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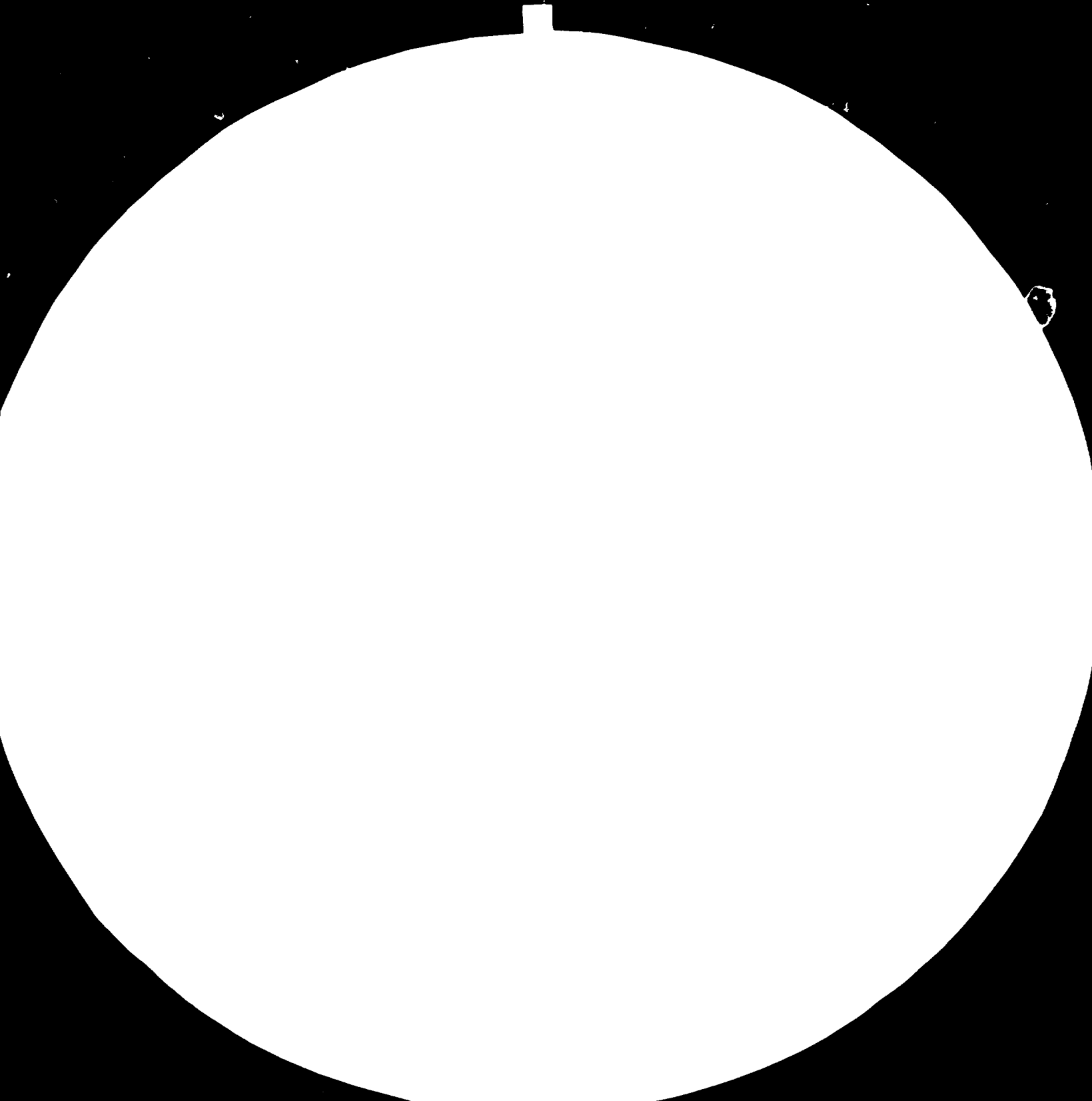
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1 NOVEMBER 1983.

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Turkey.

PROGRAMMING OF THE DEVELOPMENT
OF CAPITAL GOODS INDUSTRY.

DP/TUR/76/034

TURKEY

Terminal Report

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

Based on the work of M.M. Luther
C.ENG., F.I.MECH.E. (LOND), F.I.PROD.E. (LOND),
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United Nations Industrial Development Organization
Vienna

1766

This report has not been cleared with the United Nations Industrial Development Organization which does not, therefore, necessarily share the views presented.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 3

