No.37

THE STUDY ON HMT RESTRUCTURING AND DEVELOPMENT PROGRAM IN INDIA

Volume I

Diagnostic Overview and Corporate Plan

MAIN REPORT

MARCH 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

The Study on HMT Restructuring and Development Program in India
MAIN REPORT Vol.I Diagnostic Overview and Corporate Plan

March 1992

JICA

THE STUDY ON HMT RESTRUCTURING AND DEVELOPMENT PROGRAM IN INDIA

Volume I

Diagnostic Overview and Corporate Plan

MAIN REPORT

MARCH 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to a request from the Government of India, the Government of Japan decided to conduct the Study on HMT Restructuring and Development Program in India and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to India a study team headed by Mr. Takashi Nobehara of The Sumitomo Business Consulting Co.,Ltd. four times from March, 1991 to March, 1992.

The team held discussions with the officials concerned of the Government of India and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the program and to the enhancement of friendly relationship between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of India for their close cooperation extended to the team.

March, 1992

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

Table of Contents

GLOSSARY OF ABRIVIATIONS

1. HMT Organizations

Machine Tools

MTBG	:	Machine Tool Business Group
MTB	:	Machine Tool Factory, Bangalore
DCB	:	Die Casting Division, Bangalore
MTP	:	Machine Tool Factory, Pinjore
MTK	:	Machine Tool Factory, Kalamassery
MTH	:	Machine Tool Factory, Hyderabad
PRH	:	Press Division, Hyderabad
MTA	:	Machine Tool Factory, Ajmer
HMB	:	Horological Machinery Factory, Bangalore
PMK	:	Printing Machinery Factory, Karamassery
CNC	:	CNC Systems Division, Bangalore
MTMKT	:	Machine Tool Marketing Division
PTL	:	Praga Tools Ltd.
BLH	:	HMT Bearings Lid., Hyderabad

Watches

WBG	:	Watch Business Group
WFB	:	Watch Factory, Bangalore
WFS	:	Watch Factory, Srinagar
WFT	:	Watch Factory, Tumkur
WFR	:	Watch Factory, Ranibagh
WANC	:	Watch Assembly Ancillary, Bangalore
WCP	:	Specialised Watch Case Division, Bangalore
MBG	:	Miniature Battery Project, Gauhati
WMKT	:	Watch Marketing Division

Agricultural Machinery

AMBG : Agricultural Machienery Business Group
TRP : Tractor Factory, Pinjore
DMU : Dairy Machinery Factory, Aurangabad

General Engineering Products

GMBG : General Engineering Product Business Group
LMH : Lamp Division, Hyderabad

Corporate Head Office & Others

CHQ/CHO: Corporate Head Office, Bangalore
CSD : Computer Systems Division, Bangalore
HMT(I) : HMT (International) Ltd.

Positions

GM : General Manager
JGM : Joint General Manager
DGM : Deputy General Manager
AGM : Assistant General Manager
PS : Pay Scale
WG : Wager Grade

2. Products

Machine Tools

CAD : Computer Aided Design
CAM : Computer Aided Manufacturing

CIM : Computer-integrated Manufacturing
CNC : Computer Numerical Control
EDM : Electric-discharge Machine
FMC : Flexible Manufacturing Cell
FMS : Flexible Manufacturing System
GPM : General Purpose Machine
M/C : Machining Center
SPM : Special Purpose Machine
PIM : Plastic Injection Molding Machine

Watches

ADD : Automatic Day Date Watch
QAW : Auartz Analog Watch
QDW : Quartz Digital Watch
HWW : Hand Wound Watch

Lamps

BLL : Blended Light Lamps
FTL : Flourescent Tube Lamps
GLS : General Lighting Service Lamps
MVL : Mercury Vapor Lamps
SVL : Sodium Vapor Lamps

Bearings

BB : Ball Bearings
CRB : Cylindrical Roller Bearings
TRB : Taper Roller Bearings

3. Computer Systems

CIO	:	Chief Information Officer
CPU	:	Central Processing Unit
CIS	:	Computerized Information System
EDI	:	Electronic Data Interchange
LAN	:	Local Area Network
MAP	:	Manufacturing Automation Protocol
EDP	:	Electronic Data Processing
MIS	:	Management Information System
OA	:	Office Automation
SCC	:	Steering Committee on Computerization
SE	:	System Engineer

4. Financial Analysis

MOU	:	Memorandum of Understanding
NPBT	:	Net Profit before Tax
SVOP	:	Sales Value of Production
PAT	:	Profit after Tax
PBT	:	Profit before Tax

5. Management and Productivity

CDP	:	Carrier Development Program
HRD	:	Human Resource Development
QA	:	Quality Assurance
QC	:	Quality Control
TQC	:	Total Quality Control
VA	:	Value Analysis
VE	:	Value Engineering
WETAX	:	Worker Enterprenuer Tiny Ancillary Complex Scheme

6. Others

BIFR	:	Board for Industrial and Financial Reconstruction
CCS	:	Cash Compensatory Support
CIF	:	Cost, Insurance and Freight
CRR	:	Cash Researve Ratio
DGTD	:	Directorate General of Technical Development
FERA	:	Foreign Exchange Regulation Act
FOB	:	Free on Board
GCA	:	General Currency Area
GDP	:	Gross Domestic Product
GOI	:	Government of India
L/C	:	Letter of Credit
MODVAT	:	Modified Value Added Tax
MRTP	:	Monopolies and Restrictive Trade Practices (Act)
NFE	:	Net Foreign Exchange
OEM	:	Original Equipment Manufacturer
OGL	:	Open General Licence
PMPI	:	Phased Manufacturing Programme of Indigenization
PSU	:	Public Sector Undertakings
RBI	:	Researve Bank of India
Rep	:	Replenishment (License)
RPA	:	Rupee Payment Area
SIA	:	Secretariate of Industrial Approvals

I INTRODUCTION

This is the Final Report (Main Report - Volume I) of the HMT Restructuring and Development Program. The study is conducted based on the Scope of Work agreed between the Government of India and the Japan International Cooperation Agency (JICA) on November 22, 1990.

The report consists of the following three volumes:

Executive Summary

Main Report
- Volume I : Diagnostic Overview and Corporate Plan
- Volume II : Action Program

I-1. Background of the Study

The World Bank has conducted a series of studies in India, which provides a justification for Bank support of, and involvement in assisting the development of the capital goods sector of India. The recent results of these studies have been summarized in the report titled "India - Capita Goods Sector Update, Development Strategy in a Changing Policy Environment", which was published in August 1989. As a part of the policy recommendations made in the report, the restructuring and rationalization of important public sector enterprises in the capital goods industry in India have been proposed.

In response to the request of the Government of India, JICA, the official agency responsible for the implementation of Japan's technical cooperation programs, dispatched the preliminary study team in November 1990. After discussion among the authorities of the Indian Government, the World Bank and the Team, the Scope of Work for the study on "HMT Restructuring and Development Program" was signed.

I-2. Objective of the Study

The objective of the study is to propose a comprehensive corporate strategic plan for physical and organizational restructuring and development of HMT's operations covering product mix, organization, management systems and prospective investment areas in order to improve its competitive position, profitability, export performance, and domestic market shares and coverage, and based on the plan, to formulate investment plans and action programs for physical and organizational restructuring and improvement.

As a result, the restructuring of HMT would contribute to the development of the capital goods sector in India.

The study was divided into the following two phases.

Phase I : Corporate Strategy

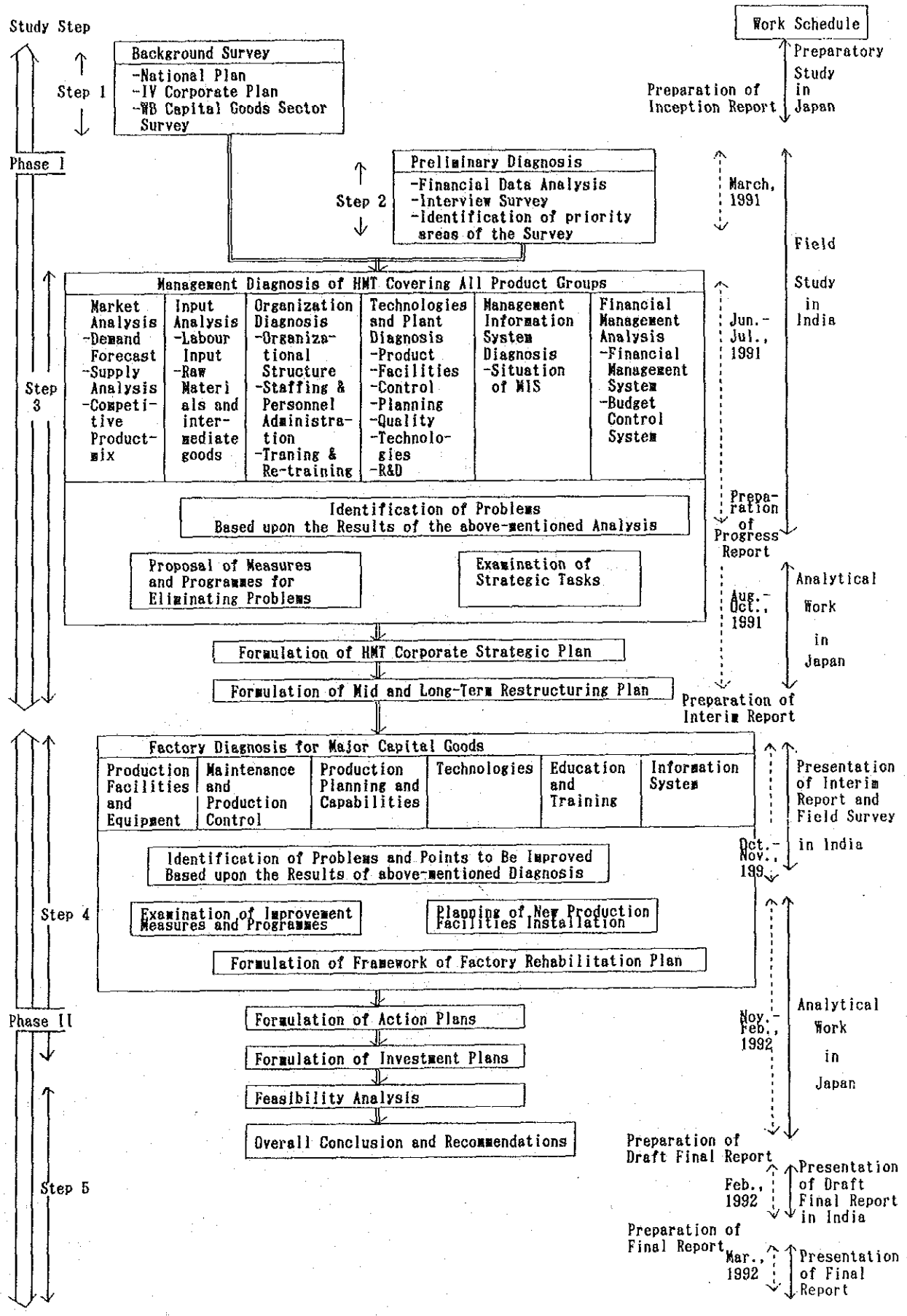
Based upon the results of diagnostic overview of the current business operations of HMT, a comprehensive corporate strategic plan for physical and organizational restructuring was proposed.

Phase II: Action Plan

Based on the corporate plan established in Phase I, for the major capital goods, viz. machine tools, tractors, press machines, printing machinery and castings and for the management system, viz. management information system, mechatronics training or productivity improvement activities, strategic action programs and investment plans were formulated and the pre-investment studies for these programs were conducted.

The overall framework of the study is briefly summarized and shown in Fig. I-2-1.

Fig. 1-2-1: Overall Framework of the Study



I-3. Scope of Work

The items covered by the whole study were as follows, based on the Scope of Work agreed to on November 22, 1990.

1. Background Study
   - 1.1 Existing national and sectoral policy
   - 1.2 Existing HMT corporate plan
   - 1.3 The World Bank sector report

2. Market Analysis
   - 2.1 Demand forecast
   - 2.2 Supply analysis
   - 2.3 Competitive product-mix and prices

3. Input Analysis
   - 3.1 Labor input
   - 3.2 Raw materials and intermediate goods

4. Diagnostic Overview of Organizational Aspects
   - 4.1 Organizational structure
   - 4.2 Staffing and personnel administration
   - 4.3 Training and re-training

5. Overview and assessment of Physical and Technological Aspects
   - 5.1 Product technologies
   - 5.2 Production facilities and equipment
   - 5.3 Maintenance and production control system
   - 5.4 Production Planning and capabilities
   - 5.5 Quality level and quality control system
   - 5.6 Technology licensing and technology transfer arrangements
   - 5.7 Research and Development capabilities

6. Overview of Managerial Aspect
   - 6.1 Management information system

7. Corporate Financial Performance including Major Product Groups

8. Formulation of Corporate Strategic Plan
   - 8.1 Organizational reform including possible expansion, divestment, joint venture and creation of

subsidiaries

8.2 Marketing/markets/technical transfer/licensing

8.3 Product-mix consideration, diversification and divestment

8.4 Production and technology

8.5 Organizational restructuring

8.6 Management information system improvement

8.7 Training and education system improvement

8.8 Research and Development strategy

9. Formulation of Action Plans

9.1 Marketing and production plan including diversification of products

9.2 Organizational restructuring plan and relevant training and re-training schemes

9.3 Technical and physical restructuring plan including plant renovation, techno-managerial improvement and technology transfer

9.4 Management information system restructuring plan

9.5 research and development plan

10. Formulation of Investment plans

10.1 Cost estimation for different categories of the selected product groups

10.2 Investment schedule

10.3 Financing plan

11. Feasibility Analysis

11.1 Technical viability

11.2 Financial analysis including sensitivity analysis

11.3 Economic analysis

11.4 Impact analysis on production, trade, value-added, profit, employment and environmental considerations

12. Overall Conclusion and Recommendations

I-4. Progress of the Study

In order to implement the study, the JICA Study Team which mainly consist of the staff members of the Sumitomo Business Consulting Co., Ltd. and Ishikawajima-Harima Heavy Industries Co., Ltd. was formed on February 22, 1991. The JICA Study Team prepared an Inception Report, and made a first visit to India in March 1991 with the purpose of conducting a preliminary diagnosis of the current operations of HMT and also to finalize the detailed contents of the study.

Corresponding to the formation of the JICA Study Team, HMT established a Task Management Group consisting of 33 managers selected from various sections of the Company. With the purpose of conducting a management diagnostic study on HMT operations, the JICA Study Team made a second visit to India from June 13 to July 16, 1991. In order both to get the maximum results from the short-time study period in India and to invite the active participation of each section of HMT in the study, various kinds of questionnaires were prepared by the JICA Study Team. The major questionnaires used and the results of the responses are summarized and shown in Table I-4-1.

Along with the management diagnostic study on HMT operations, two seminars were conducted by the JICA Study Team in India. The first one was held on June 18 and 19 at Bangalore as "Productivity Improvement Workshop for HMT". Following the workshop, HMT started the productivity Improvement Program (PIP), and the experimental introduction of productivity improvement activities in two selected factories has been started with the help of the JICA Study Team members. Another seminar was held on July 15 at Delhi under the joint sponsorship of CEI (Confederation of Engineering Industries), JICA, the World Bank and HMT.

Following the field survey in June and July in India, the JICA Study Team analyzed the collected information and data in Japan from July to September, and the Interim Report summarizing the results of the Phase I study was presented in October 1991.

Following the Phase I study, the Phase II study was conducted during the period from October 1991 to February 1992,

including the third field study in India from the middle of October to the middle of November 1991.

Based on the corporate plan established in the Phase I study, in the Phase II study, strategic action programs and investment plans were formulated for those major capital goods sectors of HMT such as machine tools, tractors, press machines, printing machinery and castings and for those management systems such as mechatronics training, management information systems and productivity improvement activities, and financial and economic evaluations of these investment plans were conducted. The results were summarized in the Draft Final Report and presented in February 1992.

A several comprehensive review sessions on the results of both the Interim Report and the Draft Final Report were held between the Jica Study Team and the Indian side in February 1992, and the Final Reports were compiled based on these discussions.

Table 1-4-1 Major Questionnaires Used for the Management Diagnostic Study

Title of Questionnaires	Major Contents of Questionnaires	Units or Persons Addressed	No. of Responses
Factory Diagnosis (Technical)	1. Factory outline 2. Design 3. Procurement control 4. Storage control 5. Schedule control 6. Quality control 7. Maintenance 8. Production 9. Casting & forging	MTB, DCB, PMK, MTK, TRP, MTP, MTH, PRH, LMH, MTA, HMB, CNC, DMU, BLH, PRAGA	15
Machine Tool Product Evaluation	1. Selected product evaluation - Price - Features - Structure - CNC application 2. Factory Evaluation - Production control - Lead time - Quality control - Maintenance - Stock control - Production engi'ring - Design control - CAM/CAD	MTB, MTK, MTH, MTA, MTP, HMB	6
Tractors (Technical)	1. Market prospects 2. Customers' requirement 3. R & D candidates 4. Facility renovation 5. Foundry renovation plan	TRP	1
Press (Technical)	1. Materials 2. Price and delivery 3. Manufacturing schedule 4. Material defects 5. Supply records 6. Engineering	PRH	1
Printing machinery (Technical)	1. R & D philosophy 2. Production 3. Assembly 4. Machining 5. Transportation/delivery 6. Production control	PMK	1

Table I-4-1 (Continued.)

Title of Questionnaires	Major Contents of Questionnaires	Units or Persons Addressed	No. of Responses
R & D (Technical)	1. Future diversification	R & D, CIM	2
Foundry (Technical)	1. Outline of the factory 2. Production control 3. Production process 4. Costing 5. Renovation plan	MTB, MTP, MTK, MTH, MTA	5
Marketing	1. Target market 2. Sales trends 3. Sales forecast 4. Sales by region 5. Competitor profile 6. Product competition	MTM(Machine tool), MTM(Printing mach.), WMK, TRP, LMH, DMU, BLH	7
Mid-term and Long-term Corporate Plan (upto year 2000)	1. Goals 2. Production 3. Sales 4. R & D 5. Manpower 6. Operating results 7. Capital investment	MTB, DCB, MTP, MTK, PMK, MTH, PRH, MTA, HMB, CNC, WFB, WFT, WFR, TRP, DMU, LMH, R&D, PTL, BLH	19
Productivity	1. Productivity indices	MTB, HMB, CHO-F	3
Productivity(PPORF) Evaluation	1. Factory level productivity evaluation	MTB, DCB, MTP, MTK, MTH, PRH, MTA, HMB, PMK, CNC, WFB, WFT, WFR, WCP, TRP, DMU, LHM, BLH, PTL	19
Organization Diagnostic Survey	1. HMT's business environment and capability 2. Working ethic & culture 3. Organization structure 4. Management system 5. HRD	All GMs & JGMs All DGMs / HODs	253
Long-term Vision and Strategies for HMT Restructuring and Development	1. Evaluation of present standing of HMT 2. Corporate vision 3. Business domain of HMT 4. Macro target 5. Basic strategies 6. Unit-base strategies	All Whole time Directors of HMT	4

II. PROFILE OF HMT

II-1. Analysis of HMT History and Current Status

HMT was set up in 1953 with collaboration and equity participation of Oerlikon BÜhrle, Switzerland to reduce the country's external dependency for machine tools, whose demand was expected to rise rapidly under planned industrial development of India. Initially a plant was set up at Bangalore to manufacture Center Lathe Machines. The company became a fully owned undertaking of the Government of India in 1957.

