quality items
Looms: casting and machining of large parts	Looms: quality casting of selected items
QIS, Tejgaon	CEMP
Spare parts: good quality castings	Spare parts: machining and heat treatment
Looms: medium-sized good quality castings	Looms: Machining and heat treatment

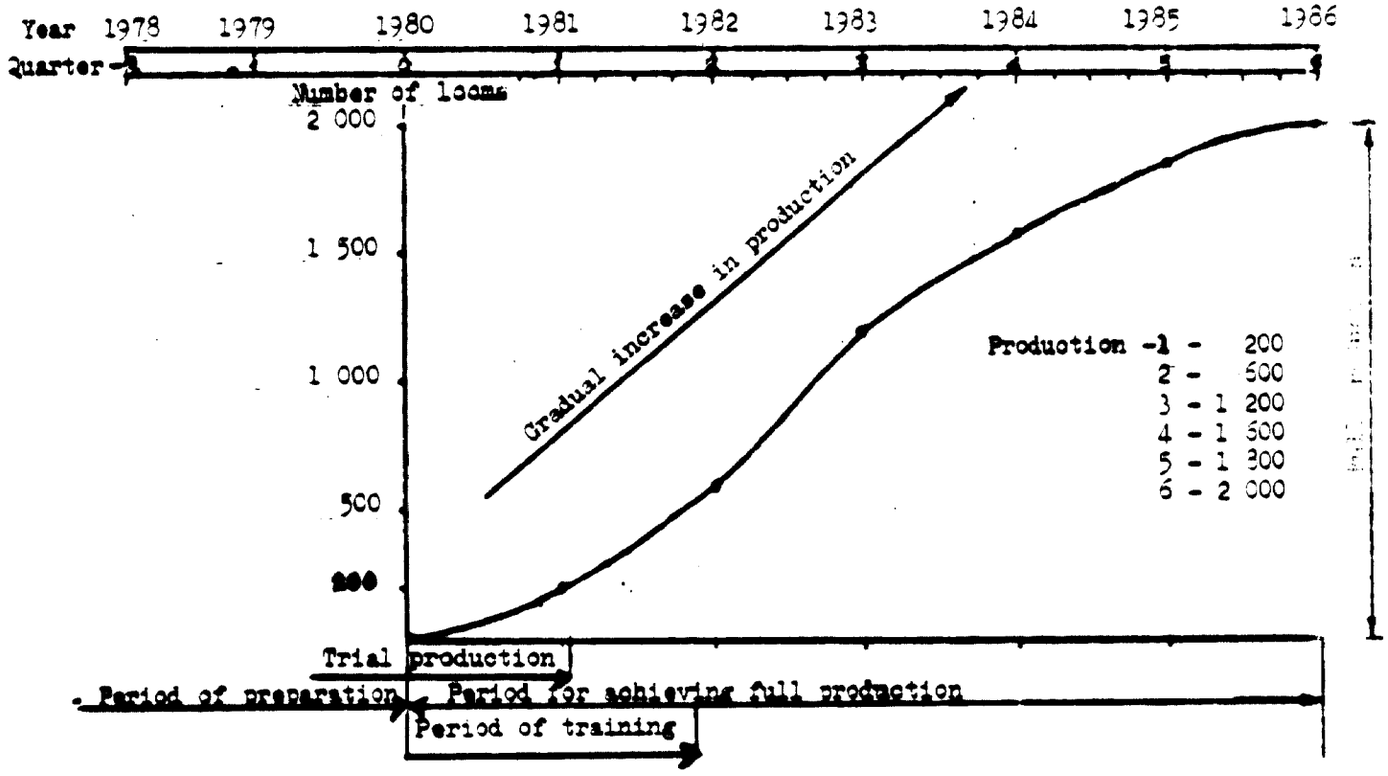


Figure V. Schedule of production of power looms and the achievement of full productive capacity

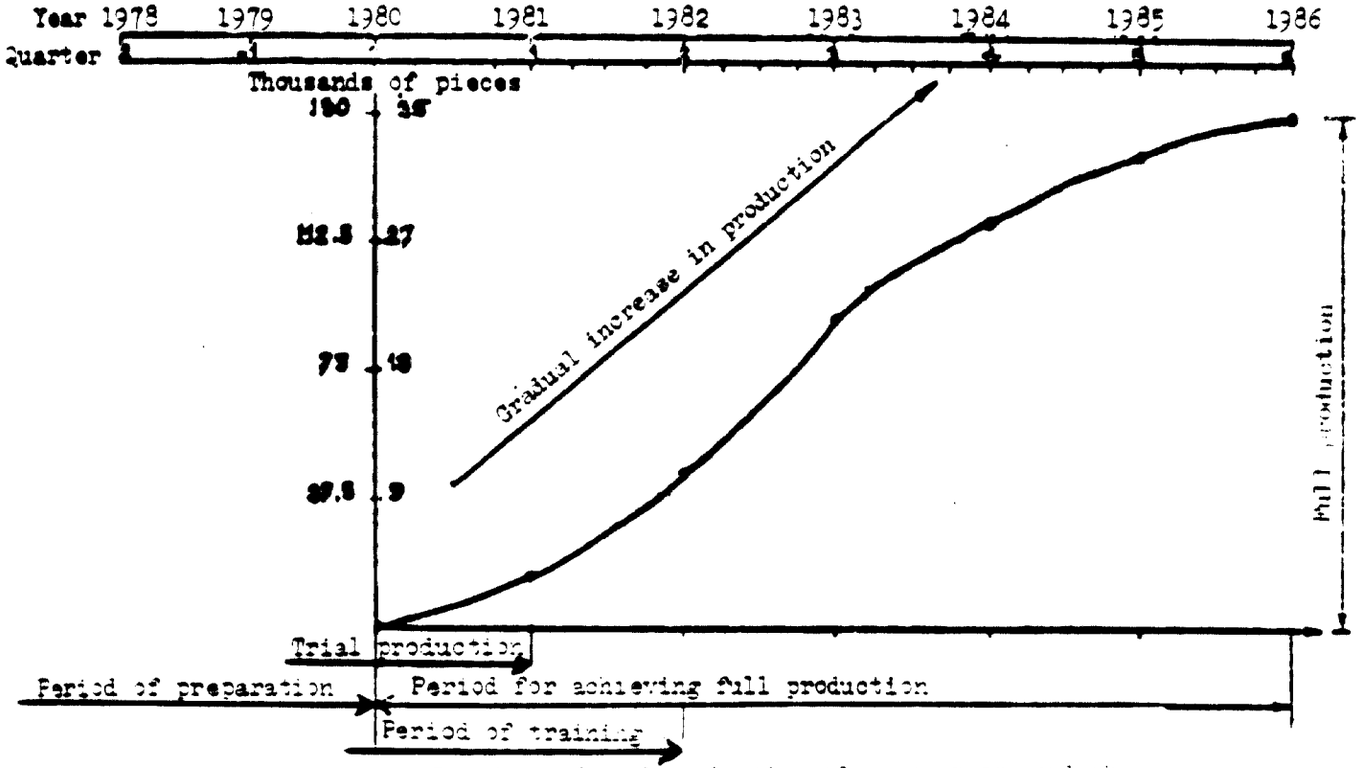


Figure VI. Schedule of production of spare parts and the achievement of full productive capacity

Table 13. Five-year production programme for power looms and spare parts

Specification	Starting-up and achieving full production capacity													
	1980		1981		1982		1983		1984		1985		1986-1990	
	No.	Value[a]	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Power looms[b]	15	30	200	400	600	1 200	1 200	2 400	1 600	3 200	1 800	3 600	10 000	20 000
Spare parts (thousands)														
Spindles	-	-	15	105	30	210	60	420	112	784	130	910	750	5 250
Rings	-	-	15	22.5	30	45	60	90	112	168	130	195	750	1 125
Tension shafts	-	-	1	2	9	18	18	36	27	54	32	64	180	360
Roller stands	-	-	1	3	9	27	18	54	27	81	32	96	180	540
Gears	-	-	0.5	1.3	4	10	8	20	12	30	16	40	100	250
Sub total (spare parts)			32.5	133.8	82	310	164	620	290	1 117	340	1 205	1 960	7 525
Sub value (Lakh taka)				19.95		46.5		93		167.55		204.3		1 128.75
Grand total (looms and spare parts	-	30	-	533.8	-	1 510	-	3 020	-	4 317	-	4 805	-	27 525
In Lakh taka		4.50	-	80.07	-	226.50	-	453.00	-	647.55	-	744		4 128.76

a/ $1,000.

b/ At $2,000 each.

The enterprise will operate on two shifts. The work time was found to be as follows:

Manual time (single shift)	=	2,100 hours/year
Machine time (double shift)	=	4,300 hours/year

Labour input in the manufacturing industry for this country is estimated to be 40 per cent higher than in Europe

Work loads

The work load specified for the assumed final production programme is given in table 14.

Table 14. Summary of manufacturing work loads

	Work load per programme					
	Power looms			Spare parts		
Activity	Machine work load (hours)	Manual work load (hours)	Total	Machine work load (hours)	Manual work load (hours)	Total
Foundry	15 000	55 000	70 000	1 100	4 400	5 500
Machining	290 000	50 000	340 000	402 200	75 700	477 900
Heat treatment	-	11 600	11 600	-	24 000	30 600
Assembly	12 000	24 000	36 000	-	-	-
Painting	-	14 400	14 400	-	-	-
Other	20 000	38 000	58 000	6 000	4 000	11 000
Total	337 000	193 000	530 000	409 300	108 100	525 000

Organization and characteristics of technological production processes

The technological production processes of power looms and spare parts contained in the production programme will comprise the following basic processes: foundry, machining, heat treatment, assembly, painting and stores.

Machining

With exception of commercial parts, all metal parts included in the production programme will be machined.

Working on machine tools

Machining on universal and turret lathes

Machining on vertical, horizontal and universal milling machines

Machining (drilling, milling, grinding, shaping) in bench and radial drilling machines

Machining of gears in gear-hobbing machines and gear shapers

Grinding on cylindrical-grinding, internal-grinding, centreless-grinding and surface-grinding machines

Heat treatment

The heat treatment process includes the following operations:

Induction hardening of shafts, sleeves and gears

Toughening

Hardening

Carburising

Tempering

Clearing

Testing of hardness will be done by means of Rockwell and Brinell testers.

Assembly

The designated technical process of assembly consists of the following operations:

Washing and supplying corrosion-resistant elements (spindles)

Assembly of mechanical subunits and units

Assembly of electrical subunits and units

Main assembly of power looms

Performing mechanical tests

Final painting

Transferring the goods to the store then dispatching them to the customers

Painting operations

Taking into consideration the overall dimensions of painted elements, the following are assumed:

Painting of elements in cabins and drying them in furnaces

Painting large elements and ready-made products, with natural drying

Spare parts, which must be painted according to technological process

Complete power looms after assembly

Woodworking shop

The woodworking shop should be equipped with necessary machines to produce the wooden parts of the power looms as well as good and accurate patterns for casting.

Selection of the required equipment

The quantity of basic equipment for the production departments was calculated on the basis of the determined work load in a two-shift operation of the plant and by working time found for machines equal to 4,300 hour/year, as well as by utilizing 70 per cent of the installed capacity of the co-operating enterprises.