LIST OF CONTENTS

	<u>Page</u>
1. List of Annexures. -----	4-7
2. Explanatory notes. -----	8-9
3. Introduction -----	10-11
4. Abstract. -----	12
5. Company visits and Training. -----	13
6. Chapter I - Objectives and Background of the Project,-----	14-17
7. Chapter II - Rationale of Project Plan - Its Priorities and Strategy,-	18-24
8. Chapter III - Brief Outline of Methodology, -----	25-39
9. Chapter IV - Activities and Outputs, -----	40-54
10. Chapter V - Factors Related to Achievement of Immediate Objectives.--	55-59
11. Chapter VI - Phasing of Capital Goods Industry, -----	60-61
12. Chapter VII - Recommendations for Increasing Productivity of Capital Goods Manufacturing Enterprises, -----	62-69
13. Chapter VIII - Exports -----	70-71
14. Chapter IX - Utilisation of Project Results,-----	72-75
15. Chapter X - Conclusions and Recommendations, -----	76-85

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 4

LIST OF ANNEXURES

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UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 5

Ann. III - <u>Equipment for project</u>	<u>Received on</u>
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(2) Copier.	Feb. 83
(3) Car Peugeot.	Apr. 80
(4) Calculator with memory.	Sep. 80

Ann. IV. - Technical Reports

- 1- Report on pilot study for industry survey by TSKB.
- 2- Macro level study on Industrial growth in 3rd. and 4th. Five Year Development Plans in public and private sectors.
- 3- Development of Capital Goods Industry in a Mixed-Economy The Turkish case by CTA.
- 4- Report on data bank for ancillary industries by CTA.
- 5- Technical Report No. I - Methodology for planning of Capital Goods Industries in Turkey by CTA.
- 6- Technical Report No. II- Role of GERKONSAN in meeting demand for steel fabrication by CTA.
- 7- Technical Report No. III- Manufacture of Diesel Engines in Turkey by CTA.
- 8- Technical Report No. IV- Capacity and potential of Consultancy Organizations in Turkey by CTA
- 9- Technical Report No. V - Tractors and Tractor Diesel Engines by CTA.
- 10- Technical Report No. VI- Light duty diesel engines by CTA.
- 11- Technical Report No. VII- Transmissions by CTA.
- 12- Technical Report No. VIII- Diesel engine industry in Turkey by CTA
- 13- Technical Report No. IX- Capital Goods demand for Cement Industry (2 Vols. Vol. II in 2 parts).

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY.

Page 6

- 14- Technical Report No. X - Capital Goods Demand for Sugar Industry (2 vols)
- 15- Technical Report No. XI - Capital Goods Demand for Petrochemicals Industry (15 Vols)
- 16- Technical Report No. XII- Capital Goods Demand for Fertilizer Industry (9 vols)
- 17- Technical Report No. XIII-Machine Tools with Special Reference to TAKSAN.
- 18- Technical Report No. XIV -Capital Goods Demand for Pulp and Paper Industry with Special Reference to SEKA.
- 19- Technical Report No. XV - Demand for Capital Goods for Iron ore mining.
- 20- Technical Report No. XVI- Demand for Capital Goods for Non-Ferrous Ores and mineral mining sector, boric acid and boron compounds with special reference to ETIBANK. (3 Volumes)
- 21- Technical Report No. XVII-Demand for capital goods for Coal Mining (2 Vols)
- 22- Technical Report No. XVIII-Demand for Power Generation, Transmission and Distribution equipment. (8 Volumes)
- 23- Technical Report No. XIX- Demand for Capital Goods on earth moving machinery with special reference to MKEK's project for manufacture of these machines.
- 24- Technical Report No. XX - Demand for capital goods for Electro-mechanical Industry with special reference to TEMSAN.
- 25- Technical Report No. XXI -Policy Guidelines for promotion of capital goods sector.
- 26- Technical Report No. XXII-Capacity for capital goods manufacture in State Enterprises-Sugar Machinery Manufacturing Plants.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 7

27- Technical Report No. XXIII - Demand for capital goods in Fertilizer
Industry (Rev.I)

28- Technical Report No. XXIV - Demand and capacity for rolling stock in
Turkish Railways by CTA.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 8

EXPLANATORY NOTES

1. The value of Turkish Lira underwent heavy devaluation during the project period. On 1.10.79 1 US \$ = 47,10 T.L, and 1.10.83 1 US \$ = 245 TL.

2. ABBREVIATIONS

- SPO - Devlet Planlama Teşkilatı, (DPT),
State Planning Organization.
- TSKB - Türkiye Sanayi Kalkınma Bankası,
Turkish Industrial Development Bank.
- TEK - Türkiye Elektrik Kurumu,
Turkish Power Authority.
- TEMSAN - Türk Elektromekanik Sanayii,
Turkish Electromechanical Industry.
- ETIBANK- Türk Bankacılık, Madencilik, Metalurji Kurumu
Turkish Mining and Metallurgy Industrial Bank.
- TKİ - Türkiye Kömür İşletmeleri
Turkish coal works.
- TDCİ - Türkiye Demir Çelik İşletmeleri
Turkish Iron and Steel Works.
- SEKA - Seluloz, Kağıt Endüstrisi,
Pulp and Paper Industry.
- CIMENTO- Çimento Sanayii,
Cement Industry.
- AZOT - Nitrogen Industries Cooperation.
Fertilizers and pesticides.
- TCDD - Türkiye Cumhuriyeti Devlet Demiryolları,
Turkish Railways.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 9