Over the years, the company expanded its operations setting up HMT II at Bangalore in 1961, HMT III at Pinjore in 1963, HMT IV at Kalamassery in 1965, HMT V at Hyderabad in 1967 and took over HMT VI at Ajmer in 1975, to meet the rising demand for a wide range of machine tools.

The Company diversified its product range, setting up manufacturing facilities at the Bangalore units for Die casting and Plastic Injection molding machines in 1971, Horological Machines in 1973, Measuring and Size Control instruments in 1983, Ball Screws for use on CNC Machines, Special Purpose Machines, etc. in 1986 and CNC Systems and Software for CNC Machine Tools in 1986.

Having achieved precision manufacturing capabilities and on the initiative of the Government, HMT diversified in 1962 into the manufacturing of wrist watches under technical collaboration with the Citizen Watch Company of Japan. Initially a unit was set up in Bangalore with an annual capacity of 360,000 units of hand wound watches. Over the years HMT expanded its capacity and diversified into new product range. At present HMT has five Watch Factories producing around 6 million watches including top line quartz analog watches. The consumer boom in the eighties and the entry of a large private sector house into the watch market prompted HMT to upgrade its technology and to design and add a new range of watch products. Besides being the largest manufacturer of hand wound watches, HMT today has a wide range of analog quartz watches.

Over the years, the company diversified into new product lines, setting up the Tractor Division at Pinjore in 1971, the Printing Machine Division at Kalamassery and the Press Division at Hyderabad in 1972, the Lamp Division at Hyderabad in 1976 and the Dairy Machinery unit at Aurangabad in 1981.

From an enterprise manufacturing a fairly narrow range of machine tools valued at about Rs 34 million and employing about 4,200 employees in 1960/61, the company has today (1990-91) grown into a giant, with 16 units (22 divisions) spread over ten states, producing goods worth nearly Rs.7.5 billion, employing 28,349 employees and marketing a wide range of capital and consumer goods including a full spectrum of general purpose machine tools, sophisticated machines like CNC turning centers, machining centers, CNC turret punch press, etc., pinting machinery, dairy machinery, tractors, watches from handwound watches to top-line quartz analog watches and lamps including fluorescent and sodium vapor lamps.

HMT has three subsidiaries viz. HMT International Ltd., through which exports of all HMT units are routed, HMT Bearings Ltd., a company producing a wide range of ball, cylindrical and tapered bearings and Praga Tools Ltd., a company which also manufactures machine tools.

Table II-1-1 illustrates significant events since the inception of the company, including the setting up of new units, diversification into new products lines and diversification into new businesses.

Table II-1-2 illustrates the broad financial data of the company from 1960/61 to 1979/80. As can be seen from the Table, while the networth of the company increased from Rs.58 million in 1960/61 to Rs.776 million in 1979/80, investment in fixed assets and working capital increased from Rs.61 million and Rs.29 million respectively in 1960/61 to Rs.1279 million and Rs.851 million in 1979/80. Sales increased from Rs.34 million in 1960/61 to Rs.1802 million in 1979/80, while profits (profits after tax) increased from Rs. 7 million in 1960/61 to Rs.157 million in 1979/80 and net operating profits increased from Rs.8 million in 1960/61 to Rs.328 million 1979/80. Return on Capital Employed (ROC) improved from 12.3% in 1960/61 to 21% in 1979/80.

Table II-1-1 Summary of HMT-Milestones

YEAR	SPECIFIC MILESTONE
1953	- Incorporation of the Company as a joint venture with Oerlikon Machine Tool Works, Switzerland.
	- Setting up of Plant at Bangalore (HMT I) to manufacture center lathe (machine tools).
1954	- Inauguration of the Bangalore machine tool plant.
1956	- Divestment by Oerlikon Machine Tool Works, Switzerland
1957	- HMT becomes a fully owned undertaking of the Government of India.
	- Initiation of diversification of product range and technical collaboration agreements with various companies for manufacturing of milling machines, radial drilling machines and cylindrical grinding machines.
1961	- Setting up of HMT II at Bangalore
1962	- Diversification into manufacturing of wrist watches by setting up a plant at Bangalore, to manufacture hand-wound watches.
1963	- Setting up HMT III factory at Pinjore, specifically to manufacture milling machines.
1965	- Setting up of HMT IV Machine Tool Factory at Kalamassery to manufacture center lathes.
1967	- Setting up of HMT V, Machine Tool Factory at Hyderabad, to manufacture special purpose machines (SPMs).
1970	- Setting up of a R&D Metal Cutting Center at Bangalore.
1971	- Diversification into manufacturing of tractors by setting up a plant at Pinjore.
	- Diversification into manufacturing of diecasting and plastic injection molding machines at Machine Tool Factory, Bangalore.
1972	- Diversification into manufacturing of printing machines at Kalamassery.
	- Setting up of Watch Factory II at Bangalore for manufacturing Automatic Day Date Watches.

Table II-1-1 (Continued)

YEAR	SPECIFIC MILESTONE
1973	- HMT Horological Machinery Division set up at Bangalore.
1975	- Takeover of Machine Tool Corporation at Ajmer as the sixth machine tool unit of HMT.
	- Setting up of HMT International Limited as a subsidiary company to handle international marketing of HMT's products and technical services.
	- Setting up of Watch Factory III at Srinagar.
1976	- Setting up of the Lamp Division at Hyderabad.
1977	- Setting up of Central Metal Forming Institute (CMFI) at Hyderabad.
1978	- Setting up of Watch Factory IV at Tumkur, for manufacturing watch components.
1980	- Setting up of Dairy Machinery Unit at Aurangabad.
1981	- Take over of Indo-Nippon Precision Bearings Ltd. (a state owned bearing manufacturing unit) as subsidiary company. The company was subsequently renamed HMT Bearings, Ltd.
	- Introduction of Quartz Analog Watches.
1982	- Setting up of Watch Factory V at Ranibagh.
	- Setting up of Watch Case Manufacturing Division at Bangalore.
1983	- Setting up of a separate unit for the manufacture of Silver Oxide batteries for electronic watches at Guwahati.
	- Setting up of Stepper Motor Manufacturing Unit at Tumkur.
	- Setting up of Measuring and Control Instrument Division at Bangalore.
1985	- Setting up of Computer Systems Division at Bangalore.
1986	- Manufacture of Ball Screws for use on CNC Machines, Special Purpose Machines, etc. in Machine tool Bangalore Unit.
	- Setting up of CNC Systems Division at Bangalore to manufacture CNC Systems and related software.
1990	- Setting up of computer Integrated Manufacturing (CIM) Division is Bangalore.

Table II-1-2 Continued.

(Unit: Rs. Million)

Year	Share Capital	Net Worth	Capital Employed	Gross F. Assets	Working Capital	Sales	Net Profit	Operation Profit
1980/81	373	897	1,790	1,334	987	1,870	133	304
81/82	373	1,120	2,186	1,519	1,290	2,018	246	489
82/83	373	1,364	2,478	1,735	1,433	2,644	265	525
83/84	373	1,569	2,892	1,931	1,702	3,230	235	484
84/85	373	1,705	3,598	2,422	2,106	3,541	200	456
85/86	373	1,772	3,829	2,670	2,319	3,744	76	372
86/87	373	1,825	4,200	2,348	2,665	4,335	53	398
87/88	436	1,870	4,331	3,019	2,805	4,628	31	363
88/89	541	2,028	4,300	3,197	2,884	5,677	47	440
89/90	741	2,285	4,531	3,332	3,122	6,558	48	439
90/91	786	2,453	5,295	3,673	3,668	7,600	141	581

Table II-1-2 Flow of Financial Data of HMT

(Unit: Rs. Million)

Year	Share Capital	Net Worth	Capital Employed	Gross F. Assets	Working Capital	Sales	Net Profit	Operation Profit
1960/61	58	58	65	61	29	34	7	8
61/62	66	72	100	79	38	48	13	14
62/63	81	95	108	107	36	71	17	23
63/64	80	105	152	175	33	98	24	32
64/65	80	120	217	242	50	129	31	44
65/66	115	168	306	300	68	125	15	25
66/67	120	186	352	336	121	150	13	25
67/68	120	179	380	345	127	147	-7	7
68/69	120	175	381	350	133	154	-4	11
69/70	120	166	376	354	139	167	-8	6
70/71	120	167	422	360	197	204	3	19
71/72	169	226	464	404	248	295	11	31
72/73	218	274	462	438	243	351	8	30
73/74	242	311	522	479	277	428	20	41
74/75	263	381	622	585	320	588	51	86
75/76	329	462	865	777	458	805	58	145
76/77	343	509	1,015	853	568	887	47	144
77/78	353	568	1,191	920	698	1,162	52	131
78/79	373	643	1,163	1,050	677	1,671	75	211
79-/80	373	776	1,559	1,279	851	1,802	157	328

Table II-1-3 illustrates key financial data for the various business groups for the years 1989/90 and 1990/91.

Table II-1-3: Key Financial Data of HMT by Business Group In 1989/90 and 1990/91

(Rs. Millions)

Business Group	Sales		Sales Value of Production		Operating Profit*		Profit before Tax *	
	1990	1991	1990	1991	1990	1991	1990	1991
Machine Tools	2,524	3,087	2,498.3	2,993.1	(30.6)	75.1	(98.2)	3
Watches	2,017	2,211	2,119.5	2,483.3	195.5	142.2	148.2	77
Agricultural Machinery	1,847	2,063	1,854.3	2,092.4,	160.1	239.2	147.1	225
Lamp	170	239	184.8	237.4	(62.5)	(53.5)	(74.9)	(62)
Unallocated Expenses							(63)	(182)
Total	6,558	7,600	6,656.9	7,806.2	262.5	323.7	58.2	161

Note: Figures in brackets indicate loss

The profitability of HMT after registering a sharp increase in 1981/82, gradually declined thereafter until 1987/88, marginally improved in 1988-89 and significantly in 1990-91.

The performance of the Tractor Division was excellent during the decade. The sales (both volume and value) and the profitability of this Division, barring 1981/82 when reportedly due to credit curbs imposed on the farm sector the performance declined, increased throughout the decade.

The turnover of the Machine Tool Business Group constitutes more than 30% of the total turnover of HMT. Although the sales of the business group have increased throughout the decade, the declining profitability, after registering a sharp increase between 1981/82 and 1982/83, affected the overall profitability of the company.

The declining profitability of the Watch Business Group, whose turnover also constitutes more than 30 % of the company's total turnover and which is a top contributor to HMT's profits, substantially affected the overall profitability of the company.

HMT set up a facility for lamp making machines (lamp chains). Lamps had to be produced in fairly large numbers to test the quality of the lamp chains. The lamps were of good quality and therefore HMT seized the opportunity and diversified into the manufacturing of lamps in 1977. At present HMT has fully integrated facilities for the production of lamps and fluorescent lamps.

The performance of the Dairy Machinery unit fluctuated between 1983/84 to 1989/90. After making substantial losses up to 1984/85, the unit recorded sharp improvement, reporting a profit in 1985/86, but thereafter the profitability gradually declined (except for marginal improvement in 1988/89). Lack of a full range of machinery is the major reason for the poor performance of the Dairy Machinery Unit.

According to the IV Corporate Plan of the company, the Tractor Division plans to introduce fuel efficient engines, synchromesh gears, four wheel drive tractors, and greater ergonomics.

According to its Corporate Plan, (IV Corporate Plan for the period 1990-95), the Company envisages a progressive transition towards high technology such as CNC, flexible manufacturing systems, robotics, etc. In the Machine Tool Business Group, progressive conversion of the existing capacity for watch manufacturing to quartz analog watches in the Watch Business Group and the introduction of fuel efficient engines, four wheel drive tractors etc. in the Agricultural Machinery Business Group.

Diversification plans for the company include going into electronics with specific focus on Factory Automation, computer software related to Factory Automation and electronics machinery for the electronics industry, food processing machinery and customer components. The company has estimated total investment of Rs.1200 million for diversification projects and anticipates a gross annual turnover of Rs.2,600 million from such new projects.