The quantity of basic equipment for the auxiliary departments was determined according to needs. A summary of the machines and equipment required to implement the assumed final production programme for power looms and spares is presented in table 15.

Table 15. Summary of the equipment required to implement the production programme

Activity	Estimated number of machines	
	Power looms	Spare parts
Foundry department	Various	3
Machining	96	102
Heat treatment	Various 7	13
Assembly	15	-
Painting	Various 10	-
Other	Various	-
Total production department	140 Various	118 Various
Tool room and overhaul shop	38	25
Quality-inspection section	Various	Various
Gauges and measuring room	Various	-
Physicochemical laboratory	Various	-
Stores	Various	-
Total auxiliary department	38 Various	25 Various
Grand total	178 Various	143 Various

Expansion of Ispahani Marshall (IML)

Machining department

Taking into consideration the total requirement of machinery for the final production programme as shown in table 12 with the existing machine tools of IML, it is suggested that the following 40 machine tools be required for future expansion:

Universal and copying lathes	13
Bench, column and radial drilling machine	6
Horizontal boring machines	2
Universal and vertical milling machines	5
Planer	1
Broaching machine	1
Grinding machines	2
Slotting machine	1
Gear-cutting machines	2
Metal saws	2
Thread-cutting machine	1
Presses	2
Guillotine shears and sheet-working machines	2

Estimated cost for these 40 machine tools is $1,750,000.

Assembly department

The assembly department will be equipped with:

Loom assembly lines	2
Fitter's benches	7
Test stands	2
Element-washing arrangement	1
Hydraulic press	1
Dynamic balancing machine	1
Drilling machine	1

The estimated cost for the assembly department is $90,000.

Inspection section

A technical inspection section with a measuring room should be provided with the necessary arrangements, utensils and measuring tools for testing power looms.

The estimated cost for the technical inspection section is $40,000.

Painting section

Basic equipment for the painting section should consist of:

Painting cabinets	2
Electric driers	1
Carriages on rails	2
Stands for paint preparation	2
Painting tables	5

The estimated cost for the painting section is $40,000.

The costs of the technological equipment for all departments and sections of production processes in the production programme for power looms and spare parts are summarized in table 16.

Table 16. Summary of the costs of the technological production processes for power looms and spare parts

Department or section	Looms ($ 000) a/			Spare parts ($ 000)		
	LC	FC	Total	LC	FC	Total
Machining	350	1 400	1 750			
Assembly	50	40	90			
Painting	5	35	40			
Technical inspection	20	20	40			
Storage and transport	10	80	90			
Others	50	150	200			
Subtotal	485	1 725	2 210			
Tooling for production programme						
Patterns	17	10	27	40	10	50
Dies, jigs and fixtures	20	10	30	270	100	370
Tools	15	5	20	10	90	100
Gauges	8	5	13	10	20	30
Subtotal	60	30	90	330	220	550
Grand total	545	1 755	2 300	330	220	550

a/ LC, Local currency; FC, Foreign currency (local currency equivalent).

Space requirements for the production of power looms and spare parts

The space requirements for the programme for the production of power looms and spare parts are presented in table 17.

Table 17. Space requirements for the production of power looms and spare parts

Department or section	Area (m^2)	
	Power loom	Spare parts
Production operations		
Foundry	1 100	100
Machining	2 900	3 800
Heat treatment	400	700
Assembly	1 200	200
Painting	400	-
Other	1 500	200
Total	7 500	5 000
Auxiliary departments		
Overhaul department and tool room	900	600
Stores	1 600	1 000
Other auxiliary	300	200
Offices and social area	600	500
Total	3 300	2 300
Grand total	10 800	7 300

Area required for expansion

After comparison of the existing area and the required expansion of Isphahani for production of power looms, it is considered that the following areas would be required for new sections.

Machining	1 000 m^2
Assembly	1 200 m^2
Painting	400 m^2
Stores	400 m^2
Total	3 000 m^2

The Civil engineering costs for this expansion of new area of about 3,000 m^2 have been estimated to be approximately $100/$m^2$.

The above estimated total cost of $300,000 can be broken down as follows:

Local currency (80 per cent) equivalent of	$240,000
Foreign currency (twenty per cent) equivalent of	$ 60,000
Total	$300,000

Manpower requirements

According to the plan of the loom and spare parts production, the manpower requirements were determined as shown in the tables 18, 19 and 20.

Table 18. Summary of manpower requirements

Specifications	Power looms					Spare parts				
	Workers					Workers				
	Direct product	Indirect product	Total	Officers and staff	Total	Direct product	Indirect product	Total	Officers and staff	Total
Foundry	33	8	41	5	46	3	2	5	1	6
Machining	162	29	191	16	207	191	27	218	12	230
Heat treatment	6	2	8	1	9	14	2	15	2	17
Assembly	41	9	50	4	54	-	-	-	-	-
Painting	7	2	9	1	10	-	-	-	-	-
Other	27	4	31	2	33	3	2	5	1	6
Total	276	54	330	29	359	211	33	243	16	259
Overhaul department and tool room	-	40	40	5	45	-	29	29	4	33
Stores	-	4	4	1	5	-	3	3	1	4
Other auxiliary and servicing	-	3	3	1	4	-	3	3	1	4
Officers	-	-	-	6	6	-	-	-	3	3
Total	-	47	47	13	60	-	35	35	9	44
Grand total	276	101	377	42	419	211	68	278	25	303

Table 19. Structure of manpower requirements in successive years

Specification	Number of persons required in successive years					
	Power looms			Spare parts		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Turners	19	45	42	30	50	43
Milling operators	11	21	25	12	19	18
Grinding operators	2	3	8	13	23	18
Drilling operators	7	17	10	5	8	7
Heat treatment operators	2	3	1	4	6	5
Assembly fitters	14	19	16	-	-	-
Foundrymen/patternmakers	10	14	13	-	-	-
Others	9	26	24	6	—	—
Total operators	78	154	133	70	115	103
Officers and staff	14	19	11	10	8	7
Grand total	92	173	144	80	123	110
Sources of trained manpower						
Own professional training:	72	120	100	60	90	85
BMTF Training Centre[a/]						
CEMP Training Centre[a/]						
Training centres in the Dacca area and in Chittagong	20	53	44	20	33	15
Total	92	173	144	80	123	110

a/ BMTF and CEMP, the two new factories of BSEC, are equipped with very modern training centres and facilities capable of training new operators.

Table 20. Schedule of professional training and its costs

Specification			Power looms					Spare parts				
			Before starting production			After starting production		Before starting production			After starting production	
			Tenth month before	Sixth month before	One month before	Until six months	Six to ten months	Tenth month before	Six to ten months before	One month before	Until six months	Six to ten months
Training of engineers												
21 power looms	7 abroad, 14 locally											
18 Spare parts	5 abroad	Abroad	2	3	2			2	2	1	-	-
	13 locally	Locally	4	7	3			4	6	3		
Training of technical supervisor abroad a/												
Training of operators locally b/												
Power looms	8 abroad, 52 locally c/											
Spare parts	8 abroad, 14 locally c/	Abroad	2	2	4	-	-	-	2	2	4	-
		Locally	8	12	20	10	-	-	6	10	20	8
Training cost will amount to		Included:										
abroad	$400,000	two experts										
locally	$200,000	for two										
Total	$600,000	years										

a/ The above training cost includes two foreign experts for 12 man/months each = 24 man/months.

b/ The training of12 engineers abroad for 6 man/months each = 72 man/months and for 8 technicians for 3 man/months each = 24 man/months.

c/ Local training for both groups, 6 man/months each x 121 persons = 726 man/months.

Raw material requirements

All of the raw material required for the production of looms and spare parts will have to be imported except for some wooden loom parts. The quantities and types of raw materials required for the production of looms and spare parts are shown in table 21.

Table 21. Raw material requirements

Type of raw materials	Unit	Quantity	Total per programme
Power looms			
Mild steel	kg	165	330 000
Medium-carbon steel	kg	60	120 000
High-carbon steel	kg	10	20 000
Steel strip and sheets	kg	10	20 000
Shaped steel bars	kg	40	80 000
Steel pipes	kg	20	40 000
Cast-iron castings	kg	600	1 200 000
Non-ferrous metals	kg	114	228 000
Standard and commercial parts	kg	40	80 000
Bearings	8 units 2 kg		4 000
Wood	m^3	0.015	30
Enamels, paints and oils	kg	3.3	6 600
Electrical equipment	kg	4	8 000
Others	kg	29.3	58 600
Sub total	kg	1 097	2 194 000
Spare parts			
Spindle (carbon steel)	kg	0.9	135 000
Bolster carbon steel, for toughening)	kg	0.4	60 000
Ring (carbon steel)	kg	0.55	82 500
Other (cast steel)	kg	0.5	10 000
Sub total			287 500
Grand total			2 471 500

Findings

For the production of power looms, IML at Chittagong will take the lead and CEMP and MIS will also participate by co-operating in machining, heat-treatment and supplying comparatively small but necessarily good castings.

For the spare parts, it is recommended that BMTF take the lead in casting iron and steel of high quality at Dacca, while at Narayanganj should co-operate with BMTF in supplying some castings, if necessary.

For the successful implementation of the scheme to produce looms and spare parts, it is recommended that separate sections or cells be formed in the two leading factories, namely BMTF and IML.

These selections are based on the skill, technical level of their work forces and the condition of their available machinery and equipment. The economic costs have also been given due consideration.

The well-equipped technical training centres of BMTF and CEMP can be utilized to train the new operators and technical staff needed.

For the fulfilment of the final programme of producing power looms, the expansion of IML will be necessary, as shown earlier. If the required extension is not feasible immediately, some balancing work and the creation of an assembly line for looms will be necessary. The technical planning and methods office will also need to be modernized and expanded.

The production of power looms and spare parts has been estimated on the basis of batch production.

To achieve the best result in starting the production of looms and spare parts, it is advisable to proceed strictly according to the schedule presented in table 13.

As regards investment cost, two variants have been presented for power loom production. Variant I envisages independent local construction; variant II envisages construction under license from abroad. The cost of variant II is estimated to be considerably higher that that of variant I, owing to the cost of license fees and the intention of the licensor to maintain standards. These variants are considered in detail in annex VI.

VIII. FINANCIAL ANALYSIS

Manufacturing cost of power looms

The cost of manufacturing a simple power loom in the BSEC enterprises is estimated to be taka 31,450 or $2,096. Raw materials, except for a small quantity of wood, will be imported. The raw materials cost structure of a power loom, when locally manufactured, will be as shown in table 22.

Table 22. Cost structure of the raw materials for a locally manufactured power loom (variant I)

(In taka)

	Amount (kg)	Market value		Import value (c.i.f. price)	
		per kg	Total	per kg	Total
Cast iron	800	8	6 400	4	3 200
Steel (mild)	200	20	4 000	10	2 000
Commercial parts					
(a) Imported items	-	1 500	1 500		
(b) Wood (cubic foot)			500		
Total			12 400		6 200

It appears from the above that the direct foreign exchange involvement in manufacturing a loom will be taka 6,200 ($413).

The c.i.f. price for the cheapest type of imported simple power loom is approximately taka 45,000 ($3,000), whereas the estimated requirement of foreig exchange for a locally manufactured power loom is taka 6,200. This is only 14 per cent of the foreign exchange required for importing a built-up loom.