- TAKSAN - Takim Tezgahlari Sanayii,
Turkish machine tool industry.
- MKEK - Makina Kimya Endustrisi Kurumu,
Machine and Chemicals industry.
- TUMOSAN - Turkiye motor sanayii,
Turkish Motor Industry.
- GERKONSAN - Gerece Konstruksuyon Sanayii,
Gerece Construction Industry.
- SITC - Standard International Trade classification.
- ISIC - International Standard Industry Classification.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 10

INTRODUCTION

The Turkish Government considers capital goods development of crucial importance for the industrial and technological development of Turkey. In addition considering the large potential of technical skills available in the country, it was felt that considerable exports of machinery and plant could be generated if there is a scientific and logical plan for rapid growth of this sector. The project was conceived to develop and implement such a plan which included evolution of a unique methodology for planning - and training local experts for continued application of this methodology.

FUNDS

The total budget for the project according to the latest revision was \$ 530.633 out of which \$ 150.000 was the cost sharing contribution. The Government of Turkey also provided office accommodation, local experts and met running costs of one project car. The original project document was approved on 14.5.79, 13.7.79 and 25.6.79 by UNIDO, UNDP and the Government of Turkey respectively. A revision was approved by these agencies on 16.9.82, 30.12.82 and 21.12.82 respectively.

The revision of Prodoc included a modification of immediate objectives which were made more explicit in the field of planning and drawing up demand-capacity balances but which excluded the project promotion aspect. This was mainly due to the fact that in the immediate future most of investment in capital goods was expected to be in projects which in different forms and stages were already either under consideration or implementation.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 11

The project activities therefore, concentrated for the purpose of investment promotion on a pragmatic approach leading to changes in plans, priorities and product-mix of these projects instead of fresh feasibility studies conceived in the original prodoc.

All the immediate objectives have been achieved in time.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 12

ABSTRACT

The Project titled "Programming of Development of Capital Goods Industry in Turkey" and bearing number DP/TUR/76/034 was intended to design a scientific, flexible methodology for projecting sectoral demands of capital goods based on international codes for priority process industries, service industries (Railways), general purpose machines and infrastructure such as castings and forgings. This involved evolution of 15 digit codes for machinery and plant based on 5 digit SITC Rev.2 and 9 digit codes for industries and their parameters based on 4 digit ISIC codes. Demands were worked out project by project for each industry and data entered into the computer files as inputs for a variety of outputs for different kinds of analysis for the purpose of investment decisions. The project work has been effectively utilised in SPO for planning of capital goods industry in the State Sector including change of product mix in existing plants and modification of proposals in those under construction or in the pipeline.

Project methodology has also been used for planning of infrastructure-castings and forgings - mostly in the private sector.

It is recommended that the SPO should make permanent arrangements for a capital goods development cell which will continuously update the demand-capacity balances whenever there are changes of priorities or character of projects.

UNITED NATIONS

NATIONS UNIES

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 13

COMPANY VISITS

During the pendency of the project Chief Technical Adviser visited all the SEE's and most of the major private sector units engaged in machine building . Other international experts visited the units related to areas handled by them.

TRAINING

Nearly 80 local experts participated on a part time basis in the project and were fully trained in the use of the methodology developed by the Chief Technical Adviser. In Jan. 83 three local experts were posted full time with the project. They are well versed in applying the methodology for future planning / monitoring progress of / and capital goods industry.

SUGGESTED ACTION BY UNIDO

It is recommended that UNIDO may use methodology for industrial planning in general and capital goods planning in particular in other countries. A manual prepared by CTA has been published by UNIDO - (Publication No. UNIDO/10,548).



CHAPTER I

OBJECTIVES AND BACKGROUND OF THE PROJECT

1.1 The immediate objectives of the project as indicated in the revision of Project Document proposed by UNDP are as under:

- (i) To design a scientific, flexible methodology for projecting sectoral demands of capital goods based on international codes for special purpose machinery, for priority process industries, service industries (Railways) for general purpose machines and infrastructure facilities such as castings and forgings.
- (ii) Classification and codification of all capital goods relevant to selected sectors to suit technological parameters anticipated to be used in Turkish Industry in future.
- (iii) Adaptation and application of classification and codification system for process industries to each selected industrial sector.
- (iv) To conduct an indepth study of selected new investment proposals for capital goods in the



state sector.