Fig. II-1-1 HMT SALES 1981-82 to 1990-91

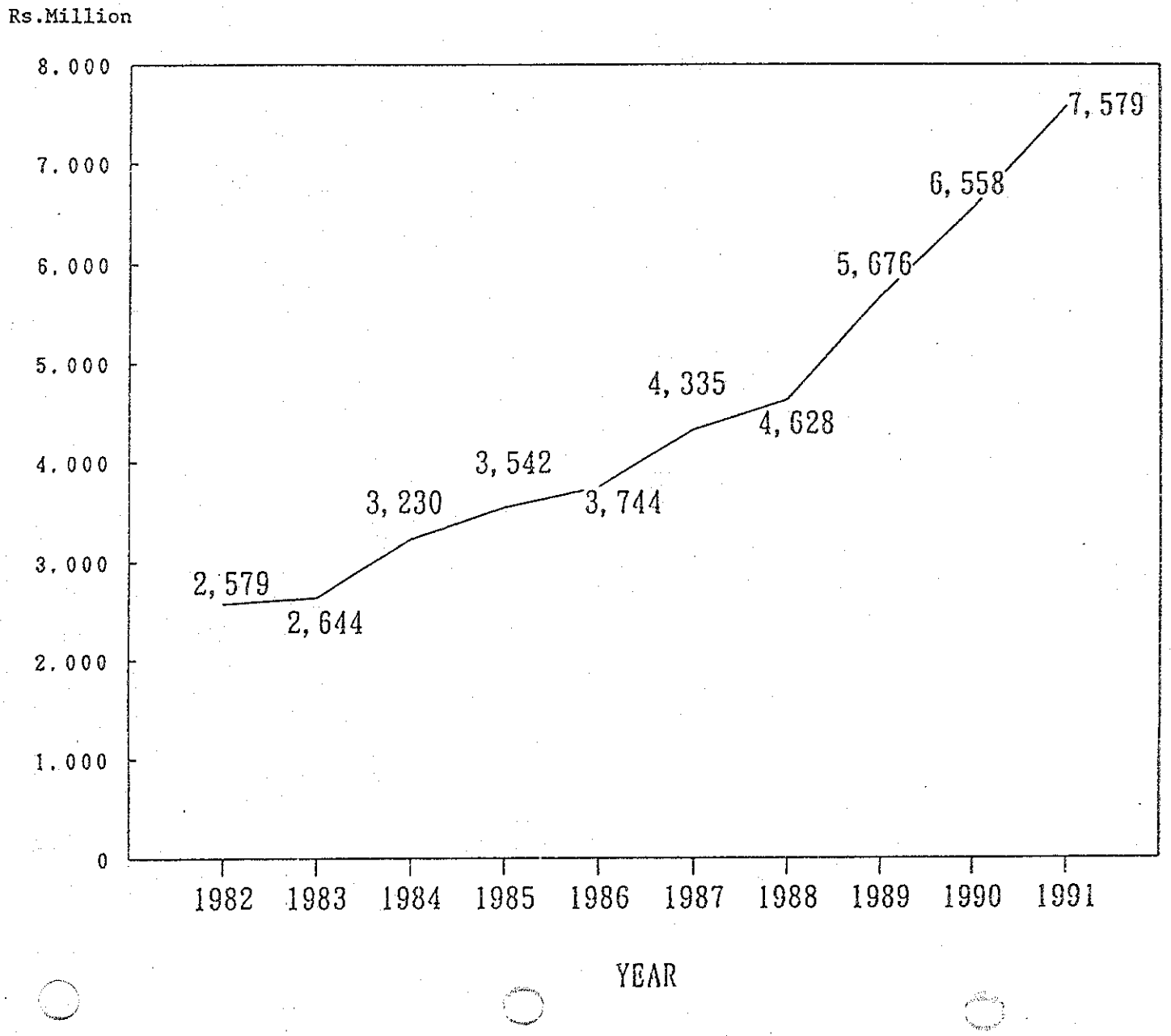


Fig. II-1-2 HMT PRE-TAX PROFIT
1981-82 to 1990-91

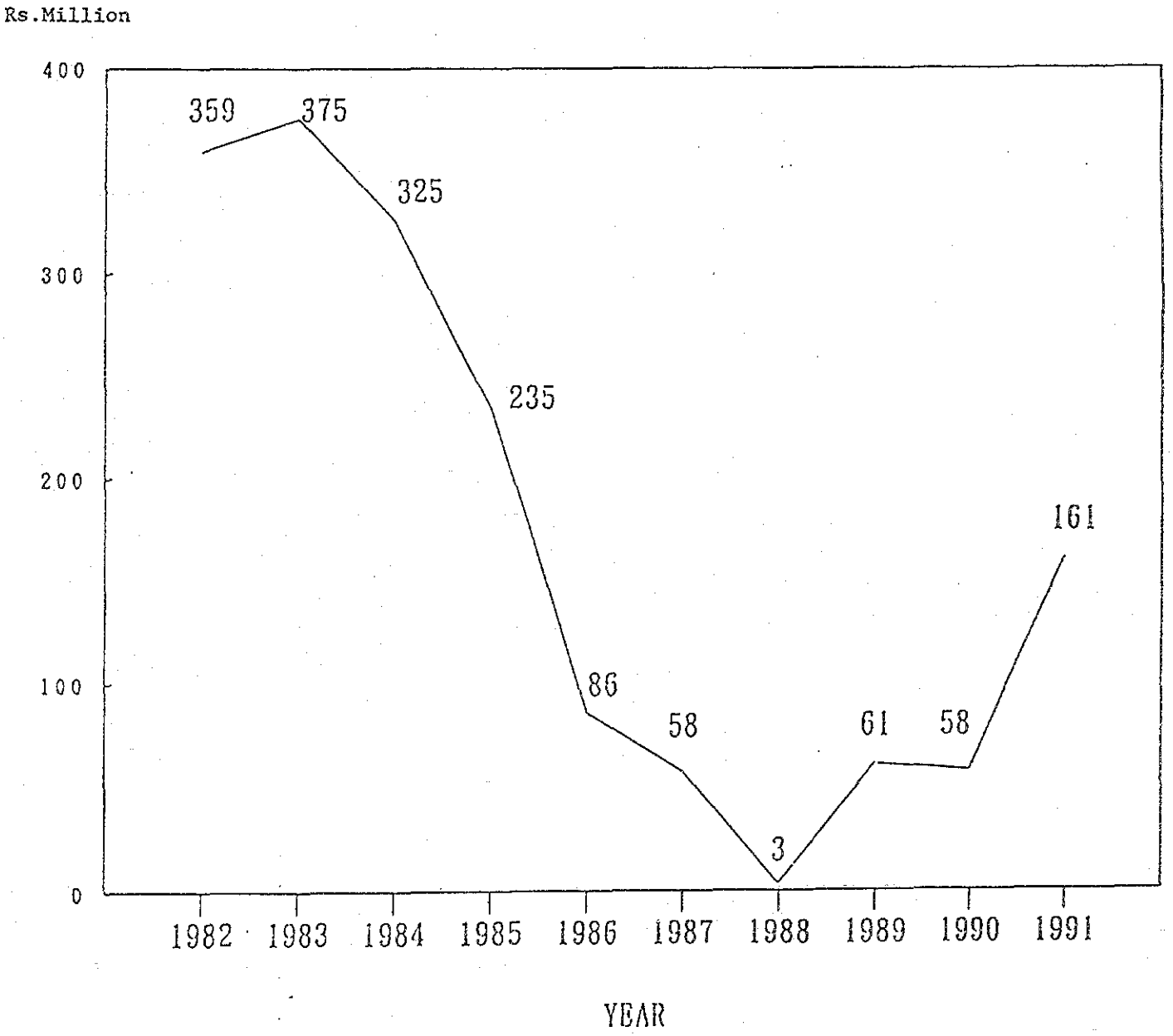


Fig. II-1-3 HMT SALES BY BUSINESS GROUP
1981-82 to 1990-91

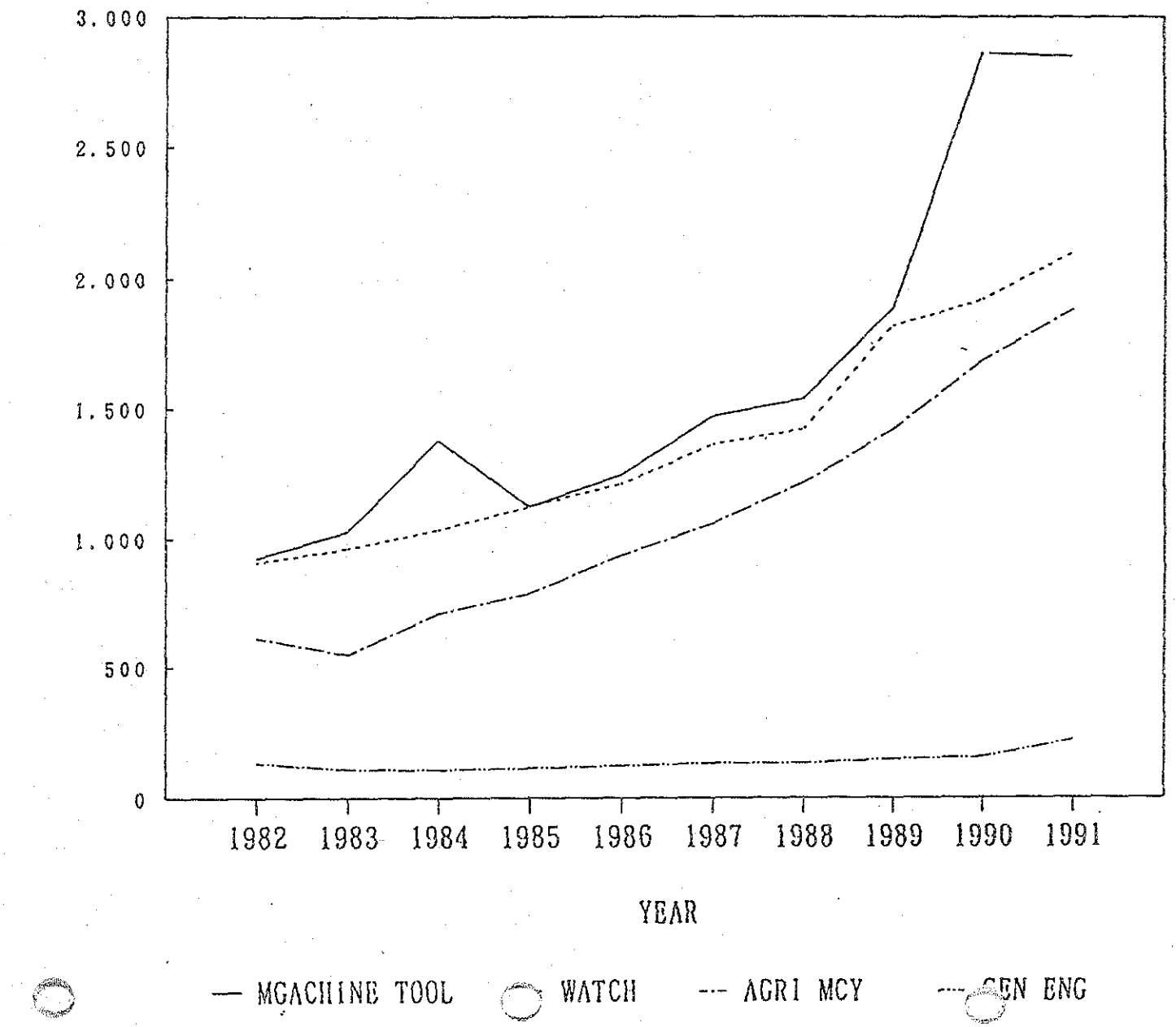
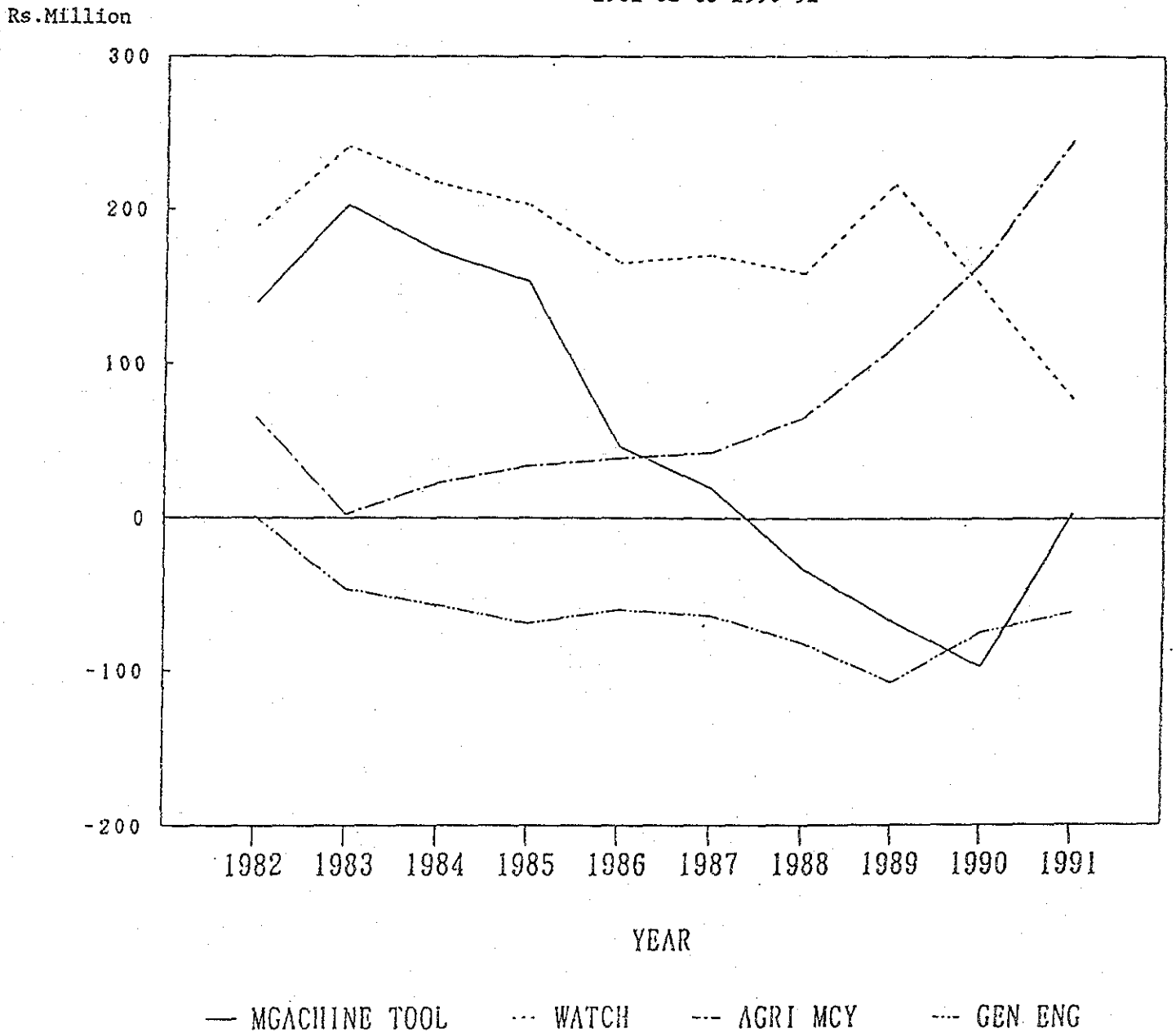


Fig. II-1-4 HMT PRE-TAX PROFIT BY BUSINESS GROUP
1981-82 to 1990-91



II-2. Performance by Business Group

A. Machine Tools Business Group (MTBG)

HMT was set up in 1953 initially to manufacture a limited range of general purpose machine tools. Machine Tools is the core business of HMT. Over the years it constantly upgraded its technology and diversified its product range to meet the changing needs of the environment. While in the early sixties the General Purpose Machines (GPM) manufactured by HMT used to cater to customer needs, the late sixties (recession period) and the early seventies required HMT to add a new range of GPMs in addition to upgrading the existing range and to place emphasis on application engineering to cater to the market expectations in order to offer appropriate application engineering support along with the basic machines. Consequently there was an increase in demand for Special Purpose Machines. During the late seventies and early eighties, with the increase in imports of technology, overseas collaborators of the user industries began to specify the machine tool requirements. Demand for GPMs declined while demand for Computer Numercial Control (CNC) machines grew rapidly from the mid eighties onwards. As the machine tool industry witnessed substantial structural changes, HMT upgraded its technology and diversified its product range to meet the changing market demands.

At present, HMT has six machine tool factories and a Horological Machinery Division manufacturing a wide range of sophisticated machines including CNC turning centers, CNC machining centers, CNC turret punch press and automated equipment like FMC & FMS, besides manufacturing a full spectrum of general purpose machines HMT's machine tools cater to the needs of several user industries including Automobile, Railways, Defense and Power equipment.

From 1983/84 onwards, the profitability of the business group steadily declined. There was a sharp decline in the profitability during the latter half of the decade (specifically 1988 to 1989/90) in most of the units, resulting in losses in 1989/90. While MTH and the Press

Division, Hyderabad (PRH), which were reporting losses in 1986/87 and 1987/88, improved their performance substantially in 1988/89 and 1989/90, sharp declines in the performance of the Printing Machinery Factory, Kalamassery (PMK), Machine Tool Factory, Ajmer (MTA), Machine Tool Factory, Bangalore (MTB), and Machine Tool Factory, Kalamassery (MTK), substantially affected the profitability of the business group. During this period the performance of the Horological Machinery Factory, Bangalore (HMB) was steady with marginal decline in profitability towards the end of the decade, while profitability of the Die Casting Factory, Bangalore (DCB) was fluctuating with a sharp decline in margins 1989/90.

Machine Tool Business Group plans progressive transition towards high technology such as Flexible Manufacturing Systems, Robotics, etc, to meet the market needs.

B. Watch Business Group (WBG)

The steady decline in profits of WBG during the eighties affected the overall profits of HMT. Although the sales value increased thoughout the period (volume also increased, except for the years 1987/88 and 1989/90), the profitability, continuously declined.

In 1981/82, the decline in the profitability of Watch Factory, Srinagar (WFS) and the Watch Ancillary (WANC) due to increased personnel costs and other expenses vis-a-vis operating revenue, effected the profitability of the entire business group and consequently the profitability declined as compared to the previous year. The rest of the units actually recorded improved profitability.

In 1982/83, the business group's performance improved on account of increased margins. The improvement in margins was achieved in spite of increased personnel costs vis-a-vis operating revenue through reduced material costs and other expenses vis-a-vis operating revenue. All the units of the business group (except Quartz Analog Watches (QAW) which reported losses) reported

improved performance. The Watch Business Group has been the top contributor to overall profits for the company.

From 1983/84 onwards, the profitability of the business group continuously declined. The margins were adversely affected by increasing personnel costs (except in 1986/87 and 1988/ 89), increasing other expenses (except in 1987/88 and 1988/89) and increasing material costs (except in 1989/90). Up to 1985/86, besides declining margins, decreased utilization of assets also affected the profitability. However, there was marginal improvement in the utilization of assets from 1986/87 onwards in spite of the increase in work-in-progress and finished goods stock.

All the units of the business group except the Watch Factory, Ranibagh (steady decrease of losses up to 1988/89, which again increased in 1989/90) and the Quartz Analog Watches (which reported improved profitability up to 1985/86), had declining returns. However, while the performance of the Watch Factory Bangalore and the Watch Factory, Srinagar marginally improved in 1988/89 and then again declined, the Watch Factory, Tumkur reported improved profits in 1989/90 and the Watch Ancillary after reporting a sharp increase in profitability in 1987/88, reported increasing losses thereafter.

Increased competition towards the end of the decade, high losses at the Watch Factory, Srinagar (due to political disturbances) and the Watch Factory, Ranibagh (in spite of improved performance) and increasing operational costs in other units, affected the profitability of the Watch Business Group.

The Watch Business Group plans to progressively convert its existing capacity for watch manufacturing to quartz analog watches to meet the market demand for high quality watches.

C. Agricultural Machinery Business Group (AMBG)

The Agricultural Machinery Business Group consists of the Tractor Division and the Dairy Machinery Division. HMT diversified into the Tractor industry as a contracyclical measure following a disastrous recession in the late sixties. Initially HMT set up a unit at Pinjore, Haryana to manufacture low power 25 HP tractors, in 1972. The price of tractors was regulated by the Government until the mid-seventies. With increasing input costs HMT was losing money . Since 1976 HMT started manufacturing higher horsepower tractors (35 and 58 HP). The demand for tractors in India increased throughout the period with increasing agricultural output. At present HMT has an installed capacity of 17,000 tractors.

HMT diversified into the manufacturing of Dairy Machinery in 1981. HMT set up a unit at Aurangabad in Maharashtra. At present HMT has an installed capacity of 265 units.

Significant features of the Tractor Division's performance have been increased sales (both volume and value), improved material utilization, and low personnel costs and other expenses (remaining almost constant throughout the period) vis-a-vis operating revenue. Another significant feature is improved usage of the assets throughout the period (except in 1989/90 when the fixed assets turnover ratio declined as compared to the previous year due to increased capital expenditure during that year).

The performance of Dairy Machinery unit was fluctuating throughout the decade. The unit registered profits in 1981/82 and thereafter the profitability declined, reporting substantial losses up to 1984/85. In 1985/86 the unit recorded sharp improvement and reported profits, but from 1986/87 onwards the profitability gradually declined (except in 1988/89 when the unit reported marginal improvement).

The poor performance of the unit can be attributed to the low volume of sales. This results from a lack of adequate orders which are reportedly due to the absence of a whole range of machinery, thus increasing personnel costs and other expenses vis-a-vis operating revenue.

D. Lamp Division

The lamp division reported losses throughout the decade, except for the year 1981/82 when operating profits amounting to Rs.13.6 million were registered. While the loss margin sharply increased between 1982/83 and 1987/88 from 26.61% to 76.8%, the division recovered between 1988/89 and 1989/90, reducing the loss margin to 45.51%.

The poor performance of Lamp Division can be attributed to low capacity utilization, the reasons for which vary from high rejection rates, low employee morale to increasing competition from the unorganized sector and increasing personnel costs and other expenses vis-a-vis operating revenue (from 21.60 % and 16.4% respectively in 1981/82 to 49.88% and 51.81% in 1987/88).

The loss margin declined in 1988-89 and 1989/90, primarily due to increases in sales, increases in selling prices and reduction in personnel costs and other expenses vis-a-vis operating revenue. However, the reduction in other expenses vis-a-vis operating revenue to 29.05% in 1989/90, is reportedly due to non-allocation of interest by the Corporate Head Office.

III. ENVIRONMENTAL FACTORS

HMT's business environment consists of environmental influences, such as economic, technological, social, political and governmental factors.

In this chapter, macroeconomic factors and, as a consequence, governmental factors will be examined because they are of great significance to HMT's strategic decisions.

III-1. Industrial Environment - Present Situation of Capital Goods Sector in India

A. Economic Setting

GDP of India was 4,427.7 billion rupees and per capita GDP was 5,454 rupees in 1989/90. Average annual growth rate during the Seventh Five Year Plan period was 5.98%, which was well over the plan target of 5% per annum.

Indian economy has experienced considerable industrial growth during the 1980s as a whole. The 7th Five Year Plan emphasized the acceleration of industrial growth with the easing of infrastructural constraints, liberalization of industrial licensing policy and provision of incentives for the development of key industrial sectors. As a result, the industrial production recorded a growth of 8.4% per annum during the 7th plan period.

Targets of the 8th five year plan (1990/91 - 1994/95) are announced as follows:

* 6% growth in the economy
* 10 - 12% growth in the industrial production

These targets as well as the plan period are under reconsideration.

There are emerging concerns on macroeconomic imbalances in fiscal and trade accounts. The unfavorable public

finance situation has put serious pressures on the balance of payments.

The finances of the Central and State Governments are under severe strain. The increasing expenditures in the public sector are to be financed with heavier borrowings in various forms.

The balance of payments position has also been under a difficult situation. There are heavy debt service obligations due to large repayments against earlier loans from the International Monetary Fund and rising external debt.

The average rate of growth in export earnings was 22.7% per annum during the period 1985 - 1990. This favorable growth, however, was offset by the considerable increase in imports due to rising world prices and continuing depreciation of the rupee.

Table III-1-1 Key Economic Indicators of India

	1985	1986	1987	1988	1989
GDP at Factor Cost* (Rs. Billion)	2,626	2,934	3,326	3,950	4,428
Growth of GDP* (%)	6.2	4.8	4.5	9.4	5.0
Wholesale Price Increase (%)	5.8	5.4	6.0	8.6	-
Government Budget Deficit * (Rs. Billion)	-223	-272	-279	-331	-292
Balance of Payments					
Trade Balance	-5,616	-5,438	-5,777	-6,581	
Overall Balance (US$ Million)	-397	-409	133	-16	

Note : * Year beginning April 1.
Source: IFS, IMF, July 1991.

B. Positioning of Capital Goods Sector in India

The capital goods sector plays an important role in India's economy feeding almost all sectors, e.g., coal, steel, fertilizers, power, petroleum, transportation, etc. Capital goods industry accounts for 16% of output value of all industry.

Over the last three decades, the capital goods sector has grown slightly more rapidly than industry as a whole, though with greater fluctuations in annual output. The average production growth rate of the capital goods industry during the 7th plan period was 14.3% against 7.0% during the 6th plan period.

It is projected that demand for the capital goods sector as a whole will increase from Rs. 259 billion in 1986 to Rs. 929 billion in 2000 (both figures at 1984/85 prices), yielding a growth rate of 9.6% per annum at constant prices.

C. Factors Hindering Growth of Capital Goods Sector

The World Bank identified the following factors as responsible for hindering growth in the capital goods sector in India.

(a) Lowered Profitability

Profitability in the capital goods industry fell sharply in the 1980s. This was due to adverse movements in metal prices relative to machinery prices. Labor expenses have also risen without a compensating reduction in financial and other overhead expenses. These movements in prices and increases in personnel expenses have been absorbed in the form of lowered profits and have not been significantly offset by increased operational efficiency.

(b) Technology, Production Facilities and Manufacturing Processes

Indian capital goods firms have had difficulty in exporting their products and in many cases competing

with imports partly because of price and partly because of product quality.