The local manufacturing of power looms will not only result in substantial savings in foreign exchange but will also ensure the utilization of installed capacity of BSEC enterprises, plus increased technical skills.

It is planned to produce the power looms with the existing installed capacity of IML and HEMP. Both of these organizations are located in the port city of Chittagong. The breakdown of the cost of the loom is in table 23.

Table 23. Cost of a domestically manufactured power loom (variant I)
(In taka)

	Raw material value		Process cost[a/]
Cast-iron parts	6 400		4 632
Steel parts	4 000		14 000
Commercial parts			
Imported items	1 500		-
Wooden parts	-		500
Assembly and painting	-		418
Total	11 900	+	19 550 = 31 450 (approx. $2 000)

a/ Casting, machining and other treatments.

IML is an old establishment and has accumulated much technical proficiency in the field of manufacturing engineering goods. However, most of its machinery is antiquated.

With the proposal to manufacturing power looms in IML, it is necessary to balance the existing workshop and to add assembly facilities to it. Much of the machining and heat-treatment operations of the steel parts will be done in GEMP.

Two alternatives for developing the power loom

Co-operation between IML and GEMP will continue as long as the latter has excess capacity to undertake production other that of its own products. Thus, when GEMP eventually becomes 100 per cent engaged for its own production programme, IML will have to be expanded. Even without expansion of workshop facilities, it will be essential to make certain investments under the two different assumptions noted in the previous chapter and considered in detail in annex VI. The investment requirements are shown in table 24.

Table 24. Investments required under the two variants[a/]
(In thousand taka at 1977/78 prices)

Item	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Designing and documentation	30	225	255	30	570	600
Specifications and technological documentation	300	900	1 200	600	3 000	3 600
Production auxiliary	300	-	300	300	1 200	1 500

Licence and know-how	-	-	-	150	2 100	2 250
Training	1 800	4 200	6 000	1 800	4 200	6 000
Grand total	2 430	5 325	7 755	2 880	11 070	13 950
Equivalents (thousand dollars)	162	355	517	192	738	930

a/ LC, local currency; FC, foreign currency (local currency equivalent).

If the loom is designed and developed locally (variant I), the initial investment required will be $520,000. On the other hand, if the loom is manufactured under a licence agreement from a foreign manufacturer, the initial investment required will be $930,000.

Economic benefit

The production and introduction of simple power looms in Bangladesh will result in manifold benefits to the economy in general. Among the most important are the three following:

Imports of cloth will be reduced, thus saving substantial amounts of foreign exchange

If power looms are to be imported, the country would have to draw on its already strained foreign exchange balance. Local production would mean import substitution

It is proposed that power looms manufactured in Bangladesh without adding any substantial new capacity in the engineering sector would mean rational utilization of installed capacity now lying idle

IX. FINDINGS AND RECOMMENDATIONS

Findings

The country's existing cotton fabric manufacturing capacity is sufficient to meet neither present nor anticipated demand. The hand-loom industry is capable of making only coarse and medium fabrics.

Despite the overwhelming importance of the hand-loom industry in the country's economy, it is difficult to find an agreed figure as to how many of them are operating.

The supply of yarn, dyes, chemicals to the hand looms is inadequate. The Technical Support Centres established by BSIC to supply the hand looms did not attain their objectives.

The requirement of cloth in terms of both quantity and quality during the coming years will increase in view of the anticipated rise in consumption per capita and of a population growth rate of 2.8 per cent per annum.

Although the major emphasis of BTMC is on spinning yarn, the present supply does not satisfy the demand.

The existing textile enterprises suffer seriously because of non-availability of spare parts.

The existing workshops of BTMC mills are poorly equipped. The central BTMC workshop at Tongi should be expanded with more machinery and heat-treatment facilities.

It would be possible to manufacture some of the more complicated spinning machines in BMTF under a technical know-how agreement from a reputed manufacturer of textile machinery.

It will be necessary to introduce simple power looms by the end of 1980 in order to supplement, and eventually to replace, the traditional hand looms. Electrical power will soon be available in the rural areas of Bangladesh, which will permit their introduction.

Simple power looms can be designed and manufactured in the BSEC enterprises; sufficient excess capacity is currently available in them. The installed capacity of only three enterprises would be needed.

The domestic production of 2,000 power looms annually/year would result in a saving of a substantial amount of foreign exchange.

The introduction of power looms would not cause unemployment, since their manufacture would create many new jobs.

While cotton is now imported, there is a possibility of growing it in the alluvial soil of Bangladesh.

Some of the costly and potentially useful machines installed in some BSEC enterprises have not been used for years even though some enterprises require them.

Recommendations

To cope with the growing quantitative and qualitative demand for cloth in the country, the introduction of simple power looms to replace traditional hand looms is necessary.

The optimal production quantity of power looms should be 2,000 units/year up to 1990. The initial production should start at 200 in 1981, reaching full production of 2,000 in 1990.

IML, with its accumulated experience in the manufacture of various engineering products, should assume responsibility for designing and manufacturing a suitable simple power loom.

The existing facilities of IML are inadequate for the independent manufacture of power looms. It can, however, avail itself of facilities such as machining and heat treatment from HEMP and other facilities such as the special casting facilities of MIS in Chittagong.

The Technical Support Centres formerly established by BSIC and now under the control of BHB should be modernized and expanded to ensure adequate auxiliary and preliminary services to aid in the introduction of power looms. With their introduction, the steady supply of essential materials such as yarn, dyes, chemicals and power should be taken into consideration.

The introduction of power looms will require a certain basic level of technical knowledge. In order to disseminate it, existing vocational institutions should introduce simple courses in textile technology.

Considering the economic condition of the rural weavers, the Government will have to provide financial support in the form of easy loan facilities. This may be done by an existing institution or a separate organization like BHB could be established.

The Government will have to protect the weaving industry from foreign competition. To encourage the spread of power looms, the Government will have to consider giving certain fiscal benefits such as tax holidays for certain periods, customs duty concessions, subsidized power supplies and the issue of import permits for raw materials to the weavers.

To ensure an adequate supply of yarn for weaving, more spinning machinery will have to be added in the coming years.

Approximately 25 per cent of the imported spinning machinery is inoperable owing to a lack of spare parts and inadequate maintenance. At least 80 per cent of the out of order machinery could be made operable by repair or renovation. This would help to conserve much foreign exchange, whereas the import of new machinery would acquire expenditure of it.

In order to establish new textile mills, it is advisable to establish necessary facilities in the country to manufacture textile machinery such as spinning-machines and spare parts needed for textile mills (annex VII).

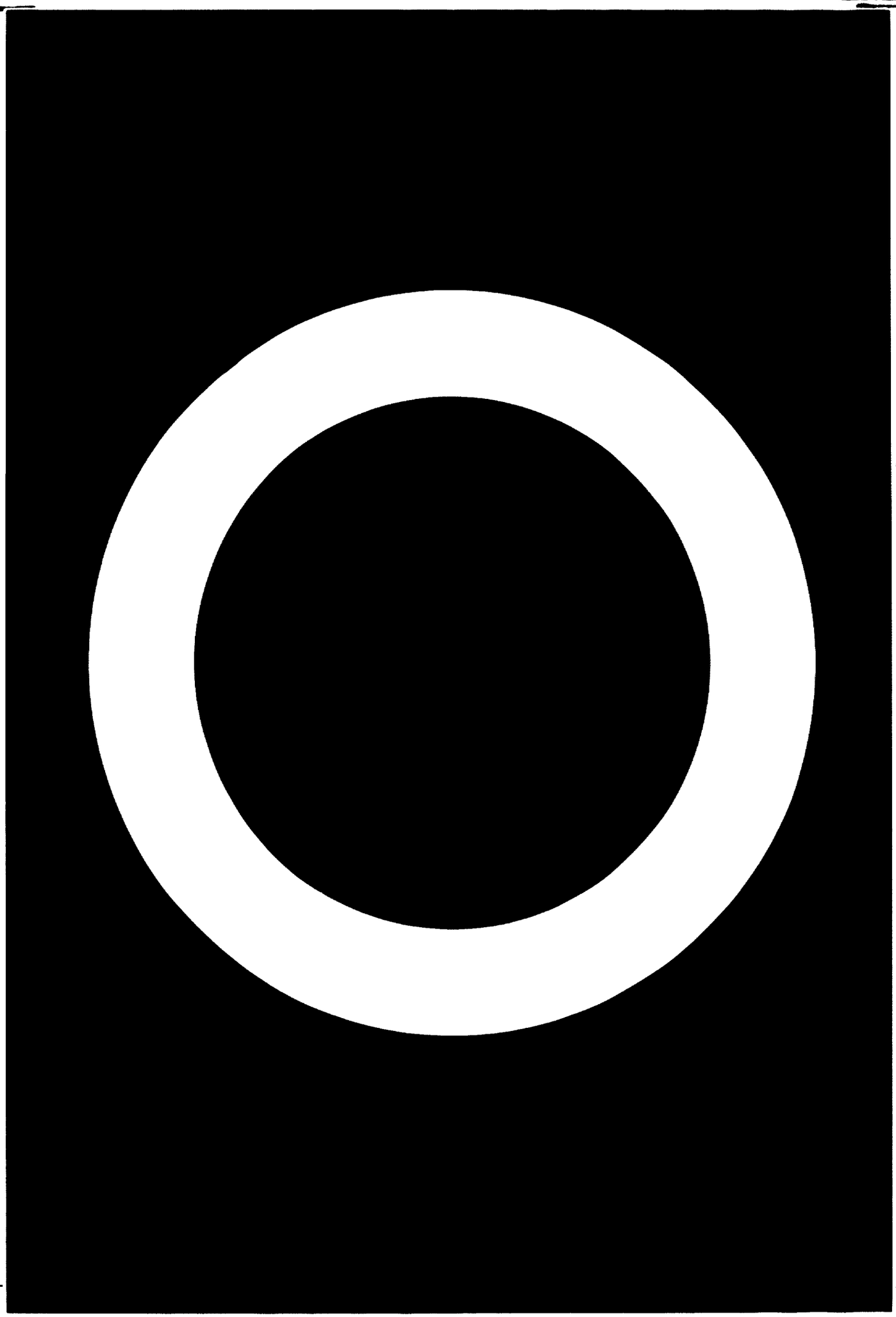
Initially, instead of setting up a new establishment to manufacture textile machinery, the existing facilities available in BMTF can be used. They would have to be modernized in collaboration with some reputed foreign manufacturer of textile machinery. In the next phase, when the country had reached a certain level of technical efficiency, an independent industry in this field should develop. The growth of requirements in the development programme for textile machinery would justify planning for the erection of further spinning-machine manufacturing works after 1985.

For emergency and preventive maintenance, the BTMC workshop should be equipped to a reasonable level, and the central BTMC workshop at Tongi (Engineering Industry Ltd.) should be up-graded to a modern workshop with all necessary equipment and facilities.

Since there are good prospects for cotton-growing in Bangladesh, intensive cultivation should be started immediately.

A survey should be conducted to identify the machines available in different BSEC enterprises but not in use for many years or not at all required by particular enterprises. These may be transferred to enterprises where they are needed; this might be done through internal arrangements by BSEC.