- (v) To compute demands of capital goods as codified, for selected priority sectors.
- (vi) To aggregate above sectoral demands with the help of a computer programme from the point of view of manufacturing facilities.
- (vii) To analyse the present and proposed capacity for capital goods in selected public sector establishments in the context of anticipated national demand.
- (viii) To study policy considerations for development of capital goods industry in Turkey.

1.2 BACKGROUND OF THE PROJECT

1.2.1 The Capital Goods Sector is considered of crucial importance for the industrial and technological development of Turkey, and the Turkish Government has already announced its emphasis on accelerated industrialisation, with a substantial portion of the new investments going to infrastructure and equipment industries.



1.2.2 It is increasingly being recognised in Turkey that the growth of the Capital Goods Sector is an essential link in the chain of industrial and technological progress, and that rapid, planned expansion of this sector represents a critical stage in the country's industrial growth. The machine-building sector is among the most dynamic sectors of manufacture, covering as it does, the production of mechanical, electrical and transport equipment in various production sectors.

1.2.3 This project aimed to provide a model frame for determining the present situation in the capital goods industry, supplying the means and tools for fast development of the industry, and to open the way for lessening external dependency. The project was designed to assist in establishing a system and methodology for the planning of the capital goods sector in Turkey which is seen as an on-going activity within the framework of planning for the industrial sector. Additionally, a group of local experts was expected to be trained in the methods of systematic analysis relevant to this exercise. Recommendations for full utilisation of existing capacity and on the projects in the pipeline were expected to emerge from the proposed studies.



1.2.4 The original project document provided for analysis of gaps between demand and capacity and a series of feasibility studies to be carried out with the association of international exports. With a large number of machine building projects already in the pipe-line in the State sector, emphasis was placed on working out afresh, the demand of Capital Goods in a scientific manner and to then analyse the already conceptualised projects in the context of these demand projections.



CHAPTER II

RATIONALE OF PROJECT PLAN-ITS PRIORITIES AND STRATEGY

2.1. BASIC CONSIDERATIONS

2.1.1. Programming of capital goods manufacture involves simultaneous consideration of a large number of independent parameters. Quite often decision on setting up new projects for machine building get taken on the basis of ad-hoc considerations, such as requirements of one or two user sectors. While this method is partially valid for some such finished capital goods as are peculiar to a particular industry (for example capacity for finish-machining of steel capacity), the problem gets a little complex when conceptualising quantitative and qualitative aspects of capacity for basic manufacturing operations (eg. steel fabrication, castings, forgings) which are common to a large number of capital goods for different user industries. For example, rolling mills for steel require heavy steel castings and forgings but so do, equipment for mining, power generation and other sectors. Forward and backward linkages of manufacturing capacities in the context of demand and supply of a large variety of capital goods thereof is inescapable.

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY



- 2.1.2. Different methodological approaches have to be used for different types of capital goods. For example, while demand analysis of capital goods for process industries can be based on demand pattern of commodities and goods they produce, requirements of general purpose machines like metal cutting machine tools have to be based on macro-level economic parameters like GNP. Similarly when a casting or forging in large quantities is required to a design which needs special manufacturing facilities (eg. diesel engines for automobiles) a relationship has to be built up between the user sector and different elements of production of their capital goods.
- 2.1.3. An initial problem that the project faced was the depth to which an analysis of demand and capacity should be conducted. Considerable experience and foresight is required to ensure that any programme developed to take into account a large number of some mutually dependent and some independent parameters does not go into such details as to defeat the objective of a macro-level approach and become counter-productive from the point of view of immediate objectives of the project and yet provides adequate data, with reasonable accuracy, to make it possible to give detailed technoeconomic consideration to alternative investment possibilities. A constant interaction by UNIDO and SPO coordinators with various teams working on the project to ensure that their work remains on course and is conducted in such a manner as to be pragmatic and realistic

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

in its output was the most critical factor in the success of the project. The entire approach to the capital goods development project in Turkey has been guided by these basic concepts.

2.2. USE OF INTERNATIONAL CODES

Two international codes have been used as the basis for programming of capital goods in Turkey. The "International Standard Industries Classification (ISIC) of All Economic Activities" has been used for classifying and codifying parameters of industries and the "Standard International Trade Classification Rev.2(SITC)" for classifying and codifying the capital goods. Details of use of these codes and their elaboration to suit the Turkish industries are given in the relevant Technical reports.