Although there are some Indian enterprises which are close to the international frontier in terms of their product design capability and process technology, most need to upgrade both, if they are to increase their competitiveness.

The various factors involved are:

- Greater engineering resources are devoted to manufacturing activities than to conceptual design activities. This contributes to Indian products not keeping up with changing technology.

- The proportion of Indian product designers and engineers at research institutes is higher than in industry and linkages between these institutes and the industry are poor. Thus much of the product design work has not led to commercially rewarding results.

- Government controls on direct imports of technology carrying capital goods, and of direct foreign investment, have retarded efforts of the capital goods sector to obtain necessary foreign technology.

- Indian capital goods manufacturers often have problems in absorption/adaptation/upgradation of imported technology as domestic R&D is not adequately developed and collaborators often do not provide technological know-how in view of payment restrictions imposed by the Government.

- The lack of supporting technologies like precision measuring materials, engineering and process control, prevents Indian enterprises from producing quality products.

- Production facilities are outdated in most cases, with a relatively low level of automation and obsolete equipment. Improvement of such facilities

is discouraged because of heavy excise and customs duties on capital goods.

- Delivery times of locally made capital goods are longer due to delays in manufacturing processes at the plant level as well as infrastructural inadequacies and policy impediments (e.g., delays in obtaining government clearances of import licenses, inputs from canalizing agencies or concurrence to collaboration agreements).

- Vertical integration in Indian firms prevents them from subcontracting arrangements whereby they could procure parts and components of better quality and lower costs.

(c) Inputs and Infrastructure

The main raw materials used by the capital goods industry are domestic in origin, and are often not up to international standards in terms of dimensional tolerances and metallurgical proportions.

The physical infrastructure also puts Indian producers at a disadvantage compared to international competition. In particular, the availability and reliability of the power supply are not up to international standards. Transport and communication facilities are also weak and this adds to production delays, and to overhead costs.

(d) Policy Barriers

Tariff rates and exemptions have changed frequently causing uncertainty in the capital goods industry. The complex array of tariff rates and exemptions on inputs and outputs creates incentives which are frequently difficult to predict in terms of their effect on profitability of investment.

While administrative controls on capital goods imports have been relaxed, the same cannot be said about the major inputs for capital goods production. Imports of steel and other basic metals are canalized or controlled by other administrative means. These restrictions effect

the efficiency of capital goods manufacturers.

Redundancy exists in the protective tariff, where output prices are generally lower than what would be expected if the tariff were binding. There are many instances where the domestic industry is negatively protected. The variation in effective protection is also quite wide.

Labor policies exist which make it difficult for a private sector mechanism to take care of restructuring needs of ailing industries.

Continuing bureaucratic controls on technology imports are in place.

MRTP (Monopolies and Restriction Trade Practices) Act and FERA (Foreign Exchange Regulation Act) restrictions make expansion difficult for successful firms and constrict an important avenue of technological upgrading through tie-ups with foreign firms.

A small scale reservation policy is in effect, which provides various benefits to small-scale operations and discourages gains from economies of scale.

D. Suggested Development Strategies

The World Bank has suggested several measures to develop the capital goods sector. These are summarized below.

(1) The Indian capital goods industry will need to have much closer interface with developments in the rest of the world.

This involves elimination of all quantitative import restrictions and a gradual reduction in the protection from imports for both the inputs and outputs of the capital goods industry. Such a reduction would lower the costs to the capital goods industry. The costs of investment to industry could be further lowered by including excise duties and the countervailing duties on capital

goods within the MODVAT Scheme.

The liberalization process as it relates to domestic industrial licensing regulations has to be continued. This would facilitate not only entry and expansion of enterprises but exit as well.

Provisions for redeployment/rehabilitation of surplus labor should also be framed. Export promotion measures have also to be strengthened.

(2) The institutional framework that provides training, research and development, information and industrial extension services in the relevant technical and techno-managerial skill areas has to be strengthened. Industrial R&D and technology absorption/-upgradation capabilities should be developed.

(3) The technology policy should facilitate technology acquisition. This could be done by easing technology imports through elimination of most licensing requirements, by increasing limits on royalty payments and easing FERA restrictions in respect of foreign equity participation in Indian enterprises.

(4) With some notable exceptions, the public sector enterprises are particularly inefficient and have become a major drain on public resources. The specific measures that could be taken to improve their performance are as follows.

- To develop and undertake turn-around strategies for sick enterprises that have been taken over by the government

- To clarify the objectives of PSUs, budget separately for non-commercial objectives and fund these from central government accounts.

- To reinforce the accountability of public sector enterprise managers through clear performance criteria and objectives in Memorandum of Understanding and at the same time increase their levels of autonomy.

It is also suggested the removal of the current advantages that public sector undertakings have in acquiring investment capital involving both their access to budgetary grants and their ability to issue tax free bonds as well as withdrawal of purchasing preferences provided to public sector enterprises.

III-2. Recent Government Policies for the Capital Goods Sector

A. Trade Policies

1. Recent Trade Policy Reforms

The foreign exchange reserve position declined sharply in 1990-91 necessitating major trade reforms and other measures to curb foreign exchange outflows.

Devaluation of the Indian Rupee was also considered necessary to make Indian exports more competitive. Thus on July 1 and 3 1991, the Indian Rupee was devalued in two stages against the major currencies of the world to bring it more in line with its real value.

This devaluation resulted in a total fall in the value of the rupee ranging between 21-23%. However, the rupee had been gradually depreciating and the total depreciation since January 1991 till the date of the last devaluation was around 45%

Following closely, on July 4, 1991, significant liberalization in the 1990-93 Import and Export Policy was announced to make it more amenable to market requirements. Special features of the reforms are as follows:

(1) The scope of Replenishment (Rep) Licensing Scheme has been enlarged and the rates enhanced and made uniform. The Rep Licenses (to be renamed EXIM scrips) will be the principal instrument for imports and will be freely tradable.

All exports will be eligible for Rep Licenses at the uniform rate of 30% of FOB value.

Registered exporters will however continue to have the option of importing against Advance Licenses but the Rep rate on such exports will be 20% of net foreign exchange earnings (NFE) against 10% allowed earlier.

(2) The categories of items permitted to be imported under Rep scheme has been enlarged and include:

* Raw materials (including iron & steel and ferroalloys), components, consumables, tools and spares listed under the Limited Permissible List (Appendix 3A & B of the Import and Export Policy 1990-93). The list includes over 200 engineering and allied items.

* For import of OGL items appearing in Appendix 6, actual users (AUs) covered by Phased Manufacturing Program of Indigenization (PMPI) were required to follow list attestation procedures and obtain OGL import entitlement certificates which are no longer required.

* Requirements of raw materials, components and consumables of capital goods manufacturers listed under Appendix 4 (which includes manufacturers of dairy machinery).

* After sales service spares imports by manufacturers of machinery and equipment listed in Appendix 9.

* Items falling under the category known as Unlisted OGL. This category has now been abolished.

(3) Rep Licenses earned against exports to general currency area (GCA) countries will be valid for imports from all countries except Fiji, Iraq and South Africa but those granted against exports to Rupee payment area (RPA) countries will be valid for imports only from these countries only. (RPA

countries include USSR, Rumania and Czechoslovakia with whom India has a large trade surplus).

(4) Export Houses (annual average net foreign exchange (NFE) earnings in the prescribed base period not less than Rs. 5 million) and Trading Houses (annual average NFE earnings in the prescribed base period not less than Rs. 20 million) will now get additional Rep Licenses at the rate of 5% of NFE earnings (against Additional Licenses of 10% of NFE) over and above the Rep rate of 30% of FOB value.

Star Trading Houses (annual average NFE earnings in the prescribed base period not less than Rs. 750 million) will now get Special Additional Rep License at the rate of 10% of NFE earnings (against Special Additional Licenses of 15% of NFE) above the Rep rate of 30% of FOB value.

(5) In view of the devaluation of the rupee and an increase in Rep rates, the CCS given to exporters (restricted to a cut-off point of 25% of NFE) has been discontinued.

(6) The objective of the trade reforms announced is to directly link imports to exports through the Rep route. However, imports of capital goods under OGL (Appendix 1B), imports by small scale sector and producers of life saving drugs and equipment of limited permissible items (Appendix 3), other non PMPI imports under OGL (Appendix 6), and canalized imports through PSUs would continue outside the Rep scheme.

(7) In terms of future direction, it has been mooted that all import licensing for capital goods and raw materials, except for a small negative list would be removed in three years time. All items would be decanalized except those that are essential. Rep Licenses would be more easily tradable as Foreign Exchange Certificates. And finally the Rupee would become fully convertible on trade account in three to five years time.

2. Impact of Recent Trade Reforms on HMT

Impact of recent changes in the trade Policy on HMT's business is examined from the view point of competition from imports, cost of production and exports.

(1) As a result of the recent devaluation of the Rupee the price of imported products would go up.

A large number of machine tools are imported into the country under OGL. In view of the depreciation of the rupee and continued availability of machine tools under OGL, (without taking into account revisions in the tariff structure) the domestic manufacturers of machine tools including HMT would enjoy a relative price advantage over imported products in the domestic market. This would also benefit domestic watch manufacturers by checking the inflow of smuggled watches.

The cost of imported raw materials, components, etc., would go up because of devaluation of the rupee and payment of premium on Rep Licenses (for imports through the Rep route) which is currently estimated at 30%. (The Rep rate was around 42% at the end of July 1991.) The increase in cost would be around 55-60% (21-23% because of the devaluation of the rupee and approximately 30% premium on Rep License).

(2) The lead time for imports of raw materials and components would be significantly reduced since imports under the Rep route would not be subject to clearances (which were time consuming) thereby reducing the level of inventories required and resulting in cost savings. The machine tools division of HMT is likely to be most affected because of higher import content.

(3) HMT routes all its exports through its fully owned subsidiary HMT(I) Ltd. which is a recognized Trading House. HMT (I) handles both HMT and non HMT products. Rupee Devaluation is expected to boost

exports by making the products more price competitive.

Rep premium would be an additional source of income. Depending on the product, the benefit would range between 24-30% approximately (21-23% because of devaluation of the rupee and approximately 3-7% additional premium over and above the earlier Rep rates of 5-20% depending on the product). However, withdrawal of CCS (which was generally between 5-20% for different products) would offset the benefit accruing from the trade reforms.

In case of machine tools, the net benefit is expected to be around 6-8% (21-23% because of devaluation, 3% additional premium on Rep Licenses less 18-20% loss arising from withdrawal of CCS).

While the benefit of the premium on Rep Licenses acquired through exports would accrue to HMT (I), HMT would be required to obtain the requisite Rep Licenses for its imports from the market at a premium.

This apparent disadvantage to HMT would require corrective action that could cover revision in transfer prices, sale of Rep Licenses to HMT at lower or nil premium by HMT (I), etc.

Exports to RPA countries would suffer because of the withdrawal of CCS and restrictions on imports from GCA countries against Rep Licenses obtained against exports to RPA countries. Moreover, the Government is also monitoring exports to RPA countries to ensure that import content of such exports from GCA countries does not exceed 30%. HMT's export of machine tools to RPA countries is significant.

B. Credit Policy Measures

1. Recent Trend

In order to restrain imports with a view to conserving scarce foreign exchange, certain monetary and credit policy measures were initiated by the Reserve Bank of India (RBI) in 1990-91. While these measures are essentially of a temporary nature, they have a severe effect in the short term.

Restrictions have been imposed on the sale of foreign exchange for imports of capital goods in effect from March 19, 1991, which are now required to be channeled through the foreign currency lines of credit available with the financial institutions. Thus commercial banks have been barred from selling free foreign exchange for the import of capital goods.

In effect from April 22, 1991, the minimum required cash margin for the opening of Letters of Credit (LC) with commercial banks for OGL imports (other than capital goods) and that for imports against specific licenses is 200% and 150% respectively. Rep licenses (issued against proof of receipt of export proceeds) issued after April 23, 1991, have been exempted from the purview of cash margins.

According to the 1991-92 budget proposal, a flexible interest rate can be charged by the financial institutions (with a floor rate of 15%) depending on the credit worthiness of the borrower. The restriction on interest rates on debentures has also been removed.

A levy of a 25% interest surcharge on bank lendings for all import finance has been introduced together with a freezing of withdrawals under the cash credit limit of Rs. 10 million and above.

In order to curb excess liquidity, the lending rates have been hiked and a 10% incremental Cash Reserve Ratio (CRR) on commercial banks has been imposed.

2. Impact of Recent Measures

These steps are likely to result in depressed demand in the short run and reduced imports. Increases in lending rates and the CRR will restrict credit availability and affect tractor sales in particular which a recent study showed are mostly bought against bank credit. Profitable and efficient units will be able to mobilize funds at relatively lower rates with the flexibility introduced in the borrowing rates.

C. Tariff Provisions

1. Background

All imports are subject to customs duties levied under the provisions of the Customs Act, 1962 and the Customs Tariff Act, 1975. The customs tariff has 3 parts

(1) basic duty which is applied to the CIF price at rates specified in Schedule I of the Tariff Act.

(2) auxiliary duty also applied to the CIF price at rates specified under the Finance Act.

(3) additional duty equal to excise duty imposed on locally produced goods (also called countervailing duty) which is levied on the CIF price and the basic and auxiliary duties.

The tariff structure is complex and highly differentiated and both the basic and auxiliary duties are subject to frequent changes through exemptions both general and specific.

The average effective basic duty for capital goods after considering exemptions was in the range of 30-50% (against the average basic duty of around 90%) with the vast majority of the items falling within the range of 10-110%.

The average standard auxiliary duty after exemptions worked out to around 30% and taking the average basic

duty rate of 40% the average protection tariff was estimated at around 70% (basic plus auxiliary).

The countervailing duty is not by design protective since it has a counterpart in the form of an excise duty charged on comparable domestically produced goods. For capital goods, the countervailing duty was typically 15%.

Exemptions were provided for capital goods imports for specified projects (new as well as expansions) and uniform rates were prescribed for both project and non-project machinery and component imports. Duty concessions for the import of machinery under a technology upgradation scheme launched in 1987 in the capital goods sector were extended to additional segments and the duties were reduced. Machine tools were adequate under three headings - those for which there were categorized domestic capacity, those for which there is negligible domestic capacity and others, with duty rates fixed at 110%, 35% and 75% respectively in 1986-87. These measures were seen to reduce the dispersion of tariff rates.

The duty rates on inputs to the capital goods sector were similarly fragmented with some being higher than the rates for capital goods. In the cases of certain categories of steel, the basic rates ranged between 150-470%. However, the exemption rates ranged between 40-300%. For non-ferrous metals, the basic duty rates ranged between 40-100% with exemptions ranging between 13-65%.

In sum, with regard to exemptions in place, the effective basic rates on ferrous and non-ferrous inputs were estimated at around 70%. Adding the auxiliary duty similar to that for capital goods, the average protective duty in place for ferrous and non-ferrous inputs was estimated at 100% compared to 70% for capital goods. In conclusion therefore duty rates were higher on inputs than on outputs.

The 1991-92 budget announced on July 24, 1991, proposes reforms in customs and excise levies so that indigenous industries are encouraged and at the same time imports

of items required for export production are not thwarted. With this aim in view, moderation of import duties has been attempted. As a measure of reform it has been proposed to reduce the ad valorem rate of basic and auxiliary duties of customs to a maximum of 150% thereby eliminating the tariff peaks above 150%. This however, would not have any substantial impact on the capital goods industries since the effective rates after concessions are below this peak.

In December 1990, in order to mobilize additional resources, auxiliary duties were increased by 5 and 20 percentage points from 5% to 25% and from 30% and 45% to 50%. In the 1992 budget proposal, duty relief of 10% has been proposed on items which were subject to an increase of 20% in December 1990. On certain categories (including machinery for newspaper and printing machinery) it was proposed to roll back the rates to pre-December rates. These proposals would benefit certain categories of capital goods industry, e.g., machine tools, agricultural, printing, leather, textiles, food processing, packaging, jute machinery, etc.

Import duty on capital goods for general projects and machinery (other than power and fertilizer projects) is proposed to be reduced from 85% to 80%. In tandem, the rate of duty on their components is also proposed to be reduced by 5 percentage points from their existing levels of 65% or 70%. Duty rates on project imports (including for gas turbine projects) remain at 30% (for above 50 MW capacity) and 40% (for below 50 MW capacity) respectively. The rate of duty for fertilizer project imports also remains at 15%. Specified items of machinery for machine tool, cutting tools, commercial tool room and steel forgings and for textile industries are now subject to reduced import duties of 50% from 85%. The rate of import duty for capital goods for the electronics industry has been made uniform at 60%.

To provide further thrust to the technology upgradation scheme, the list of machinery items has been proposed to be expanded which will attract a concessional duty rate of 50%. Import duty concessions have however been withdrawn from certain specified items of machinery

covered by the technology upgradation scheme.

Import duties have been reduced, and the concessional rate applied on specified machinery/equipment required by the leather industry and the sea food industry, specified items of machinery for the printing and newspaper and pharmaceutical industries, specified components for manufacture of high pressure sodium vapor lamps, specified items of machinery for the modernization of the vegetable oil industry and components for specified capital goods for the electronics industry.

2. Impact and Future Direction

As far as the capital goods sector is concerned the recent changes in customs duties will not significantly effect relative costs of imported capital goods vis-a-vis those manufactured indigenously since the marginal decrease in import duty on capital goods is compensated by the corresponding reduction in duties on components.

However import duties on ferrous and non-ferrous metals continue at the same levels as before. The average effective duty on inputs was higher than that on the output (viz. capital goods) resulting in negative protection. With the marginal lowering of duties on capital goods and components while that on inputs of ferrous and non-ferrous metals remains more or less the same, the gap between average effective duty on capital goods and inputs will not change significantly.

The industry will therefore continue to be negatively protected. In rupee terms, the amount of customs duty will increase in view of the devaluation of the rupee which will raise the price of imported products.

The decline in the average rate of customs duties is likely to continue over the next few years since India is committed to a phased reduction in import duties from an average level of 120% to 30% at the Uruguay round of GATT. A proposal to move towards simplification and streamlining of the tariff structure has already been mooted in the 1991-92 budget proposal.

E. Industrial Policy

1. Background

The GOI exercises control over the pattern of industrial investment, among others, size, industrial activities, location, foreign equity participation, import of technology, activities of 'strategic importance,''priority' activities, etc.

Excessive bureaucratic controls have hampered growth, modernization and competitiveness in Indian industry. However, the government has been promoting a gradual delicensing of industry and other liberalization measures for Indian industry.

To help Indian industry achieve international competitiveness the government felt the need for greater flexibility in industrial policies to enable industry to respond swiftly to fast changing external conditions.

To achieve the above objective and to usher in a market oriented economy, the Government proposed radical changes in its industrial policy which are embodied in the Statement on Industrial Policies dated July 24, 1991, (also referred to as the industrial policy). The salient features of the industrial policy are summarized below.

(a) Industrial Licensing

Industrial licensing has been abolished for all industries except 18 categories specified in Annexure II of the Statement on Industrial Policy irrespective of investment levels. The specified industries will continue to be subject to compulsory licensing for reasons related to security and strategic concerns, manufacturing of products of hazardous nature and articles of elitist consumption, etc.