In order to implement the production programme of power looms and spare parts by using the facilities of various BSEC enterprises, a special cell, called the linkage office, should be established in BSEC. This office should also keep close contact with BTMC and other concerned agencies. Detailed rules and procedures for setting up such a cell have been submitted to BSEC earlier from this project.



Annex I

BASIS OF SELECTION OF BTMC MILLS

On the basis of the following factors, the team visited 11 BTMC mills in different areas of Bangladesh:

Type of mill	Composite or non-composite
Location	Various zones/areas of Bangladesh
Condition of mill	Old, new and medium aged
Products	Specialized and general types of textiles
Origin/supplier of machinery	Federal Republic of Germany, India, Japan, the Union of Soviet Socialist Republics (USSR) and United Kingdom

Visits to selected mills

Dacca area

Zennat Textile Mills, Tongi	Established in 1954-1955 Origin - Ingolstadt, Federal Republic of Germany Spindles, 25,200; looms, 430 (composite mill)
Dakeswari Cotton Mills, Narayanganj	Established 1925-1937 Howard and Bullough, England Spindles, 51,720; looms, 1,364 (composite mill)

Comilla area

Mainamati Textile Mills Ltd.	Established 1965 Howa, Japan Spindles, 12,400 (spinning mill)
Halima Textile Mills Ltd.	Established 1962 Howa, Japan Spindles, 12,400 (spinning mill)

Noakhali

Dost Textile Mill, Feni	Established 1964 Toyoda, Japan Spindles, 12,800 (spinning)

Chittagong area

Chittagong Textile Mills Ltd.	Established 1954-1962 Howa, Japan Spindles, 37,200 (composite mill); looms, 560
Valika Woolen Mills Ltd.	Established Specialized Origin, Japan textile mills Spindles, 3,200; looms, 40

Pylon and Karilin Silk Mills	Established Origin, Japan Spindles, 1,260; looms 12 14	Specialized textile mills
Bogra Cotton Mills Ltd.	Established 1954-1960 Origin, Japan (Howa) Spindles, 20,000; looms 205	Specialized textile mills
Rajshahi Textile Mills Ltd.	Under construction Origin, India Proposed No. of spindles, 25,000	
<u>Other</u>		
Kishoreganj Textile Mills Ltd.	Established 1977 Origin, Japan Spindles, 25,000	

Annex II

CONSOLIDATED STATEMENT OF BTMC MILLS AND WORKSHOP FACILITIES

Name and address of enterprise	Year of establishment and origin	No. of textile machines		Existing workshop facilities		Remarks
		Spindles	Looms	No. of machines	Kind of treatment available	
Adarsha Cotton Spinning and Weaving Mills, Narayanganj, Dacca	1925 Howard and Bollough United Kingdom	11 432	145	5	Lathe, drilling, grinding, welding and fitting works	
Ahmed Ramany Textile Mills, Demra, Dacca	1955 Hosa 1955, 1962 Platts 1955	39 903	327	20	Lathe, shaper, milling, drilling, power hacksaw, welding, grinding and fitting works	
Alhaj Textile Mills Ishurdi, Pabna	1966 Toyoda	28 000	176	8	Lathe, drilling, grinding, welding and fitting works	
Amin Textiles Limited Chittagong	1961 Toyoda	18 400	-	7	Lathe, milling, drilling, grinding welding and fittings	
Ashraf Textile Mills Tongi, Dacca	1962 Hosa 1962 and Platts 1968	24 760	-	-	-	
Asiatic Cotton Mills, Hathajari Road Chittagong	1954 Ishikawa (Japan) 1954 and Platts, Saco-Lowell 1970	26 600	207	6	Lathe, shaper, grinding, drilling, welding and fittings	
Afsar Cotton Mills Savar, Dacca	Platts, Saco-Lowell 1970	8 907	-	-	-	

Bengal Textile Mills Noapara, Jessore	1962 Hosa 1962	12 400	-	-	There is a small workshop for urgent repair and maintenance, but no list is available	
Bogra Cotton College Road, Bogra	1954 Hosa 1954 and 1960	20 000	205	2 sets	Electric and gas welding	
Bangladesh Textile, Narayanganj, Dacca	1954 Ishikawa 1954	20 000	105	8	Lathe, milling, shaper, grinding, drilling, welding, blacksmith	
Chand Textile Mills, Kadamtali, Dacca	1958 Toyoda 1958, 1961, 1962, 1968	29 800	152	-	-	-
Christy Textile Mills, Daulatpur, Comilla	1965 Hosa 1965	15 120	-	-	-	-
Calico Cotton Mills, Rajapur, Pabna	1968 Platts 1968	12 443	-	-	-	-
Chittaranjan Cotton, Narayanganj, Dacca	1949 Okk (Japan) 1949	19 304	395	20	Lathe, shaper. milling, hacksaw, drilling, welding, blacksmith and foundry (40 maunds)	Small foundry available
Chittagong Textile North Kattali (Pahartali)	1954 Hosa 1954, 1955 and 1962	37 200	566	26	Lathe, shaper, milling, drilling, welding, grinding, press etc.	Picker manufacturing
Dacca Cotton Postogola, Dacca	1952 Toyoda 1952, 1958, 1962	14 640	206	14	Lathe, shaper, milling grinding, hacksaw, ball press, welding, moulding and foundry	Small foundry

Dhakeswari Cotton Mill No. I	1925 Howard and Bullough 1925, 1933	30 440	810	40	Lathe, shaper, drilling, milling, slotting, sawing, welding, blacksmith, carpentry, foundry	Medium-sized foundry
Dhakeshwari Cotton Mill No. II	1925 Howard and Bullough 1925, 1933	21 280	554	15	Lathe, shaper, drilling, welding, blacksmith, carpentry, foundry	Medium-sized foundry
Dost Textile Feni, Noakhali	1964 Toyoda	12 800	-	-	-	-
Eagle Star Textile Panzderhat, Chittagong	1971 Hosa 1971 Toyoda 1975	20 736	-	5	Welding, grinding and fittings	-
Fine Cotton, Monmonagar Tongi, Dacca	1961 Toyoda 1961	12 400	-	11	Lathe, milling, shaper, welding, die, press, drilling	
Gangia Cotton, Mirzapara, Faridpur	1961 Toyoda 1961 and Platts 1968	24 880	212	-	Vacant space for workshop exists	
Goalundo Textile, Allahatipur, Faridpur	1971 Hosa 1971	10 368				
Hamlima Textile Kotbari, Comilla	1962 Hosa 1962	12 400	172	7	Lathe, drilling, grinding, welding and fittings	
Ibrahim Cotton Hathajard Road Chittagong	1962 Hosa 1962	12 400	176	4	Drilling, welding, grinding and fittings	
Jalil Textile Panjderhat, Chittagong	1962 Hosa 1962	12 400	132	9	Lathe, grinding, drilling, welding	

Jaba Textile Narsingdi, Dacca	1964 Omm, Japan 1964	11 773	-	4	Drilling, grinding, welding, and fitting	
Khulna Textile Mills, Khulna	-	12 448	97	-	-	
Kokil Textile Brahmanbaria, Comilla	1963 Toyoda 1963 1964	12 400	-	6	Lathe, shaper, drilling, grinding, welding	
Kushtia Textile, Swastipur, Kushtia	1970 Platts 1970	12 400				
Laxminarayan Cotton, Narayangunj, Dacca	1949 Omm, (Japan) 1949	15 309	306	16	Lathe, planer, Shaper, drilling, milling, grinding, welding, sawing	
Mohini Mills Ltd. Kushtia	1928 Howard and Bullough 1928	19 369	537	17	Lathe, drilling, shaper, milling, grinding, welding, tool grinding, carpentry, foundry	Foundry
Momo Textile Tongi, Dacca	1960 Ishikawa 1960	15 744	-	11	Lathe, milling, shaper, welding, drilling, press machine	
Muslin Cotton, Kaliganj, Dacca	1953 Toyoda 1953, 1962	48 800	496	31	Lathe (Capstan-1), milling, hacksaw, tool-ginding, slotting, grinding, shaper, drilling, blacksmith, carpentry, heat treatment	Heat treatment
Meghna Textile Tongi, Dacca	1962 Toyoda 1962	12 720	176	2	Electric and gas welding	

Moula Textile, Fatullah, Dacca	Platts Saco-Lowell 1968	12 480	-	5	Lathe, drilling, shaper, sawing, welding and grinding	
Mainamati Textile, Durgapur, Comilla	1965 Hosa 1965	12 400	-	-		
National Cotton Mohesbkhali, Chittagong	1954 Platts 1954	13 012	218	7	Lathe, drilling, shaper, sawing, welding and grinding	
Olympia Textile, Tongi, Dacca	1954 Okk 1954 Ishikawa 1962, 1963	32 736	362	20	Lathe (Capstan-1), shaper, milling, drilling, grinding, welding, sawing, foundry	Foundry
Orient Textile Mirarbagh, Dacca	1962 Toyoda (Japan)	10 000	-			
Pahartali Textiles, Pahartali, Chittagong	1954 Toyoda 1954, 1958, 1962	30 400	476	13	Lathe, shaper, grinding, drilling	
Quaderi Textile, Tongi, Dacca	1962 Toyoda 1962	15 200	-			
Quasem Cotton Mills Joydevpur, Dacca	1971 Hosa 1971	12 528	-	-	Workshop exists, but no list available	
R.M. Textile, Bashbari, Chittagong	1964 Toyoda 1964 and 1969	27 024	-	6	Lathe, drilling, grinding, welding	
Haz Textile Noapara, Jessore	1971 Hosa 1971	12 163	-	3	Drilling and welding (both gas and electric)	
Satrang Textile, Tongi, Dacca	1964 Meiter (Swiss) 1964 Hosa 1964 Whilin (USA)) 1964	2 400	-	-		

Sharmin Textile (Khahjpur) Rupsi, Dacca	1962 Hosa 1962	12 400	176	5	Lathe, drill, grinding, welding, blacksmith and editing works	
Serajganj Textile, Serajganj, Pabna	1962 Ishikawa 1962	12 400	-			
Tangail Cotton, Gorai, Tangail	1962 Toyoda 1962	12 400	-	8	Lathe, shaper, drill, grinding, welding	
Zeenat Textile, Tongi, Dacca	1954 Ingolstad (FRG) 1954 1955	25 200	430	16	Lathe, drilling, shaper, milling, grinding, welding, heat treatment	Heat treatment
Kohinoor Textile Mills Mayarhat, Dacca	1972 Laxmi-Reiter 1973, Tata Textile 1973, Platts 1972	25 000				
Dinajpur Textile Mills, Ranirbazar, Dinajpur	1974 Laxhi-Reiter 1974, Tata Textile 1974	25 000				
Habibur Rahman Textile Chandina, Cumilla	1962 Toyoda	12 500				
Kishoreganj Textile Kishoreganj, Mymensingh	USSR and India 1974	25 000				
Barisal Textile Barisal	USSR and India 1974	25 000				
Rajshahi Textile Noapara, Rajshahi	1974 India	25 000				
Darwani Textile Nilphamari, Rangpur	1976 Hosa 1976	25 000				

Rangamati Textile Mills	1976 Mousa 1976 Toyoda 1976	12 500
Madaripur Textile, Madaripur, Faridpur	USSR	25 000
Sylhet Textile Sylhet	Romania	12 500