2.3. PRIORITIES

Page 21 gives a list of major divisions, divisions and major groups of industries covered by the ISIC code. Considering constraints of time and resources it was recommended to SPO that a selective approach may be adopted to identify high-priority sectors. Simultaneously it was felt that urgent consideration should be given to the infrastructure required for the growth of the Capital Goods Industry. National priorities of selected user industries, already-identified machine building industries and the infrastructure are shown on page 22. At this stage, the project is not covering electronics. It was however felt that if other specialist machinery items, justifying, for a variety of reasons, separate plans for their

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY



Major Division	Title of category	Major Division	Title of category
<u>Major Division 1. Agriculture, Hunting, Forestry and Fishing</u>		39	390 Other Manufacturing Industries
11	Agriculture and Hunting	<u>Major Division 4. Electricity, Gas and Water</u>	
111	Agricultural and livestock production	41	410 Electricity, Gas and Steam
112	Agricultural services	42	420 Water Works and Supply
113	Hunting, trapping and game propagation	<u>Major Division 5. Construction</u>	
12	Forestry and Logging	50	500 Construction
121	Forestry	<u>Major Division 6. Wholesale and Retail Trade and Restaurants and Hotels</u>	
122	Logging	61	610 Wholesale Trade
13	Fishing	62	620 Retail Trade
<u>Major Division 2. Mining and Quarrying</u>		63	631 Restaurants and Hotels
21	210 Coal Mining	632	632 Restaurants, cafes and other eating and drinking places
22	220 Crude Petroleum and Natural Gas Production	632	632 Hotels, rooming houses, camps and other lodging places
23	230 Metal Ore Mining	<u>Major Division 7. Transport, Storage and Communication</u>	
29	290 Other Mining	71	710 Transport and Storage
<u>Major Division 3. Manufacturing</u>		711	711 Land transport
31	310 Manufacture of Food, Beverages and Tobacco	712	712 Water transport
311-312	311-312 Food manufacturing	713	713 Air transport
313	313 Beverage industries	719	719 Services allied to transport
314	314 Tobacco manufactures	72	720 Communication
32	320 Textile, Wearing Apparel and Leather Industries	<u>Major Division 8. Financing, Insurance, Real Estate and Business Services</u>	
321	321 Manufacture of textiles	81	810 Financial Institutions
322	322 Manufacture of wearing apparel, except footwear	82	820 Insurance
323	323 Manufacture of leather and products of leather, leather substitutes and fur, except footwear and wearing apparel	83	830 Real Estate and Business Services
324	324 Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear	831	831 Real estate
33	330 Manufacture of Wood and Wood Products, Including Furniture	832	832 Business services except machinery and equipment rental and leasing
331	331 Manufacture of wood and wood and cork products, except furniture	833	833 Machinery and equipment rental and leasing
332	332 Manufacture of furniture and fixtures, except primarily of metal	<u>Major Division 9. Community, Social and Personal Services</u>	
34	340 Manufacture of Paper and Paper Products, Printing and Publishing	91	910 Public Administration and Defence
341	341 Manufacture of paper and paper products	92	920 Sanitary and Similar Services
342	342 Printing, publishing and allied industries	93	930 Social and Related Community Services
35	350 Manufacture of Chemicals and Chemical, Petroleum, Coal, Rubber and Plastic Products	931	931 Education services
351	351 Manufacture of industrial chemicals	932	932 Research and scientific institutes
352	352 Manufacture of other chemical products	933	933 Medical, dental, other health and veterinary services
353	353 Petroleum refineries	934	934 Welfare institutions
354	354 Manufacture of miscellaneous products of petroleum and coal	935	935 Business, professional and labour associations
355	355 Manufacture of rubber products	939	939 Other social and related community services
356	356 Manufacture of plastic products not elsewhere classified	94	940 Recreational and Cultural Services
36	360 Manufacture of Non-Metallic Mineral Products, except Products of Petroleum and Coal	941	941 Motion picture and other entertainment services
361	361 Manufacture of pottery, china and earthenware	942	942 Libraries, museums, botanical and zoological gardens, and other cultural services not elsewhere classified
362	362 Manufacture of glass and glass products	949	949 Amusement and recreational services not elsewhere classified
369	369 Manufacture of other non-metallic mineral products	95	950 Personal and Household Services
37	370 Basic Metal Industries	951	951 Repair services not elsewhere classified
371	371 Iron and steel basic industries	952	952 Laundries, laundry services, and cleaning and dyeing plants
372	372 Non-ferrous metal basic industries	953	953 Domestic services
38	380 Manufacture of Fabricated Metal Products, Machinery and Equipment	959	959 Miscellaneous personal services
381	381 Manufacture of fabricated metal products, except machinery and equipment	96	960 International and Other Extra-Territorial Bodies
382	382 Manufacture of machinery except electrical	<u>Major Division 0. Activities not Adequately Defined</u>	
383	383 Manufacture of electrical machinery apparatus, appliances and supplies	0	000 Activities not adequately defined.
384	384 Manufacture of transport equipment		
385	385 Manufacture of professional and scientific and measuring and controlling equipment not elsewhere classified, and of photographic and optical goods		