Exemption from licensing will apply to all substantial expansion of existing units and existing units will be allowed a broad banding facility provided there is no additional investment required.

All existing registration schemes have been abolished (e.g., DGTD registration, etc.) Only an information memorandum is required to be submitted for new projects and substantial expansions.

In locations other than cities of more than 1 million population, there will be no requirement of obtaining industrial approvals from the Government except for industries subject to compulsory licensing. In respect of cities with population greater than 1 million, industries other than those of a non-polluting nature will be located outside 25 kms of the periphery, except in prior designated industrial areas. Promotion of dispersal of industry particularly to rural and backward areas through incentives, etc., would continue.

In projects where imported capital goods are required, automatic clearance will be given where foreign exchange availability is ensured through foreign equity or if the CIF value of imported capital goods required is less than 25% of total value (net of taxes) of plant and equipment, up to a maximum value of Rs. 20 million. This scheme will however come into effect only from April 1992 (due to current foreign exchange constraints). In other cases imports of capital goods will require clearance from the Secretariat for Industrial Approvals (SIA).

The system of phased manufacturing program will not be applicable to new projects. Existing projects with such programs will however, continue to be administered.

(b) Foreign Investments

To attract foreign investment in high priority industries requiring large investments and advanced technology, approvals will be granted for direct foreign investment of up to 51% foreign equity. (The previous general ceiling was 40%.) Such clearance will be automatic if foreign equity covers the foreign exchange requirements for imported capital goods.

These industries comprising 34 categories have been listed under Annexure III of the Statement on Industrial Policy and include industrial machinery, agricultural machinery, electrical equipment and printing machinery, etc. Foreign equity proposals not fulfilling the above criteria will continue to require prior clearance. Higher foreign equity participation will be allowed in areas requiring sophisticated technology and export oriented ventures subject to prior clearance.

Payment of dividends to foreign shareholders will be monitored by RBI to ensure that it is balanced by export earnings over a period of time.

With a view to accessing high technology and world markets, a specially empowered board has been constituted to negotiate with large international firms and approve direct foreign investment in select areas.

To provide access to international markets as well as to enhance marketing expertise, majority foreign equity holdings (up to 51%) will be allowed for trading companies engaged in export activities which will be treated at par with domestic trading and export houses.

(c) Foreign Technology Agreements

Automatic permission will be given for foreign technology agreements in high priority industries if such agreements conform with the following requirements:

- lump sum payment up to Rs. 10 million and

- royalty at the rate of 5% for domestic sales and 8% for exports, subject to total payment of 8% of sales, over a 10 year period from the date of agreement or 7 years from commencement of production.

In respect of industries automatic permission for foreign technology agreements will be given if no free foreign exchange is required for any payments.

In order to encourage industry to invest more in R&D,

hiring of foreign technicians and foreign testing of indigenously developed technologies would be allowed without prior clearances.

(d) MRTP Act

The MRTP Act will be amended to remove the threshold limits of assets in respect of MRTP companies and dominant undertakings. This would eliminate the requirement for prior Governmental approval for establishment of new undertakings, expansion, merger, amalgamation and take-overs. The emphasis would be on controlling and regulating monopolistic, restrictive and unfair trade practices.

(e) Small-scale Sector

The changes in the industrial policy would not affect the small-scale sector and areas would continue to be reserved for exclusive manufacturing by the sector.

(f) Public Sector

Greater autonomy and accountability of the public sector have been proposed which would give thrust to improved performance. Categories of industries reserved for the sector have been reduced to eight with a focus on strategic, high technology and essential infrastructure (Annexure I of the Statement on Industrial Policy.) While areas so far reserved for the public sector are proposed to be selectively opened up to the private sector, the public sector will be allowed entry in areas not reserved for it.

Chronically sick public enterprises which are unlikely to be turned around will be referred to the Board for Industrial & Financial Reconstruction (or other similarly constituted Boards) for formulation of revival/rehabilitation schemes. In selected enterprises part of Government holdings will be divested to ensure market discipline.

2. Impact and Future Trends

(a) Impact on Capital Goods Sector

The capital goods industry has been witnessing delicensing measures over a period of time on the grounds that it is a priority area for development, that it plays a central role in terms of technology acquisition and that the efficiency increasing effects of competition are even more important in capital goods industries than in others since inefficiencies in this sector rapidly propagate to the rest of the economy.

As a result of these liberalization measures the capital goods sector is already subject to competitive pressures (especially machine tools) arising from the greater relative ease of entry and expansion. There is also relative ease of imports.

The impact of the recently announced radical changes in the industrial policy can be summarized as follows from the viewpoints of growth, modernization, international competitiveness and flexibility of response.

- The delicensing of industry, relaxation in MRTP controls and foreign investment and technology inflow will result in growth, modernization and rationalization of the user industries. (The engineering industry in particular, except for motor cars, has been delicensed.) This is likely to result in increased demand for sophisticated capital goods including machine tools.

- While the capital goods sector was to a large extent delicensed and liberalized over the years, the recent reforms are likely to result in further growth and expansion, greater inflow of domestic and foreign investment and sophisticated technology, which are likely to lead to improvements in product quality and productivity (through improved processes and management techniques).

- With the increased indigenous manufacturing of quality products of high international standards,

imports of such products are likely to fall and at the same time the export potential of such products is likely to improve.

- It would be possible to rationalize the product mix and achieve economies of scale.

- The abolition of PMPI would allow suitable substitution of domestically produced inferior/high cost components and parts by imports, thereby increasing efficiency.

- Export of capital goods is expected to be boosted through tie ups with international trading houses. Exports of components and parts are expected to grow significantly as a result of the increased number of tie-ups with foreign companies.

- Delicensing and removal of controls are expected to usher in a market-oriented economy in place of a controlled economy. Competitiveness and flexibility to respond to market changes would therefore be the key to success. The public sector would require greater efficiency and autonomy in functioning in order to compete effectively.

(b) Impact on HMT

Under the changing industrial environment, HMT would face increased competition from the small scale sector (for conventional machine tools in particular), other private and public sector organizations and imports.

There would be a need for substantial autonomy to be able to respond quickly to market changes relating to products and technology since products and technological innovations will become the key success factors.

Greater focus on specialization in a range of higher-end products would be necessary, specially in the case of machine tools.

Structural changes aimed at greater decentralization of operations and management, and which would be required

to achieve the desired specialization and flexibility. Increase in competition, would also result in pressure on margins, and this, coupled with the expected increase in the cost of borrowing will make it necessary for HMT to significantly improve productivity and control costs.

III-3. Government Policy on Public Enterprises

A. Current Policy on Public Enterprises

1. Basic Policy

The Statement on Industrial Policy announced on July 24, 1991, has redefined the role of the public sector in the Indian economy.

It acknowledges several problems in the Indian public sector - insufficient growth in productivity, poor project management, overmanning, lack of continuous technology upgradation, inadequate R&D and human resource development on the one hand and a poor return on investment on the other, all of which have caused these enterprises to become a burden on the national exchequer. Dilution of the original concept of public enterprises has also led to the public sector entering a number of nonessential areas, especially the consumer goods and service sectors.

To address these problems, the recent industrial policy has laid down priority areas for public sector growth. The government is also planning a review of the existing portfolio of public investments in order to exit from non-strategic areas, inefficient areas and those areas where the private sector has developed sufficient expertise and resources.

The priority areas for growth of public enterprises in the future will be the following:

* Essential infrastructure goods and services
* Exploration and exploitation of oil and mineral resources
* Technology development and building of manufacturing capabilities in areas which are crucial in the long term development of the economy and where private sector investment is inadequate.
* Manufacture of products where strategic considerations predominate such as defense equipment.

In order to strengthen PSU's in the high-priority areas, the Government has proposed a greater degree of management autonomy and accountability through the ongoing system of memoranda of understanding (MOUs) which would be extended to cover most PSU's and would upgrade its own technical expertise to make MOU negotiations and implementation more effective.

The industrial policy does not give any specific guidelines on an exit policy. Public sector undertakings (PSU's) which are financially very weak ('chronically sick') and which are unlikely to be turned around, will be referred to the Board for Industrial and Financial Reconstruction (BIFR) or a similar body for the formulation of revival/rehabilitation schemes. The issues of labor redundancy and labor rationalization have not been elaborated upon except for reference to a social security mechanism to be created to protect the interest of workers likely to be affected by rehabilitation packages.

2. Policy on Privatization

The first policy move by the Government to divest some of its stakes in select PSU's was initiated in the interim budget of 1991. In this budget, the Finance Minister proposed divesting 20% of the Government's stake in certain PSUs to financial institutions and mutual funds with the aim of improving the Government's resource position. However, since these financial institutions and mutual funds are under Government control, this cannot be construed as privatization.

The recently announced industrial policy mentions that the Government will review the existing portfolio of public investments with greater realism. It proposes that in the case of selected PSU's, part of the Government's equity stake will be disinvested in order to provide further market discipline in the performance of public enterprises. These shares will be offered to mutual funds, financial institutions, the general public and workers. The Union Budget 1991/92 (presented on July 24, 1991) echoes this policy.

B. Future Directions of Government Policy on Public Enterprises

The recently announced industrial policy has redefined the role of the public sector and given a short list of areas for priority growth of the public sector. This, however, does not prevent the public sector from entering other areas, and a repetition of the earlier policy of PSU's entering too many areas is possible.

However, the Indian Government has of late been facing a very severe resource crunch. It has responded by introducing new, market-oriented policies for external trade and industrial development. The current thinking is clearly in favor of a larger and increasing role for the private sector.

Privatization of existing PSU's is still a politically sensitive issue and large scale privatization might not take place in the near future. But a much smaller future role for the public sector, especially in non-priority areas of the Indian economy, is expected.

IV. HMT BUSINESS ANALYSIS

IV-1. MACHINE TOOLS

A. Market Analysis

1. Inland Market Analysis

(a) Market size and growth

India's machine tool market has steadily grown in the last decade as shown in Table IV-1-1. The overall market grew approximately three-fold in the same period and now stands at Rs.9407.7 million in 1990.

The import portion has been controlled to occupy about half of the inland market and only recently has the portion of domestic production started to exceed the half way point in terms of market share. This is thought to have happened due to the increase in domestic production of CNC machines.

Conventional general purpose machine (GPM) production grew to Rs. 5,622 million in 1990 but the number of ma chines actually produced machines shrunk from 12,013 sets in 1985 to 8,403 sets in 1990. (Refer to Fig. IV-1-1 and Fig. IV-1-2.)

On the other hand, CNC machines production grew eight-fold in number in the same period and more than ten times in value, recording 560 sets and Rs. 1,368 million in 1990. India's CNC machines production in 1990 holds 33.1% of all metal cutting and forming machine (Group A) production and 19.6% of all machine tools production excluding tool and testing equipment (Group A and B).

This tend is supposed to continue in future and the CNC machine ratio is expected to reach 50% of Group A and B by 1999/2000 after increasing by almost six times the production in 1990.

In the CNC machine field, CNC lathes, turning centers and machining centers are the main products which are selling the most. In addition to these three types of

Table IV-1-1 Production, Imports, Exports & Consumption of Machine Tools in India - 1980-90
(Group 'A' & 'B' Including Welding)

YEAR	Production Rs.Mil.	Growth rate in production %	Imports CIF Rs.Mil.	Import Duty all inclusive %	Landed price of Imports CIF+Import duty Rs.Mil.	Exports Rs.Mil.	*Consumption with landed price of Imports Rs.Mil.	£Share of Production to consumption %	Share import (Landed price) Consumption %
1980	1,782.2	15	1,048.6	52	1,593.8	169.5	3,206.5	50	50
1981	2,262.2	27	1,297.3	52	1,971.8	187.7	4,045.9	51	49
1982	2,644.4	17	1,766.4	76	3,108.8	197.2	5,556.0	44	56
1983	2,846.9	8	2,113.7	83	3,846.9	241.6	6,452.2	40	60
1984	3,065.4	8	1,952.9	82	3,554.2	175.9	6,443.7	45	55
1985	3,421.6	12	1,550.5	85	2,868.4	296.5	5,993.5	52	48
1986	3,716.6	9	**1,750.0	85	**3,240.0	463.0	6,493.6	50	50
1987	4,172.7	12	**2,000.0	85	**3,700.0	699.2	7,173.5	48	52
1988	4,650.0	11	**2,000.0	85	**3,700.0	430.0	7,920.0	53	47
1989	5,553.0	19	**2,000.0	85	**3,700.0	800.0	8,453.0	56	44
1990	6,990.0	25	**2,000.0	85	**3,700.0	1,282.3	9,407.7	61	39

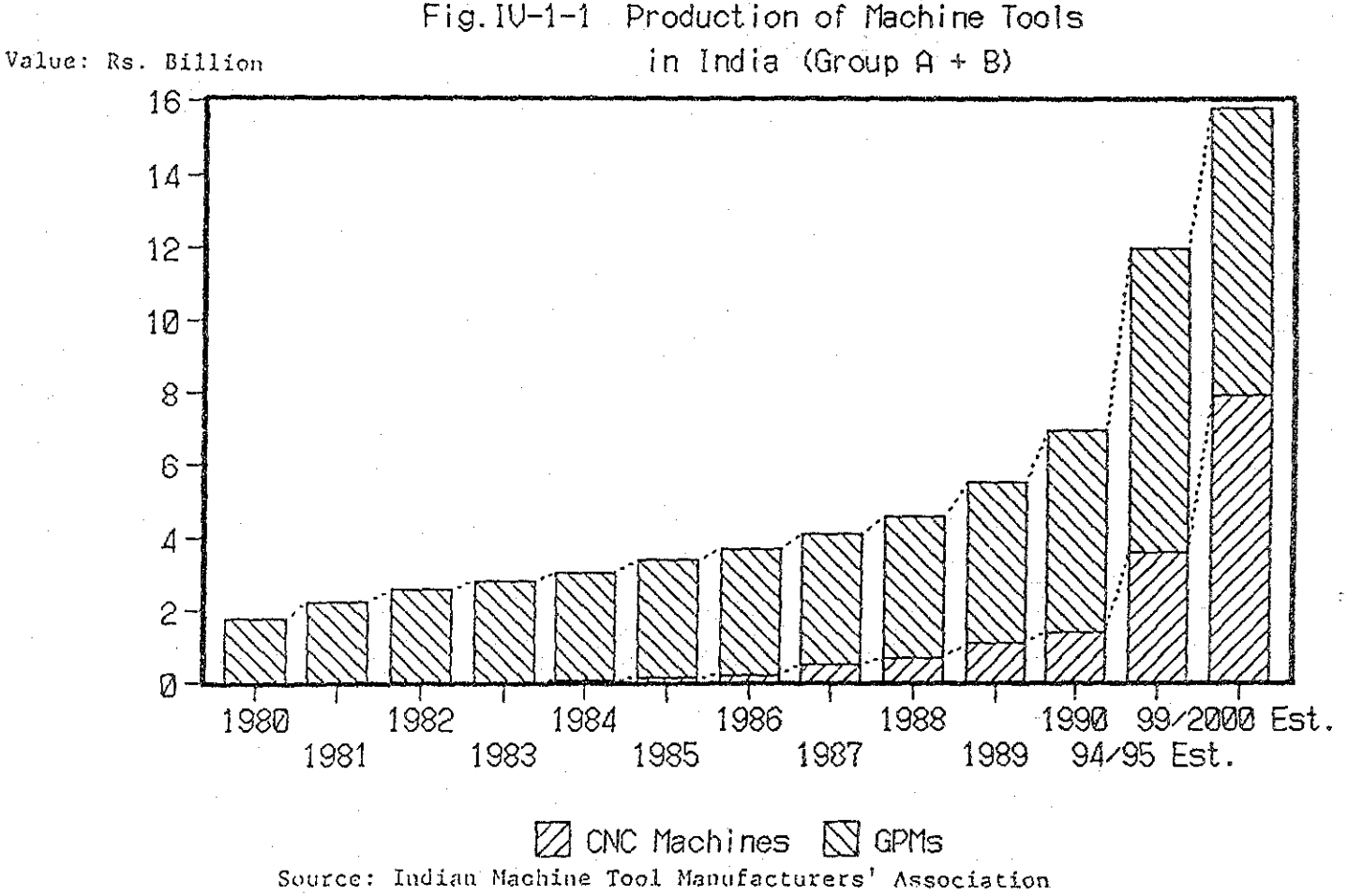
**Estimated

*Consumption = Production plus Imports (landed) minus Export

£ $\frac{\text{Production - Export}}{\text{Consumption}} \times 100$

Source: IMTMA

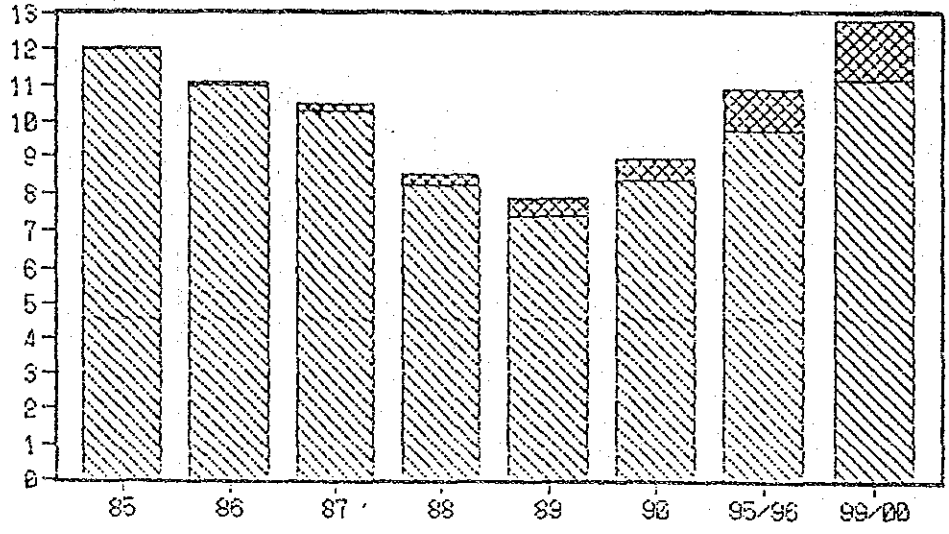
Fig. IV-1-1 Production of Machine Tools in India (Group A + B)



Source: Indian Machine Tool Manufacturers' Association

Fig. IV-1-2 Production of Machine Tools in India: 1985-1990

Unit: 1,000 sets of Machine



Note: Forecast by HMT

Source: IMTMA

machines, CNC wire-cut EDMs are also growing fast. (See Fig. IV-1-3.)

Although HMT estimates the future steady increase of GPM production in terms of quantity, it is not likely to happen because once CNC machines start to pick up in demand, they will quickly substitute GPM because of their high productivity. This is a common phenomenon in other parts of the world. The number of GPM's produced in India may remain at the same level as 1990 for some time in the near future (from an optimistic viewpoint) but it will decrease gradually there after.

(b) Customer analysis

i. Demand by sector

It is estimated in the Eighth Five Year Plan (1994/95) that automobile and automobile ancillaries, and defense production will be the major customers, followed by industrial intermediaries, and the electrical and electronics industry. (See Fig. IV-1-4.)