Annex III

PERFORMANCE OF COTTON TEXTILE MILLS 1976/77

Spinning

Mill name	Average capacity during the year (spindles)			Production target (lakh lb) in 32s	Production during the year		Percentage of production target	Average spindle shift production (oz)
	Installed	Operable	Running		In absolute terms (actual in lakh lb)	Converted in 32s (lakh lb)		
Adarsha Cotton	11 432	9 292	5 158	8.27	9.12	5.38	65.05	1.90
Ahmed Bawany	39 903	30 865	27 683	40.79	32.55	32.16	78.84	1.76
Alhaj Textile	28 080	25 000	20 278	28.35	20.00	24.40	86.06	2.28
Amin Textile	18 400	17 600	16 463	25.09	20.07	26.90	107.21	2.87
Ashraf Textile	24 760	24 760	20 944	38.65	26.85	38.95	100.77	2.80
Asiatic Cotton	24 559	24 175	19 909	29.42	23.80	26.92	91.50	2.63
Afsar Cotton	8 907	8 907	5 916	7.09	6.68	8.54	120.45	2.97
Bengal Textile	12 400	12 000	10 518	22.13	14.72	20.77	93.85	3.23
Bogra Cotton	20 000	16 800	12 914	15.15	12.99	14.07	92.87	1.79
Bangladesh Textile	20 000	14 400	13 659	20.04	17.85	18.23	90.97	2.14
Chand Textile	29 000	23 600	16 997	26.46	14.69	20.66	78.08	2.17
Calico Cotton	12 443	10 887	7 488	11.12	6.15	10.11	90.92	2.57
Chittaranjan Cotton	19 804	18 000	15 929	20.87	20.63	19.11	91.57	2.24
Chittagong Textile	37 200	34 000	28 946	41.35	35.83	35.72	86.38	2.08
Chisty Textile	15 120	13 484	10 904	18.25	14.43	16.15	88.49	2.33
Dacca Cotton	14 640	14 200	11 810	17.98	19.25	16.68	92.77	2.60
Dhakeswari Cotton I	30 440	13 801	7 120	35.95	11.54	9.10	64.56	2.19
Dhakeswari Cotton II	21 280	19 059	12 715		11.54	14.11		2.13
Dost Textile	12 800	12 000	12 227	16.68	15.71	18.54	111.15	2.77

Eagle Star Textile	20 736	20 736	17 849	38.78	33.28	36.99	95.38	3.04
Fine Cotton	12 400	12 400	11 226	22.18	7.57	19.43	87.60	2.70
Gawasia Cotton	24 880	22 000	16 918	25.92	15.17	18.37	70.87	2.02
Gualundo Textile	10 388	10 368	7 276	9.91	10.09	12.28	123.91	3.06
Halima Textile	12 400	11 600	10 642	16.59	9.92	12.93	77.94	1.79
Ibrahim Cotton	12 400	11 200	10 220	14.02	11.35	12.73	90.80	2.26
Jalil Textile	12 400	11 600	9 962	17.15	12.82	13.62	79.42	2.45
Jaba Textile	11 733	10 933	9 497	13.54	8.07	9.90	73.12	1.79
Khulna Textile	12 448	12 448	9 462	17.58	12.84	12.83	72.98	2.25
Kokil Textile	12 400	12 400	10 465	20.60	15.87	17.86	86.70	2.63
Kushtia Textile	12 480	12 480	6 947	11.54	7.60	10.47	90.73	2.92
Laxminarayan Cotton	15 309	14 861	11 795	15.44	15.47	13.31	86.20	2.04
Mohini Mills	19 369	16 081	13 319	15.81	13.90	10.36	65.53	1.55
Monnoo Textile	15 744	15 744	13 718	23.80	23.85	21.81	91.64	2.34
Muslin Cotton	48 800	44 000	37 496	44.94	36.08	38.27	85.16	1.79
Meghna Textile	12 720	12 720	10 056	20.83	14.01	15.50	74.41	2.26
Mowla Textile	12 480	10 400	8 988	15.90	8.30	13.90	87.42	2.60
Mainamati Textile	12 400	9 535	10 173	13.52	9.08	10.32	76.33	1.59
National Cotton	13 012	12 800	10 539	12.51	11.49	11.33	90.57	1.95
Olympia Textile	32 736	30 336	23 076	38.69	30.79	31.34	81.00	2.07
Orient Textile	10 000	9 200	8 797	13.25	10.39	11.04	83.32	2.16
Pahartali Textile	30 400	28 000	24 281	40.46	30.09	31.63	78.17	2.37
Quaderia Textile	15 200	14 000	10 980	21.57	13.68	17.22	89.83	2.24
Quasem Cotton	12 528	12 096	11 484	21.00	12.89	21.30	101.43	3.32
R.R. Textile	27 024	27 024	22 515	41.58	27.58	33.79	81.26	2.64
Raj Textile	12 163	12 163	10 166	17.53	13.07	18.17	103.65	3.47

Satrang Textile	12 400	11 600	10 693	17.98	13.25	14.45	80.37	2.07
Sharmin Textile	12 400	11 600	10 918	18.98	13.91	16.67	87.83	2.34
Serajganj Spinning	12 400	11 200	10 164	14.33	9.46	11.69	81.58	1.03
Tangail Cotton	12 400	12 000	9 682	19.13	15.62	15.84	82.80	2.45
Zeenat Textile	25 200	23 200	18 351	31.30	22.40	23.09	73.77	2.06
Total	921 298	829 555	685 233	1 090.00	824.22	934.24	85.77	2.42

			Weaving					
				(lakh yd^2) in 54s	(lakh yd^2)	54s (lakh yd^2)		(yd^2)
Adarsha Cotton	145	144	131	21.70	20.35	17.95	82.72	15.62
Ahmed Bawany	327	241	190	51.92	38.60	45.74	99.09	20.09
Alhaj Textile	176	176	102	31.19	17.67	19.74	63.29	21.72
Asiatic Cotton	207	185	147	24.33	20.75	20.49	85.22	21.35
Bogra Cotton	205	80	59	13.47	10.92	10.60	78.69	20.33
Bangladesh Textile	150	125	93	21.57	9.28	10.27	47.61	20.53
Chand Textile	152	128	111	22.88	14.36	15.96	69.75	14.68
Chittaranjan Cotton	395	395	332	44.86	54.88	48.04	107.09	20.42
Chittagong Textile	566	537	256	83.81	36.02	40.22	47.99	18.90
Dacca Cotton	206	294	140	34.30	33.52	29.67	86.50	23.72
Dhakeswari Cotton I	810	530	161	122.19	19.63	17.21	47.99	18.72
Dhakeswari Cotton II	554	385	316	-	44.30	42.43		13.50
Gawsia Cotton	212	200	137	21.30	13.51	13.74	64.51	19.62
Halima Textile	172	160	141	21.62	14.08	13.96	64.57	14.16
Ibrahim Cotton	176	110	109	15.92	15.08	16.21	101.82	23.35
Jalil Textile	132	132	72	8.65	6.06	7.71	89.13	18.04

Khulna Textile	97	97	67	18.99	13.18	13.63	71.77	18.89
Laxminarayan Cotton	306	276	243	36.17	38.93	33.23	91.87	22.18
Mohini Mills	537	470	424	48.83	50.42	39.40	80.69	15.47
Muslin Cotton	496	300	215	55.72	38.57	42.39	76.00	15.70
Meghna Textile	176	155	115	35.01	23.42	25.24	72.09	19.77
National Cotton	218	200	152	28.18	24.32	24.44	86.73	25.40
Olmpia Textile	262	312	241	56.27	40.11	45.44	80.75	18.32
Pahartali Textile	476	370	307	75.30	37.61	43.24	57.42	14.74
Sharmin Textile	176	176	98	16.16	11.28	10.31	63.80	12.39
Zenat Textile	430	300	172	59.66	35.31	39.98	67.01	22.32
Valika Woolen	-	-	-	-	-	-	-	-
Total	7 859	6 388	4 531	970.00	681.16	686.20	70.75	18.90

Annex IV

ANNUAL REQUIREMENTS OF SPARE PARTS OF ALL BTMC MILLS

Spinning Total No. of spindles 1 million (approximately)

Name and specification	Origin	Quantity required (approx.)
Spindle with bolster (5 in.to 9 in.lift)	Japan	150 000
Ring cup (various sizes)	Japan	150 000
Snail wire	Japan	75 000
Rubber cots for F.T. roller	Japan FRG	200 000
Synthetic rubber apron (top) (various sizes)	Japan	50 000
Top rollers	FRG/Japan	150 000
NSK ball bearings of various numbers	Japan	75 000
Front roller bearing 2B-15 Z-7A	Japan	150 000
PK-211 top weighing arm	FRG/Japan	150 000
Bottom apron 86x30x1 mm	Japan	4 500 000
Kanai brand ring traveller of various numbers (say 4/0,5/0,6/0)	Japan	40 000 box
Cam meter	Japan	1 000
Canvas belts, various sizes	Japan	2 500 000
Middle bearing of various sizes for blowroom	Japan	3 000 pieces
Flat tap, flat pieces	Japan	20 000 pieces
Flat chain for card	Japan	3 000 pieces
Metalic wire for cylinder and doffer	Japan	600 sets
Stripping wire 28s	Japan	3 000 coils
Circular brush	Japan	10 000 pieces
Signal lamp	Japan	5 000 pieces
Clearer rubber tube for drawing	Japan	50 000 pieces
Pressure for simplex (various sizes)	Japan	150 000 pieces (1.5 lakhs)
Bottom chain for ring lifting motor and also top chain	Japan	10 000 pieces
Cardles	Japan	200 000 (2 lakhs)
Lappet	Japan	100 000 (1 lakh)
Bobbin holder (umbrella type)	Japan	150 000 (1.5 lakhs)

Balloon control room	Japan	200 000 (2 lakh
Duplex chain	UK/Japan	50 000 pieces
Motor pully (various size)	Japan	20 000 pieces
Separator	Japan	50 000 pieces
Microswitch	Japan	5 000 pieces
Card-gauge measuring tools	Japan	40 pieces
Tin roller (CE)	Japan	500 pieces
Tin roller (M)	Japan	2 500 pieces
Tin roller (CE)	Japan	500 pieces
Front roller (shaft (RL))	Japan	600 pieces
Front fluted roller (RL) various types	Japan	600 sets
Middle roller with shaft	Japan	300 sets
Trumpet	Japan	4 000 pieces
Ring rail, lifting bracket	Japan	2 000 pieces
Button roller RL	Japan	500 sets
Poker bar bracket	Japan	4 000 pieces
Magnet	Japan	100 pieces
Connecting lever	Japan	200 pieces
Cylinder under casting	Japan	600
Taner in under casing	Japan	600
Sub-assembly of detaching roller end	Japan	400
Back sliver guide for comber	Japan	5 000
Front sliver guide	Japan	5 000
Needle bar for comber	Japan	200
Flat needling bar for top comb-setting needle size 22/32x7/16	Japan	100
Power-grip belt 1/250	Japan	300
Bearing (R&M I/L j 10 E) for tube wheel	Japan	300
Distance cap (Blaese)	Japan	5 000
Syceflyer with pressure	Japan	5 000
Claw clutch	Japan	100
Side claw clutch	Japan	200
Complete boss for spindle footstep for D/Simplex	Japan	10 000
Collector	Japan	10 000
C.B. 135 first runner assembly (complete)	Japan	7 000
Middle runner assembly (complete)	Japan	7 000