NATIONAL PRIORITIES

USER INDUSTRIES

1. POWER
 Generation
 Distribution
 Transmission
2. MINING { FERROUS NON-FERROUS }
 { COAL CHEMICALS }
3. PULP & PAPER
4. CEMENT
5. FOOD & BEVERAGES
6. CHEMICALS & PETROCHEMICALS
7. FERTILISERS & PESTICIDES
8. RAILWAYS

Whose capital goods require for manufacture

MACHINE BUILDING INDUSTRIES

- MACHINE TOOLS METAL CUTTING
- " " " FORMING
- DIESEL & PETROL ENGINES
- ELECTRIC MOTORS & INDUSTRIAL MACHINERY
- PUMPS & COMPRESSORS

Which require for manufacture

FACILITIES FOR HIGH ACCURACY MACHINING & ASSEMBLY

AND

INFRASTRUCTURE
STEEL FABRICATION
CASTINGS
FORGINGS
ELECTRONICS

AND

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY

Page 22

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CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

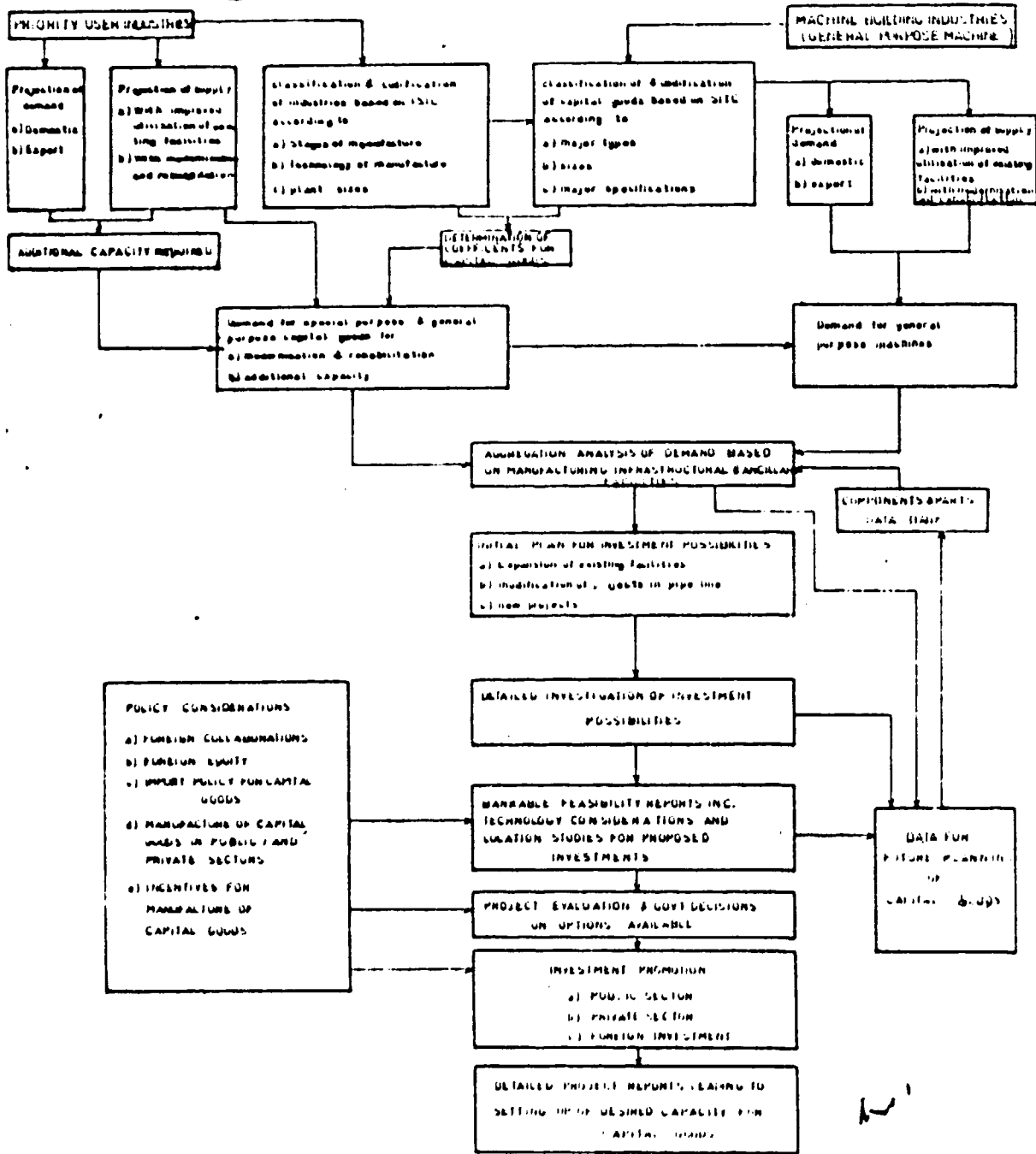
manufacture get identified, they may get added to the machine building industries' list.