In actual sales of HMT for the last five years, Automobile and auto ancillaries comprise 24% of the total cumulative sales followed by Defense (17.5%), Industrial intermediaries (16.6%) and Industrial machinery (8.6%). (See Fig. IV-1-5.)

Taking into consideration that recent economic development in India's private sector has been more active than expected and the Government is facing a severe budgetary deficit, it is foreseen that public spending on defense may have to be squeezed and while on the contrary, private industries may become more aggressive in investment, which may be encouraged by the Government in order to strengthen the competitiveness of Indian industries over other developing countries.

In this context, more growth can be expected in the area of automobile, industrial machinery, electrical or electronics industries and related industries.

Fig. IV-1-3 Production of CNC Machines in India
by Type: 1986-1990

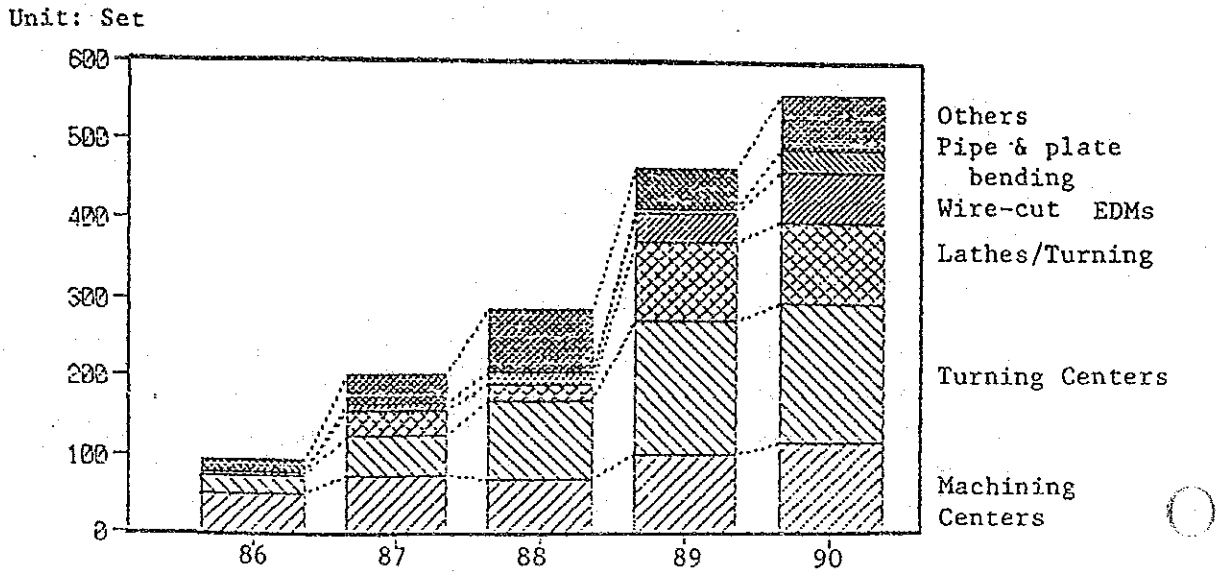


Fig. IV-1-4 Sector-wise Distribution of Machine Tools

Estimates for the Eighth Five Year Plan

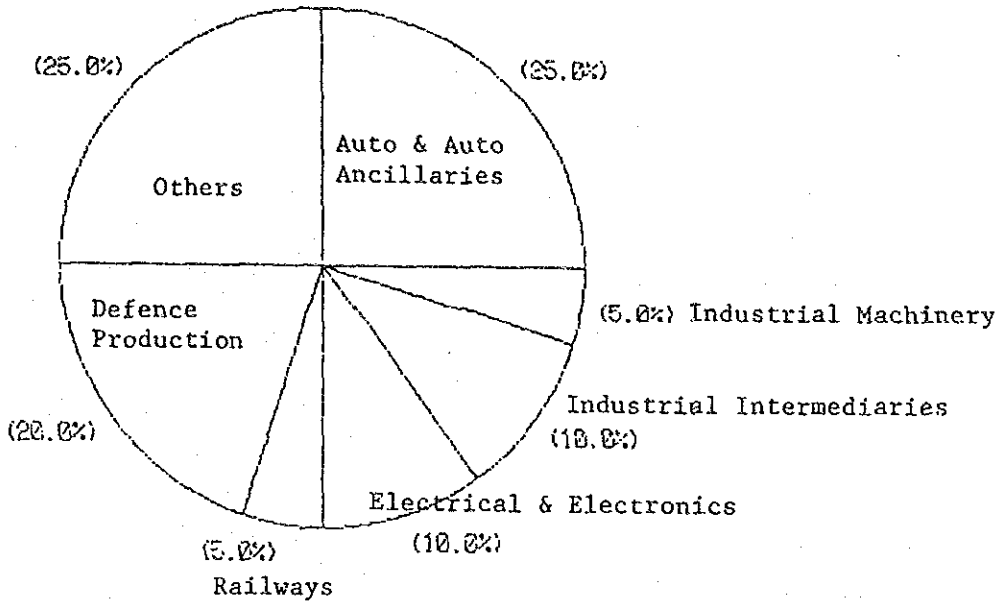
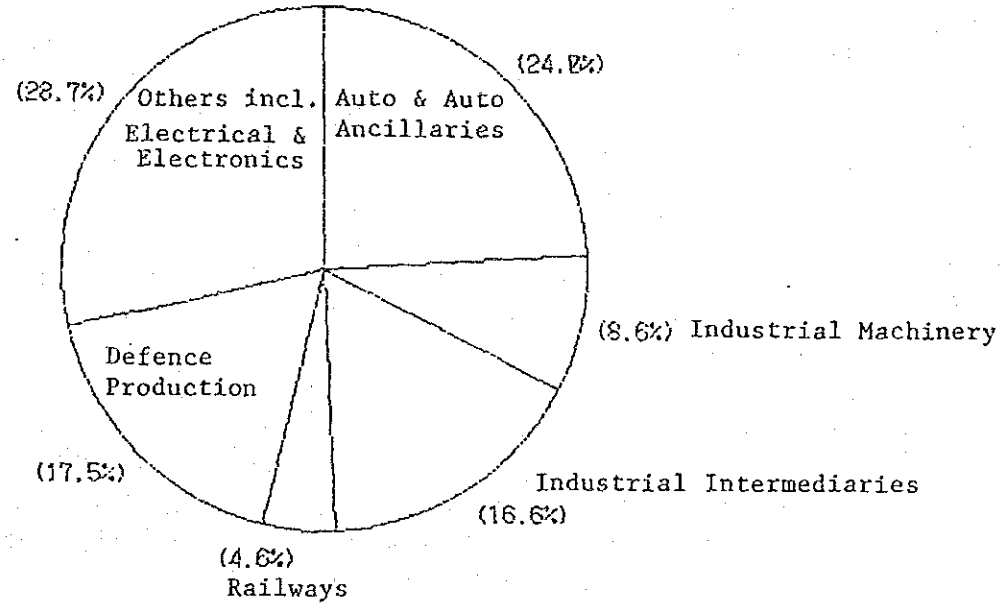


Fig. IV-1-5 Sector-wise Orders Booked by HMT



Note: Cumalative from 1986/87 to 1990/91

ii. Customer needs

The Indian machine tool market was once a so-called suppliers' market but it has already become a buyers' market with more and more competitors coming into the industry, offering higher and more up-to-date technology.

On the other hand, users of machine tools require automation technology for higher productivity and more stable quality, lower pricing for the economics of their own businesses, and quicker response (delivery). If HMT can meet these needs of large customers, then it will certainly have a brighter future.

HMT seems to have a comparative weakness in terms of pricing, CNC technology, delivery terms and service quality, for smaller users. (See Table IV-1-2.)

In many cases, Indian customers seek to combine various machine tools by purchasing through one supplier.

Having a wide range of products, HMT has been successful in meeting this demand and approximately half of HMT's sales of machine tools are generated from this area (so-called "Projects").

(c) Price trends

India has been facing a relatively higher rate of inflation during the last decade, affected by its growing population.

Its currency, once considerably over-valued, has been steadily decreasing in value, as inflation in the Indian economy has remained untackled. This made the import of necessary material components and parts for machine tool manufacturing gradually more expensive.

At the same time, productivity improvement has been left aside for a long time, because the emphasis was put on generating employment.

Table IV-1-2 Customer Analysis by Sector

Sectors	Customer Need	Customer Behavior (KFS)	HMT'S Standing	Action regd. by HMT
Automobile, Indust. M/C, Agri. M/C, etc.	SPM, GPM(T), Stand-alone CNC, Gear cutting, Metal forming [Key tech: Automation]	Automation technology Techno-economics Product reliability Back-up service Price Brand preference	SPM: Good GPM(T): Good CNC: Fair Gear cutting: Good GPM: Poor (price wise)	Pricing Application back up After sales service Delivery commitments Up grade CNC tech.
Defence, Railways, Earth moving	GPM(T), GPM, Stand-alone CNC (For defence) FMS, Metal forming specialised production equip and heavy duty M/C [Key tech: Automation]	Automation technology Brand preference Product and delivery reliability Back-up service Commercial terms Price	GPM(T): Good CNC: Good GPM: Fair FMS: Good Metal forming: Fair	Delivery commitments After sales service
Consumer durables	GPM(T), High precision SPM, Small capacity precision presses Auto assembly M/C for watches CNC especially for component manufacturers [Key tech: High precision]	High precision and automation technology Techno economics Product reliability Price Service reliability Brand preference	Horological Machinery: Good Other machines for consumer durables: Fair	Manufacture of precision dies, moulds and press toolings Manufacture of assembly machines and systems Manufacture of precision low tonnage presses

Note: KFS - Key factors for success

Consequently, the selling prices of machine tools kept going up and, in the last five years, it increased 65-75% in most of the cases in HMT. (See Table IV-1-3.)

Prices of other domestic manufacturers of machine tools are relatively lower than HMT by 10-30%.

The price of machines tools made in India are already as expensive as that of Japanese made machine tools. Also, it is commonly known that machine tools made in Taiwan are in many cases cheaper than Japanese makes by 30-40%.

In an effort to provide competitiveness to Indian industries by supplying machine tools at reasonable prices, indigenous machine tool prices are not likely to be increased as in the past.

(d) Competition Analysis

i. General situation

Presently, there are about 150 machine tool manufacturers in the organized sector and 300 manufacturers in the small-scale sector.

Among them, 10 major manufacturers contribute about 75% of the total machine tool production.

ii. HMT's share

HMT'S turnover of machine tools in 1989/90 was Rs. 254 crores, followed by Praga Tools and Kirloskar group of 3 companies who sold Rs. 46 crores each. (See Table IV-1-4.)

Since Praga Tools is now a subsidiary of HMT, the scale of HMT's machine tool business is completely dominant in the Indian market.

HMT has a wide product range of GPMs, whereas other major organized manufacturers have limited product lines, which makes a big difference in turnover for HMT and others.

Table IV-1-3 Price Change of HMT Products

	Machine			Price (F.O.R.): RS.		
	Name	Model	Unit	1987/88	1991/92	up %
GPM	Turret Lathe	L22TP	Bangalore	354,300	608,900	71.9
	Radial Drill	RM62	Bangalore	185,800	339,700	82.8
	Cylindrical Grinder	G17/1200P	Bangalore	380,800	632,300	66.0
	Surface Grinder	SFW1	Bangalore	393,700	649,000	64.8
	Heavy Duty Centre Lathe	L45/3000	Bangalore	832,000	1,388,900	66.9
	Milling M/C	FN3V	Pinjore	310,800	539,300	90.9
	Broaching M/C	RISZ 10	Pinjore	841,400	1,803,600	114.4
	Precision Lathe	NH22/1000	Kalamassery	212,000	319,500	50.7
	Auto. Multi-Cycle Copying Lathe	SPL1000	Kalamassery	631,900	989,800	56.6
	Horizontal Boring	UTA130P	Hyderabad	5,485,100	9,162,400	67.0
	Centreless Grinder	GCL/100	Ajmer	774,100	1,400,500	80.9
CNC	Grinder	GNC18	Bangalore	3,458,000	6,198,000	79.2
	Machining Centre	SINUMERIC HTC600	Pinjore	3,737,800	6,545,000	75.1
	Machining Centre	VTC1200	Pinjore	2,406,200	4,173,000	72.4
	Turning Centre	STC25/1000	Kalamassery	1,525,000	2,712,000	77.8
	Turning Centre	STC15	Kalamassery	*1 1,500,000	1,965,000	*2 31.0
	Machining Centre	HMC800	Hyderabad	3,794,000	7,528,000	98.4
	Machining Centre	HMC1000	Hyderabad	5,495,000	8,310,000	51.2

*1: 1989/90 when STC15 was put on a market

*2: increase % over 1989/90

HMT's share in indigenous production was about 41% in 1989/90, but HMT accounted for only 25% of total domestic consumption. This implies that imported machine tools are major competitors of HMT. (See Table IV-1-5.)

iii. Future competition

In the field of GPMs, technology improvement is hardly foreseen and it will become easier for small scale manufacturers to start production of GPMs utilizing their cheaper manufacturing facilities. Although there will be no possibility for cheaper machines from NIES to come into the Indian market due to the Government regulation or the protection by high duties, there will be fiercer competition in GPM's of lower technical grade with India's small scale manufacturers.

Other major manufacturers are putting more emphasis on CNC machines, obviously because they are the products of the future. Most of the competitors of HMT have arranged technical collaborations with major foreign manufactures of CNC machines for newer or more up-graded technology. (See Table IV-1-6.)

iv. Competition in CNC machines

In 1990, HMT accounted for approximately 40% of the total Indian production of CNC machines. However, in the main field of CNC machines, such as CNC turning and machining centers, there are very ambitious plans for expanding production on the competitor's side.

In CNC turning centers, Lakshmi Machine Works (LMW) is most active, followed by ACE Designers and Kirloskar Warner Swassey (KWS).

Table IV-1-7 Sales of CNC Turning Centers

Company	1990/91	1991/92(Plan)
HMT (MTK only)	113 sets	149 sets
LMW	40	80
ACE	62	NA
KWS	30	NA

Table IV-1-5 HMT's Share in India

Unit: Rs.Crore

YEAR	COUNTRY (GROUP A+B)		HMT'S PRODUCTION	HMT'S SALES(INLAND)	SHARE		
	CONSUMPTION	PRODUCTION			% IN PRODUCTION	% IN CONSUMPTION	
						PRODUCTION	INLAND SALES
1985-86	599	342	132	101	39	22	17
1986-87	649	371	147	114	40	23	18
1987-88	717	417	160	117	38	22	16
1988-89	792	465	178	155	38	22	20
1989-90	918	553	226	212	41	25	23
1990-91(Budoeted)	1019	600	252	212	41	25	21
1994-95(Proj.)	1742	1220	489	399	40	28	23

Table IV-1-6 Technical Collaborations in CNC Machine Tools

Name of the Indian Company	Name of the Foreign Company	Item of Manufacture
Batliboi & Co, Ltd. Udhana	Klopp Werke Germany	NC/CNC Knee and Bed Type Milling Machine
Bharat Fritz Werner Bangalore	Fritz Werner Germany	Machining Centres
	Technoimpex Hungary	CNC Universal & Slant Bed Lathes
HMT Ltd. Hyderabad	KTM Ltd. UK	Machining Centres including Head Changer Machining Centres and FMS
	Siemens Germany	CNC Systems
	Carl Zeiss Germany	Ballscrews
	Gildmeister Germany	Flexible Multi-spindle Automatics
Kirloskar Warner Swassey, Hubli	The Warner Swassey Co. USA	CNC Turning Machines
Lakshmi Machine Works, Coimbatore	Mori Seiki Co. Ltd. Japan	Machining Centres & CNC Lathes
Motor Industries Co. Ltd, Bangalore	Robert Bosch Germany	ECM, TEM
PMT Machine Tool Automatics Pvt Ltd. Pune	Traub GmbH Germany	CNC Turning Centres including CNC Systems
Praga Tools Ltd. Secunderabad	Mitsubishi Japan	Machining Centres
	Sachman Italy	CNC Bed Type Milling Machines

Name of the Indian Company	Name of the Foreign Company	Item of Manufacture
	Keiyo Seiki Japan	CNC Lathes
TELCO Pune	Niigata Engineering Co. Ltd. Japan	Machining Centres including Monitoring Systems
	Nachi Fuji Kashi Japan	NC SPMs
The Mysore Kirloskar Ltd. Harihar	Balding Engineering Ltd.(Beaver Works) UK	Machining Centres including Pallet Transfer Systems & Ballscrews
	Maccanica Nova Italy	NC/CNC Internal Grinders
The Premier Automobiles Ltd. Pune	Hitachi Seiki Japan	Machining Centres

Table IV-1-7 Competitors Turnover in Machine Tools Business & Growth

Unit: Crores

No.	COMPETITOR	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91 (Est.)
1.	Praga Tools	16.99	24.08	35.13	40.34	45.99	45
2.	Mysore Kirloskar	21.29	20.85	21.15	*28.40	*34.81	42
3.	BFW	10.21	8.17	14.27	14.20	22.40	27
4.	Premier Auto (Cooper)	12.13	24.01	15.98	18.13	19.00	NA
5.	Amteep M/C Tools	7.90	-	9.80	10.50	13.90	NA
6.	Batliboi & Co.Ltd.	7.09	6.30	6.80	10.62	11.06	NA
7.	PMT (Perfect Machine tools)	6.50	8.50	10.00	5.00	9.50	NA
8.	Kirloskar Warner Swassey	0.18	2.74	2.74	4.90	7.56	9
9.	ACE Designers	0.80	1.60	1.60	2.40	5.25	9.5
10.	Kirloskar Brothers	3.13	2.70	4.28	5.65	3.52	NA
11.	Becs Engineering	2.85	3.60	5.00	4.70	3.50	NA
12.	Geedee Weiler	-	1.40	1.20	2.40	2.40	NA
13.	LMW				0.75	1.64	10

* for 15 months

Regarding machining centers, HMT is rather weak, competing with Mysore Kirloskar (MK), BFW and Praga.

Table IV-1-8 Sales of Machining Center (1990/91)

Unit: Sets

Type	HMT	MK	Praga
Horizontal MC	15	20	16
Vertical MC	12	30	-

Besides the above-mentioned three companies, Premier Automobiles Ltd. (PAL), who have a collaboration with Hitachi Seiki and are now concentrating on the supply of machining centers for its own use, may come into the market in a year or two.

It is obvious that HMT's market share in 1990/91 declined considerably and will be even lower in 1991/92 in the field of CNC lathes/turning centers and machining centers, which are claimed to be the biggest markets in CNC machine tools.

Other feasible markets in CNC machines are CNC Milling where BFW and Batliboi are strong and CNC Wire-cut EDM where HMT has only a nominal share.

Thus, HMT seems to be slipping down from the position of industry leader in CNC machines. Since HMT itself is foreseeing harder competition in future, it is strongly recommended that HMT seek new technology collaboration with a major foreign manufacturer for upgrading CNC technology and introducing new design concepts and a drastic shift of manufacturing systems towards CNC machines.

v. Profile of Major Competitors

Regarding the details of competitors, refer to Table IV-1-9.