Middle runner assembly (complete)	Japan	7 000
Guide bracket, G.E. Guide	Japan	7 000
Tension device assembly (complete)	Japan	5 000
Bobbin holder pivot assembly	Japan	10 000
F. 134 Cane	Japan	
Feeder wire	Japan	50 000
Stopping horse	Japan	50 000
Balance weight	Japan	50 000
Starting handle	Japan	10 000
Ratelet bar	Japan	5 000
Bobbin holder stand	Japan	20 000
Upper pan	Japan	20 000
Lower pan	Japan	20 000
Sprocket	Japan	2 000
Tension-rod bracket (R)	Japan	1 000
Tension-rod bracket (L)	Japan	1 000

Drawing frame section

Fluted bottom roller (front, R and L)	Japan	3 000
Sealed bearing (60052)	Japan	1 000
Bottom roller joint: all types	Japan	20 000
Stop ring	Japan	5 000
Gear box for tube gear drive (while shaft bearing all set)	Japan	4 000
Special spanner for Fe 28	Japan	40 sets
Stop-ring for B403	Japan	20 000
Bracket for top arm (all types)	Japan	50 000
Nylon brush E. 53	Japan	10 000
Nylon cap	Japan	5 000
Spring for top cover	Japan	5 000
Spring for front top cleaner	Japan	5 000
Spring for ratchet pin	Japan	20 000

Weaving: No. of total looms 8,000 (approximately)

Hopper Stand D-SOB-1A	Japan for a Sakamoto	3 500 pieces
Bobbin guide SOB 3A	Cop change (automatic)	10 000 pieces
Rivet for bobbin guide for SOB-3	Looms	5 000 pieces

Model 1964		
Hold-back pawl stud SOB-5	1964	7 000 pieces
Transferer SOB-6A	1964	7 000 pieces
Spring for transferrer for SOB-6	1964	8 000 pieces
Tranaferrer spring colour SOB-8	1964	8 000 pieces
Feed pawl SOB-10	1964	7 000 pieces
Feed pawl stud SOB-13BL	1964	7 000 pieces
Transferrer fork SOB-13BL	1964	5 000 pieces
Tranferrer knock pin SOB-14	1964	7 000 pieces
Hold-back pawl SOB-22	1964	8 000 pieces
Dobbin support D-SOB-24A	1964	8 000 pieces
Bolt for bobbin support A for SOB-24A	1964	8 000 pieces
Spring for bobbin support B for SOB-24A		
Feed-pawl spring	Japan	4 000
Latch stand	Japan	5 000
Latch finger	Japan	3 000
Finger guide for fork release	Japan	100 000
Feeler spring	Japan	4 000
Stick buffer support (varioue typee)	Japan	200 000
Temple-holder B.S.	Japan	3 000
Temple-holder B.S.	Japan	3 000
Temple-holder cap pin	Japan	3 000
Temple-cutter blade-stop Pokt.	Japan	4 000
Temple-cutter blade	Japan	2 000
Temple-cutter action pin	Japan	2 000
Action roller	Japan	2 000
Blade pin	Japan	2 000
Short blade	Japan	2 000
Blade spring	Japan	2 000
Blade-spring nut	Japan	2 000
Blade cover	Japan	2 000
Stiffing-rod action lever spring	Japan	1 500
Feed-pawl spring	Japan	1 500
Ratchet stop lever spring	Japan	10 000
Weft feeler finger engine bracket	Japan	10 000
Driving pulley	Japan	5 000

Vinyl pipe end (various types)	Japan	50 000
Plain tappet for 56 in.	Japan	1 000 pieces
Stripper	Japan	500 coils
Plate for brass shoe	Japan	5 000
Brasses for middle bracket (various types)	Japan	2 000
Shuttle	Japan	10 000
Reed (stud) (various sizes) steel dropper	Japan	200 000

Annex V

SUMMARY OF SOME IMPORTANT ASPECTS OF BTMC ENTERPRISES

(Based on 1976/77)

Name of enterprises with location	Employees: Officers and staff	Employees: Workers	Employees: Total	Products	Unit	Attainable capacity	Attained capacity in 1976/77 (per cent)	Expansion programme during 1978/79 in (lakhs Taka)
Bangladesh Welding Electrodes Ltd Chittagong	23	27	50	Welding Electrodes SMG 6-16	Mft.	180	73 (41)	
Dacca Radio Electronics Ltd, Dacca	8	35	43	Transistor radio	Nos.	10 000	2 268 (22)	
Eastern Cables Chittagong	144	118	262	Power and domestic cables	Tons	6 000	1 234 (4)	10.00
Eastern Tubes, Dacca	51	59	110	Fluorescent tube light	Pieces	300 000	230 168 (72)	
Facto Industries Ltd Dacca	11	17	28	HDBC and PVC wires, plastic	Ton Pieces	200 90 000	22 (11) 7 756 (8.6)	
Facto Yamagen Ltd Dacca	16	48	64	Radio and television sets	Pieces Pieces	15 000 1 200	1 956 (13.04) 270 (22.5)	
Gazi Wires Ltd Chittagong	60	58	118	SBCM and HDBC	Tons	280	142 + 28 (60.7)	0.65
Meher Industries Ltd Dacca	45	71	116	Radio, gas stoves, conduit pipes	Pieces Pieces Lakhs Mft.	20 000 3 750 1.5	1 740 (87)	
Metalex Corporation Ltd Tongi, Dacca	85	99	184	Ceiling fans PT Choke	Pieces	20 000	17 106 (85.5) 9 325 (46.62)	10.75
Bangladesh Diesel Plant Joydevpur, Dacca	121	111	232	Diesel engine	Pieces	8 000	1 118 (14)	
Hashmi Can Co. Ltd Chittagong	64	247	311	Assorted cans	Tons	1 800	926 (51)	

New Era Industries Ltd Chittagong	26	91	117	Bucket, Pans, Jalkats	Dozens Pieces Tons	14 000 170 000	12 838 (91.7) 162 671 (95.68)	
Prantic Traders, Dacca	22	100	122	Enamel wires	Dozens	110 000	77 700 (71)	
Ispahani Marshall Ltd Chittagong	43	252	295	Tea garden machinery and sparrco steel poles	Tons Pieces	1 000 (single shift)	534 1 000 (53)	5.60
Quality Iron & Steel Dacca	15	41	56	C.I. Sanitary fittings	Long tons	300	142 (47)	
Dockyard & Eng. Work Narayanganj, Dacca	375	780	1 155	Water vessels	Long tons	3 000	2 555 (85)	4.50
Khulna Shipyard Ltd Dacca	422	753	1 175	Water vessel	Long tons	4 000	3 236 (53)	14.50
Bengal Metal Industries Dacca	19	61	80	M.S. rods	Long tons	3 500	2 786 (80)	5.22
Chittagong Steel Mills Ltd (CSM) Chittagong	878	2 653	3 581	Steel ingots	Tons	140 000	102 000 (73)	24.00
Dacca Steel Works Ltd Dacca	41	75	116	M.S. rods	Long tons	7 000	3 413 (49)	
General Iron & Steel Chittagong	51	105	156	M.S. rods and sections	Long tons	7 000	2 938 (42)	2.86
G.M. Steel Ltd Chittagong	57	105	156	M.S. rods and sections	Long tons	7 000	3 996 (57)	2.50
Hussain Industries Ltd Chittagong	23	17	40	Steel pipe	Lakhs Rft.	100	18.94 (19)	
Khulna Industrial & Trading Corporation, Khulna	35	59	94	M.S. rods	Long tons	3 500	5 387 (98)	2.75
Malik Re-rolling Mills Ltd, Chittagong	7	74	116	M.S. rods	Long tons	6 000	2 080 (34)	
Mohammadi Iron and Steel Works Ltd, Chittagong	59	138	198	Steel ingots	Tons	5 500	5 140 (93)	7.80

National Tubes Ltd Tongi, Dacca	149	105	254	Mild steel cast iron pipes	Tons	6 000	3 784 (63)	10.25
National Iron & Steel Industries Ltd	76	84	160	Mild steel rods and baling hoops	Tons	9 000	9 005 (100)	
New Era Steel Mills Ltd Chittagong	8	91	99	Mild steel rods	Tons	7 000	5 384 (77)	1.70
Prince Iron & Steel Ltd Dacca	43	72	115	Mild steel rods Libbed or ton steel	Tons	7 000	6 561 (94)	5.50
Quaraishi Steels Ltd Khulna	88	57	145	Mild steel rods	Tons	7 500	5 333 (71)	
Rahman Metal Industries Dacca	44	161	205	Mild steel rods Aluminium utensils	Tons	4 500 182	2 119 (47) 153 (84)	4.90
Atlas (Bangladesh) Ltd	48	67	115	Motorcycles	Pieces	3 000	2 010 (67)	
Bangladesh Cycle Ltd Dacca	43	211	254	Bicycles	Pieces	20 000 40 000 (2 shifts)	29 236 (96)	
Progoti Industries Ltd Chittagong	739	441	780	Buses, trucks, jeeps, cars	Pieces	1 500	1 015 (66)	
BMTP, Dacca (under construction)	425	613	1 038	Machine tools, cutting tools, pumps and agriculture and textile machinery	-		-	
CEMP, Chittagong (under construction)	199	78	277	-	-	-	-	

Note: Workshop facilities of most of the enterprises other than the selected groups are mainly limited to maintenance workshop required for the factory concerned or special machines engaged in particular type of products.

Total capacity utilized - 57.76 per cent. Total unutilized capacity = 42.2 per cent.

Total employees - 12,417.

Annex VI

INVESTMENT COSTS

The estimated investment cost for introducing power looms and spare parts as shown in the final production programme, covers the following activities:

Designing documentation

This documentation consists of:

Assembly drawings, parts drawings, specifications and engineering extracts

Testing quality control and the like

Operation and maintenance instructions

Alternatives

Variant I: Local design

Variant II: Manufacture under licence

Details may be seen in figure VI and figure VII.

Estimated cost $000[a]

	Variant I			Variant II		
	LC	FC	TOTAL	LC	FC	TOTAL
Power looms	2	15	17	2	38	40
Spare parts	-	-	-	4	26	30
Total	2	15	17	6	64	70

[a] LC, equivalent in local currency; FC, equivalent in foreign currency.

Technological documentation

This document consists of:

Technological instructions with unit time of individual operations, with calculation of materials consumption

Summary of materials specification

Specification of tools and workshop aids

Workshop drawings of special tools

Estimated cost $000[a]

	Variant I			Variant II		
	LC	FC	TOTAL	LC	FC	TOTAL
Power looms	30	60	90	40	200	240
Spare parts	-	-	-	10	60	70
Total	30	60	90	50	260	310

[a] LC, equivalent in local currency; FC, equivalent in foreign currency.