2.4 STRATEGY AND CONCEPTUAL FRAMEWORK OF METHODOLOGY

2.4.1 The project is following well-defined, coordinated steps to achieve its immediate objectives. The scientific approach using international coding systems, elaborated to suit the Turkish environment with a relatively simple mathematical model for macro level planning of investment opportunities is novel and has immense potentiality for use in other developing countries.

2.4.2 The strategy presented by CIA to the SPO and approved is on Page 24 .

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY
 CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY
 STRATEGY



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CHAPTER III

BRIEF OUTLINE OF METHODOLOGY

3.1 METHODOLOGY FOR PROCESS INDUSTRIES

3.1.1. Different concepts were used by the Capital Goods Development Project teams for working out future demands of capital goods in different types of industries. This section briefly outlines the methodology as developed for process industries. The technology and plant size for each plant were considered and a mathematical model developed. The data was codified under 15 digit codes and information transferred on to a computer programme. Using a computer system, it is possible to identify common items and to readily establish requirements first for each plant, then for the particular industry and finally for all industries.

Estimated cost data for each item has also been included in the programme.

Instruments and electrical requirements are not included in this study.

3.1.2 CLASSIFICATION OF INDUSTRY

3.1.2.1. COMMODITY CLASSIFICATION

The 4 digit Industrial Standard Industrial

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Classification of all Economic Activities of United-Nations (ISIC) has been used as the basis for classification of different parameters of industry to suit the Turkish conditions. A fifth digit has been added to identify the specific commodity under consideration. All products considered were classified and their details have been given in the technical reports dealing with relevant sectors. ISIC codes, as modified, for products considered are on pages 27 to 29.

3.1.2.2. MODULAR PRODUCTION CHART

This chart shows the use of raw materials, the resultant intermediate products, by-products, waste products and of course the final products.

It does not take into account the process used nor the type of machinery or plant capacities. The main products and by-products are indicated in a square and the waste products in an ellipse. Full lines joining any two represent a production module in which the machine pool exists. In case of more than one entry to the same



ISIC CODES FOR COMMODITIES

- 2100 - COAL MINING
 - 2100-1 - Lignite

- 2301 - IRON ORE MINING
 - 2301-1 - Iron ore

- 2302 - NON-FERROUS ORE MINING
 - 2302-1 - Copper
 - 2302-2 - Aluminium
 - 2302-3 - Silver
 - 2302-4 - Chromium
 - 2302-5 - Tungsten
 - 2302-6 - Uranium
 - 2302-7 - Mercury
 - 2302-8 - Lead and Zinc
 - 2302-9 - Antimony

- 2901 - STONE QUARRYING, CLAY AND SAND PITS
 - 2901-1 - Limestone

- 2902 - CHEMICAL AND FERTILIZER MINERAL MINING
 - 2902-1 - Phosphate
 - 2902-2 - Baryte
 - 2902-3 - Sulphur
 - 2902-4 - Borate
 - 2902-5 - Pyrite

- 2909 - MINING AND QUARRYING NOT ELSEWHERE CLASSIFIED
 - 2909-1 - Perlite

ISIC CODES FOR COMMODITIES

- 3118 - SUGAR FACTORIES AND REFINERIES
 3118-1 - Sugar
- 3411 - MANUFACTURE OF PULP, PAPER AND PAPERBOARD
 3411-1 - Printing and writing paper
- 3511 - MANUFACTURE OF BASIC INDUSTRIAL CHEMICALS
 EXCEPT FERTILIZERS
 3511-1 - Caustic soda
 3511-2 - Soda Ash
 3511-3 - Chlorine and HCL
 3511-4 - Calcium carbide
 3511-7 - Boric acid and Boron compounds
- 3512 - MANUFACTURE OF FERTILIZER AND PESTICIDES
 3512-1 - Ammonia from coal
 3512-2 - Ammonia from naphtha
 3512-3 - Sulfuric acid
 3512-4 - DAP
 3512-5 - Urea
 3512-6 - Phosphoric acid
 3512-7 - Nitric acid
 3512-8 - Ammonium nitrate
- 3513 - MANUFACTURE OF SYNTHETIC RESINS, PLASTIC MATERIALS AND
 MAN-MADE FIBRES (EXCEPT GLASS)
 3513-1 - (NSC) - Naphta steam cracking plant
 3513-2 - (CA) - Chlorine-Alkali
 3513-3 - (VCM) - Vinyle chloride monomer
 3513-4 - (PVC) - Polyvinyle chloride
 3513-5 - (PELD) - Polyethylene Low Density
 3513-6 - (PEHD) - Polyethylene High Density
 3513-7 - (PP) - Polypropylene
 3513-8 - (Styrene) - Styrene
 3513-9