表IV-1-9 Profile of Competitors

Name of Company	Mysore Kirloskar Ltd.	BFW	Premier Automobiles Ltd.	Batliboi & Co., Ltd.
Brief History and Profile	Leading Manufacturer of center lathes in India.	Established in 1961 in collaboration with Fritz Warner. Reputed at home and abroad for its milling machines.	A machine tool division was formed by taking over the Cooper Machine Tool Division of Walchandnagar Industries	Surat based engineering company with many business interests.
Name of C.E.O.	Vikram S. Kirloskar	J. M. Kothari	J. M. Vakil	Nirmal Bhogilal
Capital	66.38 Crs. (1989)	5.7 Crs.	146 Crs.	20 Crs.
Date of Establishment	1952	1962	—	—
Number of Employees				
Turnover of Machine Tool	Rs. 34.81 Crores (89/90)	Rs. 22.4 Crores (89/90)	Rs. 19.0 Crores (89/90) (Machine tools only)	Rs. 11.06 Crores (89/90)
Average Annual Sales Growth Rate (1984/85 - 1989/90)	17.00 %	38.00 %	14.00 %	10.00 %
Profit Ratio	2 %	1.5 %	3 %	1.5 %
Sales Breakdown	Center Lathes % Grinding Machines % CNC Lathes % Machine Centers % Other Products %	SPMs % Boring and Multi-spindle Machines % CNC Boring and Milling Machines % CNC Machining Centers % CNC SPMs % CNC Lathes %	Rotary Milling Machines % Vertical Lathes % Gear Hobbers % Vertical and Horizontal Machining Centers % CNC Gear Hobbers %	Milling Machines % Radial Milling Machines % CNC Milling Machines % Sole sales agent in India for Cincinatti turning centers.
Sales Network *Indore & Madras etc.	Bangalore, Delhi, Lucknow, Calcutta, Bombay, Pune, Nagpur.	Bombay, Calcutta, Hyderabad, Madras, Delhi and Pune.	Marketted by Voltas India Ltd.	Bombay, Ahmedabad, Baroda, Calcutta, Coimbatore, Delhi, etc.
Sales Force	Represented by own marketing setup and by Alfred Herbert.	Own Marketing setup.	Selling through Voltas Ltd.	Selling through Batliboi & Co. Trading House.
Present State of Competition	CNC turning machines model MKU-S and MKU-500/600 directly compete with HMT's STC-345 and UMC-345. Their Warner Swassey CNC centers pose competition to HMT's CNC lathe.	BFW-UHU Milling Machine compete with HMT's FN U/U models H. Machining Center TNC-300 competes with HTC 600.	Gear Hobber P-251 competes with HMT's H250 /H400 models. Competition in boring machines, machining centers also.	Radial drilling machines BR 851 & BR 618 competes with HMT's RM Series.
History of New Product Development	Predominantly new products introduction by collaboration.	Predominantly new products introduction by collaboration.	Predominantly new products introduction by collaboration.	Predominantly new products introduction by collaboration.
Technical Collaboration Please see Annexure-U	Balding Engg. Ltd., UK, for Machining Centers including Pallet transfer systems and ball screws. Macconics Nova, Italy, for NC/CNC internal grinders.	Fritz Warner for CNC Machining Centers.	With Hitachi Seiki for vertical and horizontal machining centers. Schless, Germany for vertical turning centers. Herman Pfauter, Germany for CNC gear hobbing machines.	With Cincinatti of USA for CNC turning centers. With Klopp Works, Germany for NC/CNC knee and bed type milling machines.
Future Product Development & Introduction into Market	Pollution Control FMS Packaging	FMS	—	Planning to make electrostatic precipitation in collaboration with Wheelabrator Air Pollution Control, USA.
Type of Strategy	Flexible Commercial terms.	Concentrates on technical excellence.	Concentrates on select products only.	CNC Turning Centers in collaboration with Cincinatti, USA.
Degree of Threats to HMT in 1995 VH:Very High, H:High M:Medium, L:Low, VL:Very Low	V H	V H	M	M
Possible Threats or Challenge to HMT	Outstanding on commercial terms and price.	Technical superiority in Machining Centers.	—	—
Degree of Threats to HMT in 2000 VH:Very High, H:High M:Medium, L:Low, VL:Very Low	H	M	M	L
Possible Threats or Challenge to HTM	Entering FMS Widening size or range of machine tools.	FMS Automation.	FMS Automation.	CNC Turning and Machining Centers.

表IV-1-9 Profile of Competitors (Continued.)

Name of Company	Ace Designers	Lakshmi Machine Works	NC Machines Pvt. Ltd.	Perfect Machine Tools
Brief History and Profile	Bangalore based company concentrating on CNC lathes.	Quality textile machinery taker. They opened their machine tool division in 1988 in collaboration with Mori Seiki Co., Ltd. of Japan for advanced CNC machines.	Cochin based machine tool maker. Started its operation in CNC lathes. Diversifying into hydraulic winch systems.	Pune based company.
Name of C.E.O.		D. Jayarathnavelu		Shailesh Sheth
Capital		70.20		
Date of Establishment				
Number of Employees				
Turnover of Machine Tools	Rs. 5.25 Crores (89/90)	Rs. 1.64 Crores (89/90)		Rs. 9.50 Crores (89/90)
Average Annual Sales Growth Rate (1985 - 1990)	67.00 %	—		16.00 %
Profit Ratio		4 %		
Sales Breakdown	CNC Lathe Model LT-16 % CNC Lathe Model LT-20 %	Machining Center Model MV Junior % Turning Center SL3 %	CNC Lathe Model NCM-20 % CNC Lathe Model NCM-25 %	SSA's % Grinders % CNC Turning Centers % PMT is a marketing agent for domestic and foreign machine tool makers.
Sales Network	Marketted by M/s. Micromatic Machine Tools Pvt. Ltd. Delhi.	Marketted by M/ps. Alfred Herbert Co. Ltd. & Supersales Agency.	Their products are marketted by Machine Tool India Ltd.	Marketing offices throughout India, Calcutta, Delhi, Madras and Bangalore.
Sales Force	—	—	—	—
Present State of Competition	Their CNC turning centers will be stiff competitors for HMT STC-15 and STC-25 mostly on price and payment terms.	Their products are well accepted in the market.	NCM-20 and NCM-25 offer good competition for HMT's model STC-25.	CNC turning center model TND 360 that falls in between STC-15 and STC-25 of HMT has startted creating market slots for itself.
History of New Product Development	Own development of Auto Lathe, CNC Lathes and Machining Centers.	Through collaboration.	Own development of CNC Lathes.	Through collaboration.
Technical Collaboration Please see Annexure-V	—	With Mori Seiki Co.,Ltd. for Machining Centers and CNC lathes.	—	TRAUB GmbH of Germany for CNC turning centers including CNC systems.
Future Product Development & Introduction into Market	LT-2 CNC, CNC Chucker, Machining Center MCH 400 will be introduced in 1992.	Turning Centers SL-00 in 1991-92. Turning Centers SL-20 in 1991. Allenbrandley CNC System Tool Room CNC Milling Machine in collaboration with Deckel.	NCM-15 and CNM-40 which are parallel to STC-15 and SBCNC-35 of HMT.	—
Type of Strategy	With the incentives to small scale industries. They compete on the price front.	Concentrates on High Value CNC Machines only.	Caters to the price concious Medium Scale orders only. Turning Centers.	—
Degree of Threats to HMT in 1999 VH:Very High, H:High M:Medium, L:Low, VL:Very Low	M	V H	L	H
Possible Threats or Challenge to HMT	Price and payment terms	Technical superiority	Price and Delivery.	—
Degree of Threats to HMT in 2000 VH:Very High, H:High M:Medium, L:Low, VL:Very Low	M	H	L	H
Possible Threats or Challenge to HTM	Turning, Grinding, and Machining Centers.	FMS, Automation, CNC Milling & CNC Systems.	—	Turning, Grinding, FMS & Automation.

If there are other major competitors, please describe their profile.

表IV-1-9 Profile of Competitors (Continued,)

Name of Company	Klockner Windsor	Anteep M/C Tools	Kirloskar Warner Swassey	Kirloskar Brothers
Brief History and Profile	Engaged in the manufacture of PI Moulding Machines Extruders. Has got plants at Tane, Vaha & Chattral.	–	–	Engaged in the production of power driven pump, compressors and Machine Tools.
Name of C.E.O.	–	–	Shyam S. Kirloskar	Mr. Sanjay Kirloskar
Capital			4.5 Crs.	43.8 Crs.
Date of Establishment	1963			
Number of Employees				
Turnover of Machine Tool	59.94 Crores	–	5.84 Crores (1988/89)	96.4 Crores (8 months)
Average Annual Sales Growth Rate (1984/85 - 1989/90)	56.00 %	–	49.00 %	15.00 %
Profit Ratio	9.3 %	–	9.8 %	2.0 %
Sales Breakdown			CNC Turning Centers WUU 12 %	CNC VTL % CNC VBM %
Sales Network			Marketted through MKL Network.	
Sales Force				
Present State of Competition	Competes with HMT's PI 130, 180, 300, 400 models.		WSU 12 competes with SBCNC of HMT.	Currently operating out of HMT range.
History of New Product Development			Through collaboration.	Own development of CNC Vertical Boring Mills.
Technical Collaboration Please see Annexure-V	Klockner - Works DESHA, Germany		Warner Swassey, USA	
Future Product Development & Introduction into Market	Shoe moulding machines.		–	
Type of Strategy			Commercial terms.	
Degree of Threats to HMT in 1995 UH:Very High, H:High M:Medium, L:Low, UL:Very Low	H		H	L
Possible Threats or Challenge to HMT	H			When HMT enters into CNC VTL area.
Degree of Threats to HMT in 2000 UH:Very High, H:High M:Medium, L:Low, UL:Very Low	H		H	L
Possible Threats or Challenge to HTM			Same as MKL.	

2. International Market Analysis

(a) World market size and growth

The production value of the world machine tool industry has been steadily growing in the last five years and reached $46.6 billion in 1990, which was 61% higher than in 1986.

Exports and imports also grew accordingly and became 63% and 66% higher respectively.

Table IV-1-10 World Machine Tool Production & Trade

Unit: Million US$

Year	Production	Export	Import
1986	28,890.6	13,399.6	10,904.0
1987	33,081.5	15,196.8	13,010.4
1988	37,934.6	17,259.9	14,403.5
1989	42,057.6	18,908.1	15,724.1
1990	46,582.5	21,873.9	18,117.3

Source: American Machinist

(b) Major suppliers in the world

Japan, after surpassing West Germany in 1982, is the largest producer of machine tools in the world, followed by West Germany. These two countries together contribute more than 40% of total world production.

Italy, Taiwan and South Korea increased considerably their production in 1990, Taiwan became the tenth largest supplier in the world and South Korea 13th, while India reduced its production value, remaining in the same position, 21st. Inflation and the consequent devaluation of the rupee pushed down the production value in US dollars. On the contrary, re-evaluation of the NT dollar and the Won contributed to the sudden upswing of Taiwan and Korea.

Table: IV-1-11 Machine Tool Production by Country
Unit: Million US$

Country	1988	1990
Japan	6,872.2	10,832.1
West Germany	5,185.4	8,826.5
USSR	3,762.0	4,580.0
Italy	1,623.3	3,966.0
Taiwan	534.0	1,034.9
South Korea	452.9	733.3
India	269.8	243.5
Total	37,934.6	46,582.5

(c) Competition with East Asian countries

The important phenomenon in the global scene is that Taiwan and South Korea are drastically increasing their production capacity of CNC machines. (See Fig. IV-1-6.)

Among CNC machines, Taiwan put an emphasis on the production of machining centers, CNC turning centers/lathes and CNC milling machines, whereas South Korea concentrated on turning centers/lathes. Most of them seem to be for export.

China's production of CNC machines is stagnating due to the governmental policy binding new/additional investment since 1989. (See Fig. IV-1-12.)

In 1989, Taiwan produced NT$ 26.6 billion (Approx. US$ 1,011 million) of machine tools and 27.9% of it were CNC machines. The CNC machine ratio is estimated to have reached 40% by the end of 1990. 64% of the total production was exported and only 24% of the total exports were CNC machines. (See Table IV-1-13.)

NT$ 19.2 billion were from GPM's and 67.4% of the total GPM's produced in Taiwan were exported. The export amount of GPM's was almost $492 million and nearly 1.9

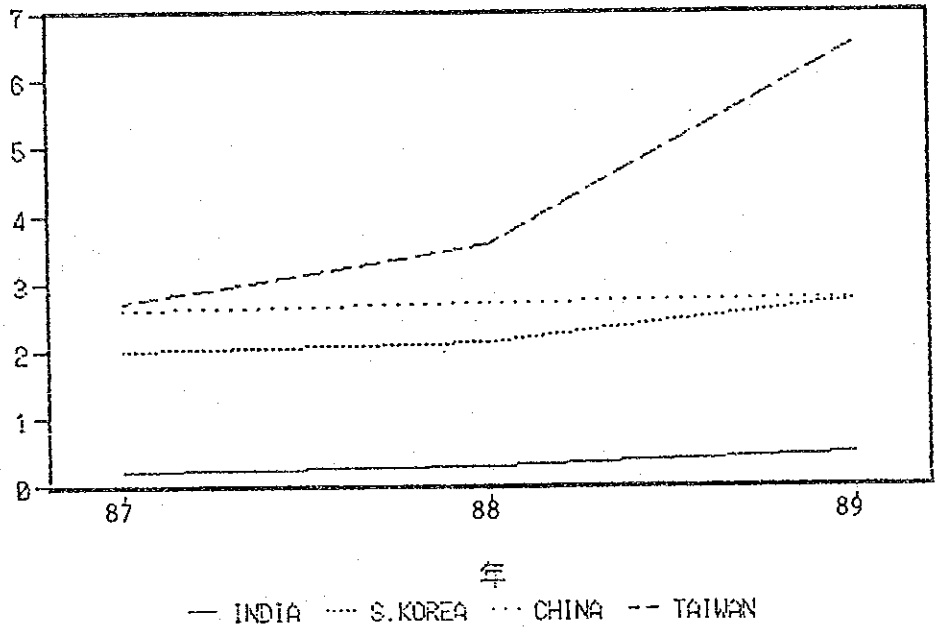
Table IV-1-12 Production of CNC Machines by Country/by Type of Machine

Unit: set

	Japan ('89)	Taiwan ('89)	Korea ('89)	India ('90)	USA ('88/Sale)
Machining Centers	15,016 (25.1%)	2,470 (37.8%)	572 (20.7%)	116 (20.7%)	1,770 (33.8%)
Lathe/Turning	27,041 (45.1%)	2,414 (36.9%)	1,952 (70.6%)	265 (47.3%)	1,763 (33.7%)
Milling	2,733	1,300 (19.9%)	94	33	654
Drilling	2,390	36	26	5	101
Boring	429	48	-	2	
Grinding	2,920	66	24	14	688
EDM	6,442	200	90	64	NA
Press	-	6	-	4	NA
Gear Hobbing	622	-	8	-	NA
Laser	649	-	-	-	NA
Other	1,630	-	-	-	254
TOTAL	59,872	6,540	2,766	560	5,230

Fig. IV-1-6 Comparison of CNC Machine Production

Unit: 1,000 sets



times as much as the total machine tool value produced in India in that year.

Approximately 40% of machine tools exported from Taiwan went to industrially advanced countries as shown in Table IV-1-14

Table IV-1-13 Machine Tool Production and Export in Taiwan

Unit: Million NT$

	1986	1987	1988	1989
Production	13,198	18,491	22,021	26,604
(GPM)	(10,506)	(15,833)	(17,194)	(19,185)
(CNC)	(2,692)	(3,658)	(4,827)	(7,419)
Export	9,404	12,158	14,202	17,005
(GPM)	(7,318)	(9,739)	(11,338)	(12,928)
(CNC)	(2,086)	(2,419)	(2,864)	(4,077)

Source: TAMI

Table IV-1-14 Destination of Machine Tool Export from Taiwan in 1989

Value: Million US$

Country	Amount
USA	133.4
UK	33.0
Italy	28.3
Japan	27.6
W.Germany	26.7
Others	397.8
Total	646.8

In 1989, South Korea produced 404.8 billion won (Approx. US$ 595 million) of machine tools and out of this, 41.6% were CNC machines. 19.4% of the total production was exported and 56.8% of the total exported amount were CNC machines.

Table IV-1-15 Machine Tool Production and Export in South Korea

Unit: Million Wons for Production
Million US$ for Export and Import

	1987	1988	1989
Production	323,646	353,253	404,821
(GPM)	(207,174)	(229,860)	(236,473)
(CNC)	(116,472)	(123,393)	(168,348)
Export	32.7	51.1	69.5
(GPM)	(10.1)	(16.9)	(30.0)
(CNC)	(22.6)	(34.2)	(39.5)
Import	340.7	464.3	679.0
(GPM)	(260.3)	(368.1)	(535.7)
(CNC)	(80.4)	(96.2)	(143.3)

Source: KOMMA

Table IV-1-16 Destination of Machine Tool Exports from South Korea in 1989 (Jan. - Nov.)

Unit: set of machines

	USA	JAPAN	W.Germany	UK	Whole World
CNC Turning	243	22	49	96	613
MC	52	27	56	7	165
GPM Lathe	579	260	38	48	1,099
GPM Milling	1	215	2	-	313
GPM Grinding	64	302	-	-	515
GPM Others	228	2,596	4	3	8,280
Total	1,167	3,422	149	154	10,985

(d) Future Direction

The production pattern in the world seems to be changing as show in Fig. IV-1-7.

In the export market, Taiwan and South Korea will be the toughest competitors for HMT in its product range.