Figure VII. Stages of establishment of power looms and spare parts production in ESEC according to variant I and variant II

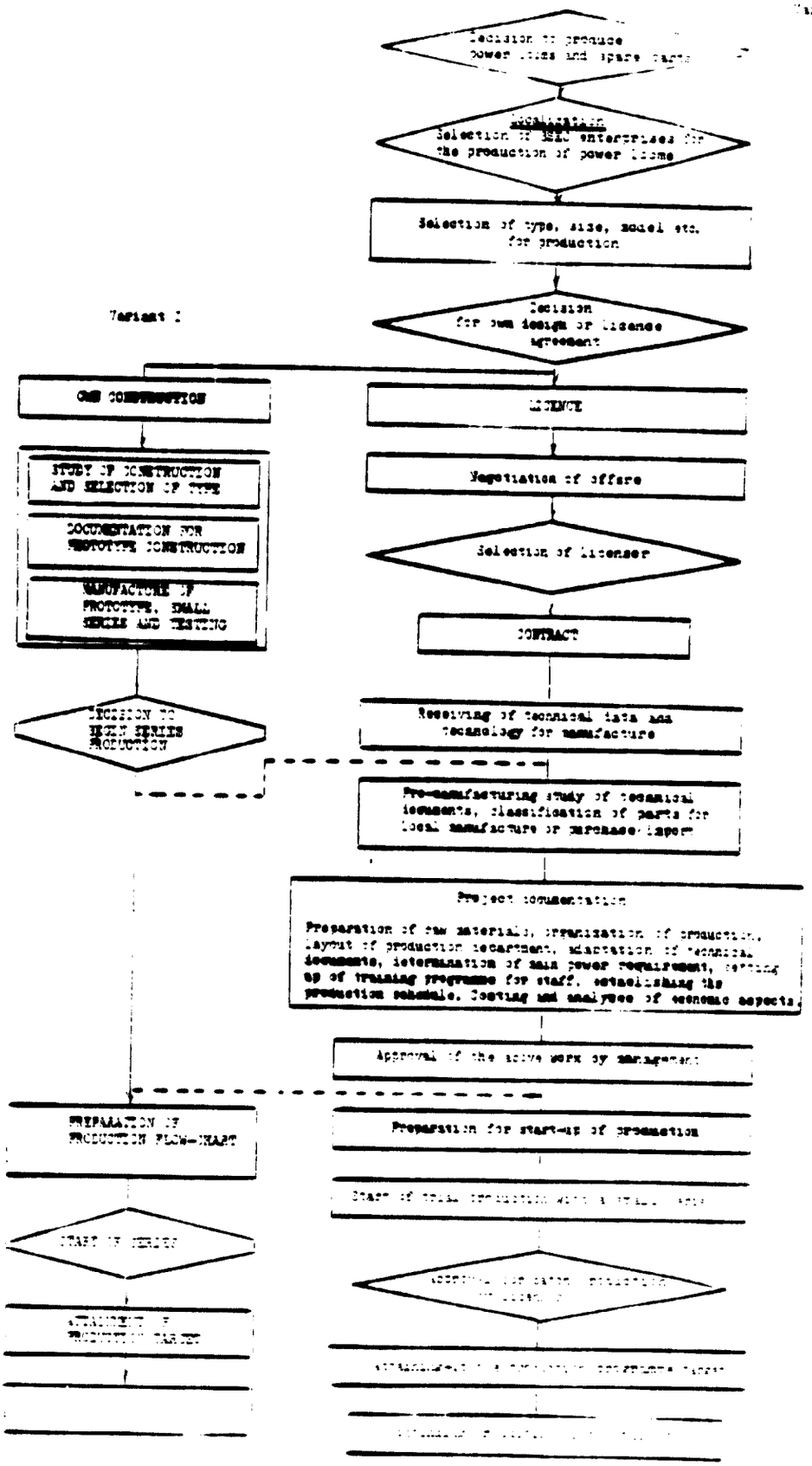
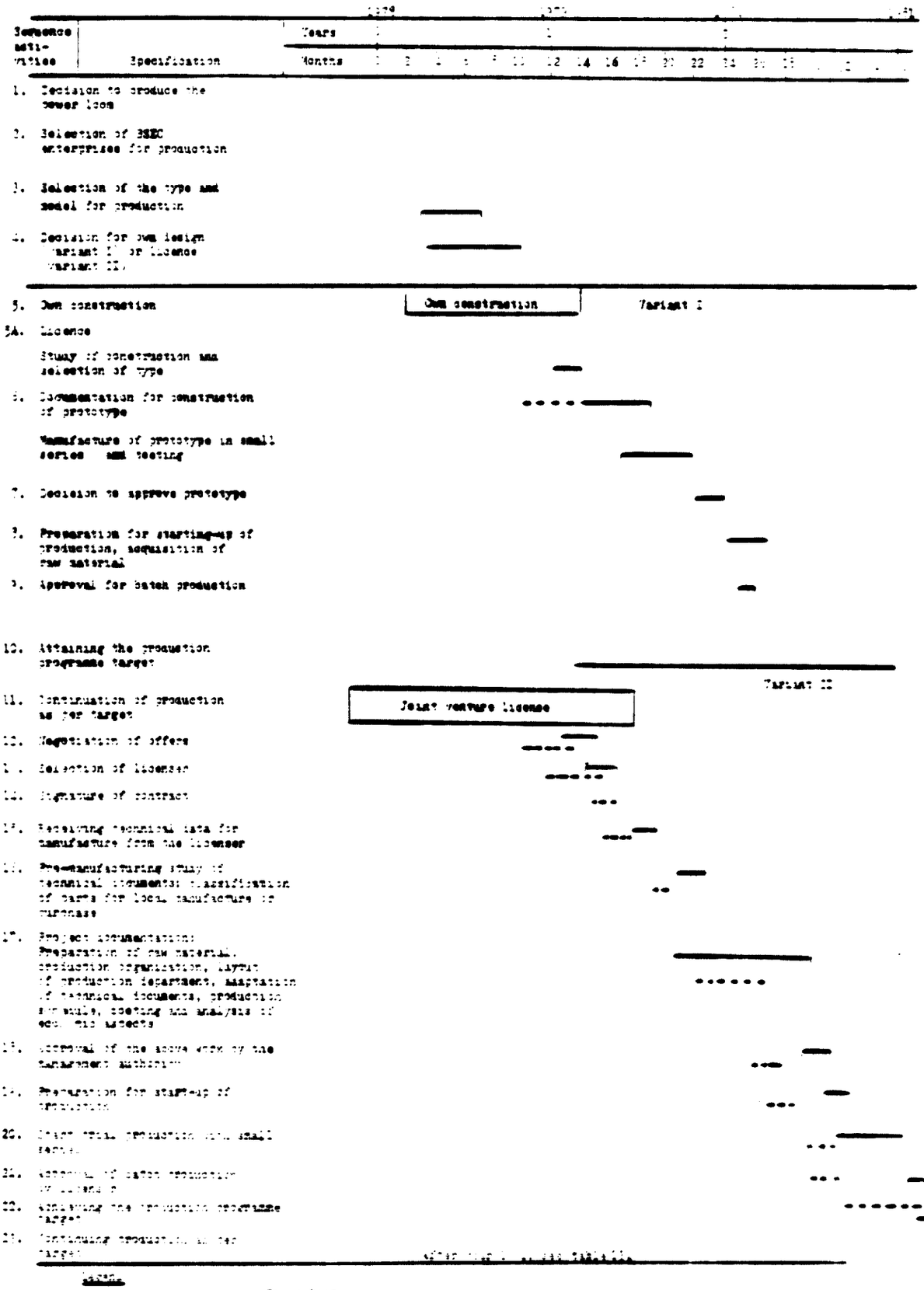


Figure VIII. Schedule for the development of textile power loom spare parts production in BSEC



Plant designing documentation

This documentation consists of:

Plant technological design

Assumptions of technological installation for machines and equipment layout

Estimated cost $000[a/]

	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Power looms	5	35	40	10	170	180
Spare parts	-	-	-	5	85	90
Total	5	35	40	15	255	270

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Investment for production equipment

The cost of technological equipment was determined on the basis of labour consumption for the production programme for IML according to chapter VI of present report. These new expansions of equipment should guarantee the production by IML of almost all necessary cast components and steel parts for power looms.

Estimated cost $000[a/]

	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Power looms	485	1 725	2 210	800	2 610	3 410
Spare parts	-	-	-	-	-	-
Total	485	1 725	2 210	800	2 610	3 410

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Auxiliary means of production

This heading includes the following special tools, made in metal for individual types of machines:

Patterns, dies and fixtures

Special cutting tools, gauges

Estimated cost $000[a]

	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Power looms	20	-	20	20	80	100
Spare parts	-	-	-	30	90	120
Total	20	-	20	50	170	220

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Licences and know-how

Estimated cost $000[a]

	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Power looms	-	-	-	-	100	100
Spare parts	-	-	-	-	60	60
Total	-	-	-	-	160	160

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Training

Estimated cost $000[a]

	Variant I			Variant II		
	LC	FC	Total	LC	FC	Total
Power looms	120	180	300	280	190	570
Spare parts	-	-	-	-	-	-
	120	180	300	280	190	570

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Civil engineering works

Covering construction works for expansion of IML according to chapter VI of the present report. The estimated cost of the above works is assumed to be as follows:

3,000 m^2 x $100/m^2 = $300,000

Cost summary

The costs of the above eight categories are summarized in the accompanying table.

Summary of estimated investment cost

(1977/78 prices $000 a/)

Description	Power looms						Spare parts		
	Variant I			Variant II			Variant II		
	LC	FC	Total	LC	FC	Total	LC	FC	Total
Designing documentation	2	15	17	2	38	40	4	26	30
Specification/technological documentation	20	60	80	40	200	240	10	60	70
Plan designing documentation	5	75	80	10	170	180	5	85	90
Technological equipment	485	1 725	2 210	800	3 790	4 590	-	-	-
Auxiliary production	20	-	20	20	80	100	30	90	120
Licences and know-how	-	-	-	10	140	150	5	55	60
Training	120	280	400	120	280	400	80	120	200
Civil engineering works	240	60	300	240	60	300	-	-	-
Total	892	2 215	3 107	1 242	4 758	6 000	134	436	570
Total value (Lakhs Taka)	134	332	446	186	713	900	20	65	86

a/ LC, equivalent in local currency; FC, equivalent in foreign currency.

Annex VII

SUMMARY OF THE NEW INVESTMENT REQUIRED TO ESTABLISH AN ENTERPRISE TO MANUFACTURE SPINNING MACHINERY

The existing spinning capacity of the country will be unable to keep pace with the growing demand, as the population is increasing by 2.8 per cent per annum. Furthermore, per capita consumption is also rising. If the consumption level is estimated to be at 12 yd^2 (10 m^2) per capita in the year 1990, the country will require approximately 1.60 million spindles. Details are given in chapter II.

In view of the need to expand the country's spinning capacity, it is considered necessary to establish an industry to manufacture the required spinning machinery.

The team that prepared the present report has calculated the investment requirement for the manufacture of the three spinning machines listed below. The production programme, with the number of units of each type of machine, is as follows:

Machine	Units/year
Ring-spinning frame	400
Assembly-winder frame	200
Ring-twisting frame	120

The above numbers of machines would be enough for the installation of about 200,000 new spindles per year. The principal elements to be considered for the implementation of this programme - 1. Production programme for spinning machinery manufacture; 2. Manpower requirements; 3. Summary of specifications and quantities of machines and equipment; 4. Space requirements; and 5. Estimated investment cost - are presented in tabular form below.