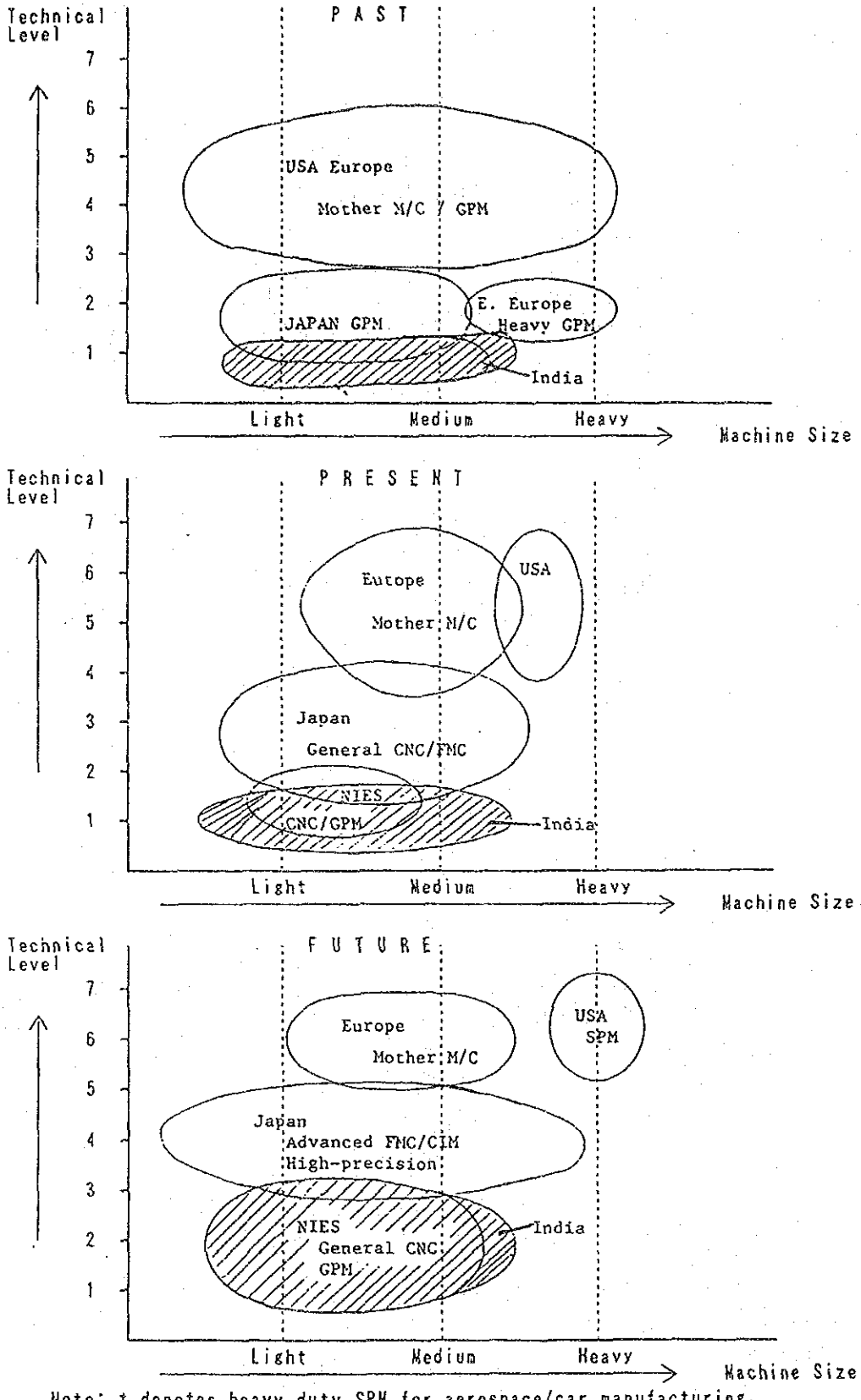
Taiwan and South Korea will concentrate more on the production of the so-called volume zone, so that they will be able to economize their production to realize a competitive price in the world market.

South Korea exports more CNC machines to the USA and Europe and more GPM's to Japan. At the same time, South Korea imports US$5million of GPMs and that can be the target market of HMT exports once the prices of HMT products become competitive.

In the case of CNC machines, those made in Taiwan or South Korea are said to be cheaper than those made in Japan made by 30-40%. It can hardly be feasible that HMT-made CNC machines will be competitive in the world market when their prices are almost equal to, or even more expensive than, the Japanese-made machines.

Accordingly, it is considered that GPM market has more potential than CNCs. But development of an active sales network, a reduction in cost and firm and quick deliveries are urgently required for the improvement of the export performance of HMT's GPM's.

Fig. IV-1-7 Product Shift in the World Machine Tool Industry



Note: ± denotes heavy duty SPM for aerospace/car manufacturing.
▨ indicates Indian machine tools.

B. Product Competitiveness Analysis

1. Price Competitiveness

(a) Domestic Sales Price

The prices of HMT's GPM machine tools are compared with the quoted prices of the machines of similar specifications and performance sold in the Japanese market including Chinese, Taiwan, Korean or Taiwanese machine tools in Table IV-1-17.

Quoted prices are used for the comparison because reliable data are not available for actual selling prices. In the Japanese market, discounts are a common trade practice. Actual prices tend to be considerably below the quoted price. They widely vary according to the buyer/seller relationship.

Table IV-1-18 shows the price comparison between HMT CNC machines and the Japan-made machines of similar specifications (on a quoted price basis). Japanese machine tools selected for the comparison are of similar specifications but of higher performance level.

For GPMs, the following are pointed out.

(1) The domestic sales price is competitive

Currently, high tariffs are imposed on imported machines under the protection policy of the Indian government and even with the lowering of the tariff in accordance with the inevitable free trade direction, HMT GPM prices would be competitive with the imports.

But internal competition with the Indian domestic manufacturers still exists, which certainly necessitates improvement in cost performance.

(2) There are considerable differences in cost performance among the HMT units.

Table IV-1-17 Price Comparison of General Purpose Machines (GPMs) of MTB

No	Model (Unit)	Specifications	Upper Column: 1991-92 Ex-works Price Lower Column: 1991-92 Export Prices FOB Indian Port		Price of Similar Machine Tool Sold in Japan (¥)
			(Rs.)	(¥)	
1	B32 (MTB)	Height of Centre:320 Dist.betw'n Centres:1500mm	800,000 621,000	4,400,000 3,415,500	4,000,000
2	L45 (MTB)	Height of Centre:450 Dist.betw'n Centres:3000mm	1,361,700 1,111,000	7,489,300 6,110,500	7,000,000
3	RM63 (MTB)	Maxdist Column to Sp.:1750mm Drill.Capacity: φ50mm	398,900 330,000	2,193,950 1,815,000	3,500,000
4	G17/1200U (MTB)	Height of Centre:175 Dist.betw'n Centres:1275mm	619,900 489,000	3,409,450 2,689,500	5,500,000
5	H250 (MTB)	Maxdist dia. of Gear:250mm Hob dia/length:130/150mm	1,116,400 1,210,000	6,140,200 6,655,000	6,000,000
6	FN1H (MTP)	Table:1070×230mm Speed,r.p.m:45-2000	199,700 164,000	1,098,350 902,000	2,000,000
7	FN2EV (MTP)	Table:1350×310mm Speed,r.p.m:35.5-1800	374,800 327,000	2,061,400 1,798,500	3,000,000
8	FN3U (MTP)	Table:1600×355mm Speed,r.p.m:35.5-1800	585,300 488,000	3,219,150 2,684,000	4,000,000
9	EM3H (MTP)	Table:1600×355mm Speed,r.p.m:35.5-1800	677,900 602,000	3,728,450 3,311,000	4,500,000
10	NH22 (MTK)	Height of Centre:220mm Dist.betw'n Centres:1500mm	325,700 252,000	1,791,350 1,386,000	2,500,000
11	NH26 (MTK)	Height of Centre:260mm Dist.betw'n Centres:3000mm	465,300 304,000	2,559,150 1,672,000	3,000,000
12	NL22 (MTK)	Height of Centre:220mm Dist.betw'n Centres:1500mm	268,700 214,000	1,477,850 1,177,000	2,200,000

13	NL26 (MTK)	Height of Centre:260mm Dist.betw'n Centres:1500mm	284,100 223,000	1,562,550 1,226,500	2,300,000
14	S－Pilote (MTK)	Automatic Multi-Cycle copying Dist.betw'n Centres:1000mm	976,000 773,000	5,368,000 4,251,500	7,000,000
15	AZ9 (MTH)	Sp.dia:φ40mm, Power:7.3kw(AC) Table size:900×1200mm	2,300,000 1,758,000	12,650,000 9,669,000	12,000,000
16	AZ11 (MTH)	Sp.dia:φ110mm, Power:10kw(AC) Table size:900×1200mm	2,500,600 1,918,000	13,753,300 10,549,000	13,500,000
17	GTC28 (MTA)	Swing:280mm Table cloming area:980×140mm	182,600 122,000	1,004,300 671,000	1,800,000
18	K130/500P (MTA)	Height of Centre:130mm Dist.betw'n Centres:550mm	376,600 292,000	2,071,300 1,606,000	2,500,000
19	GIF80/125 (MTA)	Max.grind.bore: φ80mm Max.grind.depth:100mm	1,109,800 830,000	6,103,900 4,565,000	6,500,000

Note: Rs.1=¥5.5
HMT prices are from the HMT Price List 1991-1992.

Table IV-1-18 Price Comparison of CNC Machines

No	Model (Unit)	Specifications	1991-92 Export Prices FOB Indian Port		Price of Japanese Machine Tool of Similar Specifications (¥)
			(Rs.)	(¥)	
1	STC15 CNC Lathe	Max turning dia: φ150mm Dist.betw'n Centres:600mm	2,131,981 1,700,000	11,725,895 9,350,000	9,000,000
2	STC25 CNC Lathe	Max turning dia: φ250mm Dist.betw'n Centres	2,952,489 2,472,000	16,238,689 13,596,000	11,000,000
3	HMC1000 Mach.Centre	Table size:1000 ×1000mm Sp.motor:150kw DC(conti.)	9,500,000 6,817,000	52,250,000 37,493,500	40,000,000

Note: Rs.1=¥5.5
HMT prices were obtained during the survey in June-July 1991.

MTP and MTK concentrate on production of standardized milling machines and lathes. The series models have been established as main product lines.

MTP has the FN series of the knee type milling machine, which is divided into three groups by size and horizontal-, vertical- and universal-types are prepared for each group. A total of 16 models are available in this series.

MTK has the NH series of high precision lathes, which are classified by the height of the center and by the distance between centers. A total of 8 models are available.

The use of modular components enables efficient economic production and mass-production at MTP and MTK, which definitely contributes to a reduction in cost.

MTA concentrates on the production of grinding machines, where standardization is not so prevalent, as compared to MTP and MTK.

MTH is carrying out the indigenous production of large-size products, in which cost performance efficiency is high.

At MTB, an excessive product mix obstructs efficient production system.

The price competitiveness of HMT's CNC machines seem to be very small. At present, there seems to be no way other than to rely on the government protection. The strengthening of the price competitiveness of CNC machines is of urgent priority.

(b) Price Competitiveness in Overseas Markets

i. GPMs

Potential markets

Only the USA has a potential for the GPM exports to the advanced countries.

Other potential markets are ASEAN counties, Africa, Oceania, the USSR and some East European countries.

Competitors

Asian NIES countries and China are major competitors of GPMs of HMT.

Price competitiveness of HMT products

HMT's GPM exports seem to hold prospects for FN and EM series of MTP and the NH and NL series of MTK.

The rest of the products would be difficult to export unless an exceptional export drive were to be generated in HMT.

ii. CNC machine tools

It seems difficult for HMT to export CNC machine tools because of its high cost as far it depends on Knock-Down production for core components and CNC control modules.

2. Competitiveness in Product Quality

Accuracy determines the quality of a machine tool. There are three important factors which realize high accuracy.

(1) Higher accuracies of mother machines and of finishing machines.

(2) Use of measuring equipment and their reliability.

(3) High consciousness among engineers on accuracy concepts.

According to the results of the survey on HMT machine tool factories, the above three factors are almost satisfied at HMT.

Major findings on the product quality level of HMT are as follows.

i. Scheduled maintenance on the critical machines

The principal mother machines and finishing machines are designated as the critical machines, and the scheduled maintenance of those machine is carried out although they are superannuated.

ii. Precision measuring

There are first class instruments of Zeiss, SIP in air-conditioned (temp. 20°C, humidity 60%) areas. Periodic recalibration of the micrometers and calipers is standard.

iii. Inspection results and the accuracy standards

For such major parts as main spindle, lead screw, gears and beds, all the parts are inspected, and measured data are recorded in the inspection records.

Accuracy inspection after the assembly is carried out in accordance with the accuracy standards of DIN.

An example of the defect ratios is indicated in Table IV-1-19. Similar data are available for other units. As far as this data indicates, the quality is at the acceptable levels.

However, for CNC machines, the number of defects and the warranty cost are exceptionally significant when compared with GPMs according to the data from MTP. This indicates the necessity of R&D efforts in CNC machines.

Table IV-1-19 Indicators of Quality at MTP

Year	No. of defects per machine		Warranty Cost per machine (Rs.)		Standard Hours lost due to rejection (%)
1989-90	GPM	1.00	GPM	336/-	1.8
(Recent record)	CNC	4.2	CNC	12,217/-	
1990-91	GPM	0.9	GPM	210/-	1.5
(Recent record)	CNC	3.72	CNC	7,200/-	
1991-92	GPM	0.72	GPM	170/-	1.3
(Target)	CNC	3.00	CNC	5,750/-	

C. Production Facility and Product Technology Assessment

1. Production Facility

As the common features of production facility in the Machine Tool Units including PRAGA TOOLS, the following are pointed out. They are the most serious problems in HMT at present.

(1) Extensive superannuation.

(2) Extremely low number of installed CNC mother machines, except at the CNC factory of PRAGA TOOLS.

To cite an example, the key indicators of production facility at MTP are shown as follows. The situation at MTK, MTA, MTH MTB and PTH is quite similar, which is a serious problem.

The Situation of MTP Production Facility

(1) Age of machinery

Age	Percentage
1 - 5 Years	3 %
5 - 10	4
10 - 15	6
15 - 20	3
Over 20	80

(2) Ratio of CNC Machines to the total: 3 %

2. Product Technology

It is quite difficult to evaluate the product technology of individual model of machine tools for all the products because HMT's product range is wide and diversified. Therefore, in this survey, the level of product technology of each unit as a whole is evaluated.

The level of product technology is evaluated from the viewpoint of accuracy and productivity.

The results of evaluation are as shown in Table IV-1-20. It is seen that, for accuracy, all the units are at the similar level, which is practically close to that of Japanese manufacturers. For productivity, all the units are far behind the Japanese level. At the same time, there is a large difference among units. MTP receives the highest score for productivity, followed by MTK and PTH.

3. Production Technology

The overall level of production technologies at each unit is evaluated based on the answers to the questionnaire which consists of questions of the following 7 categories:

(1) production control
(2) quality control
(3) maintenance control
(4) working environment
(5) storage control
(6) production technology, and
(7) design department.

The checklist for the evaluation of production technology is shown in Table IV-1-21.

Table IV-1-22 indicates the results of evaluation of the production technology. The production technology of HMT units are scored assuming that the average level of top Japanese machine tool manufacturers is 100.

Table IV-1-20 Level of Product Technology *

(A) Unit Level

Unit	Accuracy Level	Productivity Level**
MTB	95	25
MTK	95	50
MTP	95	55
MTH	95	40
MTA	95	25
PTH	95	45

(B) Product Level

Product	Productivity Level
Flexible Manufacturing Cell: FMC-600	100
CNC Cylindrical Grinding Machine: GNC18	90
CNC Turn Mill Centre: GDM	95
NC Turning Centre: SB CNC	95
CNC Slant Bed Turning Centre: STC25	95
Horizontal Machining Centre: HMC	95
Vertical Machining Centre: VMC/VTC	90
CNC Milling Machine: FN2V CNC	85
Heavy Duty Lathe: L45	15
Drum Turret Lathe: RTV	25
High Speed Predision Lathe: NH22/26	25
Milling Machine: FN2	25
Milling Machine: EM3	25
Radial Drill: RM	20
Tool & Cutter Grinding Machine: GTC	15
Internal Grinding Machine: GIF	20
Vertical Special Surface Grinding Machine:GV	20
Hydraulic Cylindrical Grinding Machine: K130	25
Gear Hobber: H250	30
Horizontal Boring & Milling Machine: AZ	35
Multi-Special Drill (SPM)	75

Note: * The level of top ranking Japanese machine tool manufacturers is designated as 100.

** For the unit level evaluation, the wighted averages are shown.
The weighted average of each unit =

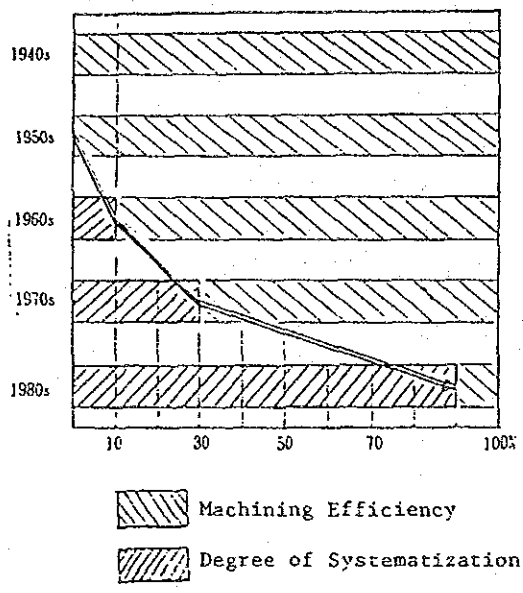
$$\frac{\Sigma \text{ (Productivity level of each model} \times \text{No. of machines produced of each model)}}{\text{Total number of machines produced at each unit}}$$

Table IV-1- 21 Notes on the Evaluation Methodology of Product Technology and Production Technology

A. Product Evaluation

The productivity of machine tool is measured by the degree of systematization and FA (weighted 90%) and the machining efficiency (weighted 10%).

Changes of Components of Productivity



The concept of productivity or, in other words, the measuring scale of productivity of machine tool has significantly changed along with the development of factory automation directing to labor-saving and unattended operation.

The productivity of machine tool was at first measured by the machining efficiency, i.e., "How many components can be produced?" The difference of such mechanical specifications as main axis r.p.m. or feeding speed has become very small or undistinguishable among major manufacturers. On the other hand, the increasing importance has been placed on the labour-saving and unattended operation, i.e. "How is manpower saved?", in measuring the efficiency.

The chart shown left indicates the transition of the above, where in the 1940s - 50s, the productivity was measured solely with the machining efficiency, in the 1960s, the degree of FA and systematization gradually took over, and finally in the 1980s, the productivity was measured mostly by the degree of FA and Systematization.

B. Checklist of Production Technology Evaluation

1. Production Control
 a. Computor Utilization
 b. Lead Time
  -How many months?
  -How many intermediate products?
2. Quality Control
 a. TQC
  -How far? How active?
 b. Inspection and Measuring Instruments
  -Precision Measuring Space
  -Air-conditioned Environment
  -Instruments
  -Periodic inspection System
 c. Accuracy Control
  -Measuring Items and Measuring Scheme
  -Recording System
3. Maintenance Control
 a. Maintenance
  -Periodic?
  -Mother Machine Accuracy Check and its intervals
 b. L.O. Control
  -Centralized control
  -Replacing Timing
4. Working Environment
 a. 4S Activity
 b. Machine Cleaning
 c. Component Inventory Control Status
 d. Safety Precaution, Uniform
5. Storage Control
 a. Automatic Storage System
  -NC Store
  -Semi-automaticStore for Pick-up System
  -Mechanization in Material Handling
  -Fork-Lift Utilization
 b. Inventory Contorl
  -Inventrory Months
  -Auxiliary Inventories (Bolts, Nuts, Small Screws)
 c. Space
  -Floor Space of the Store
  -Ratio of the Store Floor Area to the Total Factory Space
 d. Finished Products Storage
  -Time from Assembly Completion to Dispatch
  -The ratio of space for finished products (including space for dispatch preparation, tool setting, and testing) to total facory floor
6. Production Technology
 a. CNC Machine
  -How many?
  -CNC Percentage to the Total Machine
 b.Automation Functions (Accessory Equipment)
  -Utilization of:
   Cutting Monitoring
   Auto-detection of Tool Breakout
   Automatic Gauging and Compensation
   Tool Life Calculation/ Cumulative
   Robots
   Automatic Loading and Unloading
   Automatic Chip Removal
 c. FMC & FMS
  -Numbers of installed sets
  -Software level
 e. Clean Shop
  -Floor Space
  -Ratio to total factory floor
7. Design Dept.
 a. CAM, CAD
  -What is the progress?
  -How active?
  -How many drawing output per day?
  -Where does software come from?
 b. Drawing Control
  -Micro-film storage
  -Automatic submittance system