1. Production programme: spinning machinery manufacture

(1977/78 prices)

Specification	Number of pieces per programme	Weight (tons)		Value ($000)	
		Unit	Per programme	Unit	Per programme
Spinning frames (408 spindles)	400	6.6	2 640	119	16 760
Cylinder winder frames (18 spindles)	100	2.0	200	29	2 900

Assembly winder frames (48 spindles)	100	2.4	240	49	4 900
Ring-twisting frames (384 spindles)	120	5.7	684	42	5 040
Total machines	720		3 818		29 600
Spare parts (15 per cent of value)	-	-	500	-	4 400
Grand total	720	-	4 318	-	34 000

Summary of specifications of work loads for the production programme

Specification	Total hours of work consumption per programme		
	Machine hours	Manual hours	Total
Foundry		115 800	115 800
Machining	573 900	164 850	738 750
Assembly	18 750	197 150	215 900
Heat treatment	-	61 750	61 750
Electroplating	-	73 900	73 900
Painting	-	61 450	61 450
Others	-	46 650	46 650
Total	592 650	721 550	1 315 800

2. Manpower requirements[a/]

Specification	Direct	Indirect	Total	Officers and staff	Total
I. Production departments					
Foundry	60	50	110	18	128
Machining	344	52	396	32	428
Sheet-metal works and welding	41	6	47	6	53
Assembly	111	16	127	12	139
Painting	31	4	35	3	38
Heat treatment	31	4	35	3	38
Electroplating	38	5	43	3	46
Others	25	2	27	2	29
Total production department	681	139	820	79	899

II. Auxiliary departments					
Tool room	-	75	75	9	84
Overhauling	-	45	45	5	50
Other auxiliary	-	16	16	2	18
Stores and transport	-	43	43	6	49
Total auxiliary departments	-	179	179	22	201
Total I + II	681	318	999	101	1 100

a/ It is assumed that the production programme will be executed on a two-shift basis. A worker's time is assumed to 1,930 hours/year.

3. Summary of specifications and quantities of machines and equipment: quantities for final production programme

Specification	Number of machines
I. Production departments	
Foundry	Various
Machining department	174
Sheet metal and welding shop	62
Assembly department	32
Metal-cutting shop	7
Heat-treatment department	Various (15)
Painting department	Various
Electroplating department	Various
Total	275 and various
II. Auxiliary departments	
Tool-room	22
Tool grinding shop	12
Overhaul shop	16
Quality inspection	Various
Gauges and measuring room	Various
Physio-chemical laboratory	Various
Stores	Various
Compressors station and boilers room	Various
Others	Various
Total	50 and various
Total plants I + II	325 and various

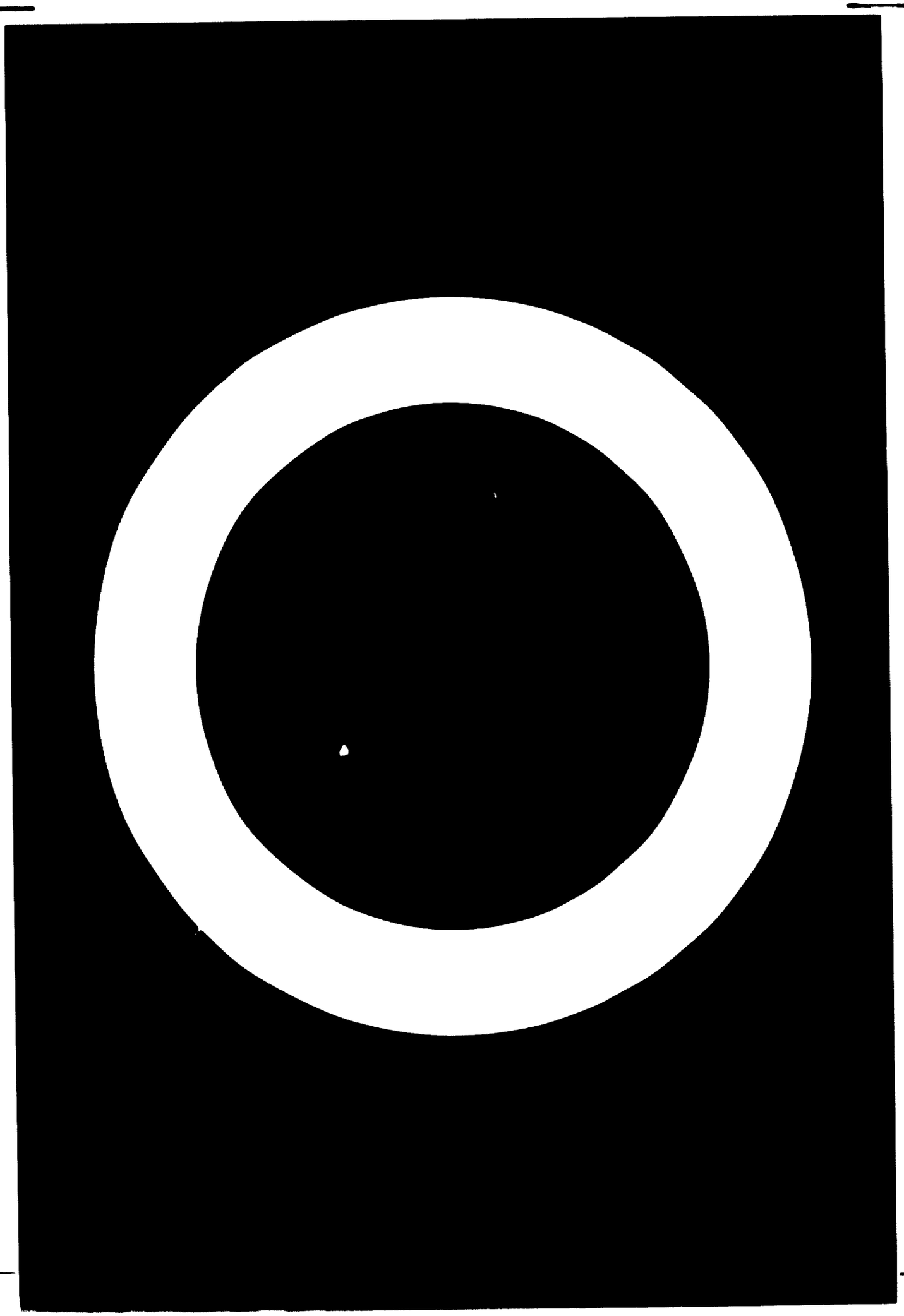
. Requirements

Specification	Covered area (square metres)
I. Production departments	
Foundry	2 000
Machining department	4 400
Sheet-metal and welding shop	1 000
Assembly department	2 000
Painting department	900
Heat treatment	500
Electroplating department	900
Cutting shop	300
Roads and passages	2 000
Total	14 000
II. Auxiliary departments	
Tool-room with tool-grinding shop	800
Overhaul shop	1 100
Stores and transport	2 800
Other auxiliary	900
Offices and social area	2 400
Total	8 000
Total plants I + II	22 000
Site area	75 000

5. Estimated investment cost[a]
($000)

Description	LC	FC	Total
Adaptation of design documentation	10	50	60
Technological documentation	100	300	400
Plant design	30	270	300
Technological equipment (machinery and equipment etc.)	4 000	24 400	28 400
Production auxiliaries	200	500	700
Licence and know-how	90	550	640
Training	200	600	800
Civil engineering works, including all utility services	5 000	1 000	6 000
Miscellaneous	1 000	1 700	2 700
Total	10 630	29 370	40 000
Value in lakhs taka	1 594	4 406	6 000

[a] This estimate has been prepared very roughly so as to give a pre-investment idea of the scale of the project.



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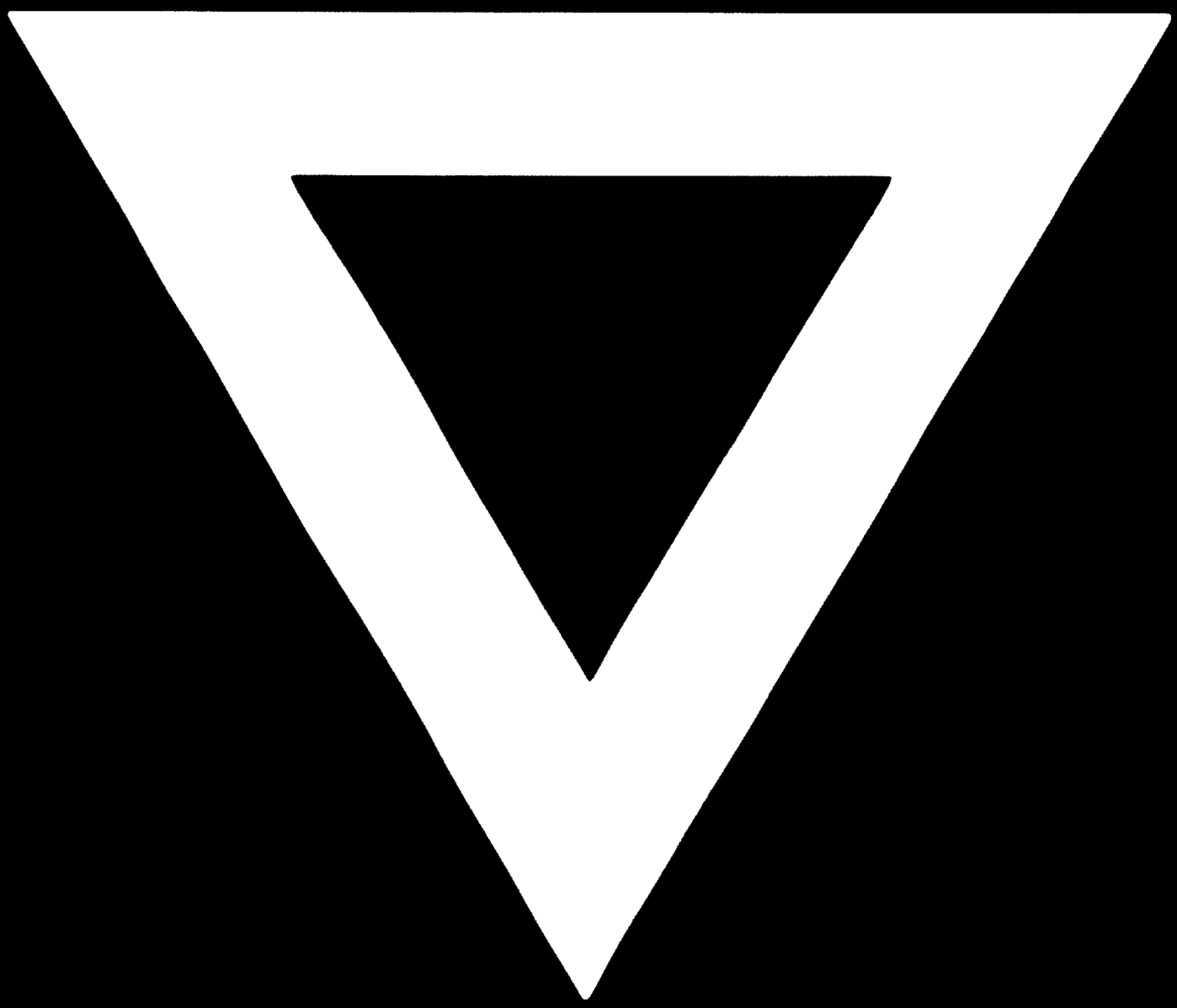

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