ISIC CODES FOR COMMODITIES

- 3514 - ADDITIONAL CODE FOR MANUFACTURE OF SYNTHETIC RESINS,
PLASTIC MATERIALS AND MAN-MADE FIBRES (EXCEPT GLASS)
- 3514-1 - (ACN) - Acrylonitrile
- 3514-2 - (ABS) - Acrylonitrile Butadiene-styrene
- 3514-3 - (SBR) - Styrene-Butadiene Rubber
- 3514-4 - (EO) - Ethylene oxide
- 3514-5 - (EG) - Ethylene glycol
- 3514-6 - (BDX) - Butadiene Extraction
- 3514-7 - (PTA) - Pure Terephthalic Acid
- 3514-8 - (M.A.) - Methanol
- 3514-9 - (ARO) - Aromatics
- 3575 - ADDITIONAL CODE FOR MANUFACTURE OF SYNTHETIC RESINS,
PLASTIC MATERIALS AND MAN-MADE FIBRES (EXCEPT GLASS)
- 3515-1 (LAB) Linear Alkyl Benzene
- 3515-2 (LLDPE) Linear low density polyethylene
- 3692 - MANUFACTURE OF CEMENT, LIME AND PLASTER
- 3692-1 - Portland cement
- 4101 - ELECTRIC LIGHT AND POWER
- 4101-0 - Light and Power, power generation, transmission and
distribution (Mechanical Part)-Non-electrical energy
- 4101-1 - Light and Power, power generation, transmission and
distribution - Electrical energy upto 3 KV.
- 4101-2 - Electrical energy 6 KV
- 4101-3 - Electrical " 10 KV
- 4101-4 - " " 15 KV
- 4101-5 - " " 25 KV
- 4101-6 - " " 30 KV
- 4101-7 - " " 60 KV
- 4101-8 - " " 150 KV
- 4101-9 - " " 380 KV



production module, these multiple production lines converging for production modules are represented by a full production line. Each product (Main, by-, intermediate or waste) has been given a two digit number.

3.1.2.3 INDUSTRY ACTIVITIES CHART

To classify and codify the process industries and production activities an industry activities chart showing the stages of production has been prepared for each main product. A cumulative 9 digit coding system consisting of SITC code for industry sector(4), main product(1), intermediate product or production stage (2), technology (1), capacity (1), has been used. As explained in Para 3.1.2. , the 5th digit identifies the main product, a specific item in the sector covered by the relevant ISIC code. Out of the remaining 4 digits on the industry activity chart, the first 2 for intermediate products which are processed in a production module. The 8th and 9th digits are for the alternative technologies and capacities of a particular production module respectively. In addition the name of the critical equipment and



its capacity (defined as the 8th digit of SITC Codification system which will be described later) are also shown on the chart. In case of more than one critical equipment determining the capacity the item with the highest value is considered as critical.

3.1.2.4. MODULAR PROCESS FLOW DIAGRAM AND PLANT

SURVEY FORM

TO identify each production module one modular process flow diagram showing the process flow and plant survey for recording the required information have been prepared. The modular process flow diagram shows the process flow between equipment and machines in the order they are required. The left hand of the diagram is the flow diagram and the right hand side is the list of equipment which are used in the process together with their 15 digit codes quantitative and machine function codes. Different symbols and codes numbers between 0-29 are used for process equipment while the square symbol (□) and numbers 30-39 for inspection, the triangle symbol (Δ) and numbers 40-59 for storage, the arrow symbol (→) and numbers 60-79 for



transport equipment, Full lines(-) represent work flow. Plant survey form shows besides data of specifications and manufacturing characteristics and identifies specifically the 15 digit code for each. The purchase year, the cost at the time of purchasing and the cost in 1980 US dollars of the equipment are also given in these forms.

3.1.3 CLASSIFICATION AND CODIFICATION OF CAPITAL GOODS

3.1.3.1. A 15 digit system based on the 5 digit SITC code has been evolved to cover all capital goods expected to be used in sectors considered by the Capital Goods Development Project in Turkey. The 5 digits are the SITC codes and classify machines and equipment according to their functions. The next 9 digits have been allocated for definition of nomenclature, specifications and manufacturing characteristic and the last digit is used for information on whether it is imported or manufactured in Turkey. This system is schematically shown below.



LAYOUT OF 15 DIGIT CODES FOR CAPITAL GOODS

1 2 3 4 5	SITC Group name
6 7	Machine name
8	Major specification (Capacity)
9	Major specification (Optional)
10	Major specification (Optional)
11	Type
12	Manufacturing Characteristics 1 (Weight)
13	Manufacturing Characteristics 2 (x)
14	Manufacturing Characteristics 3 (xx)
15	Origin

(x) Type of material in the case of fabricated equipment (eg. type of steel) and that of principal parts in the case of machines (eg. type of casting).

(xx) Plate thickness in the case of fabricated equipment and maximum weight of a component in the case of machinery.



3.2 METHODOLOGY FOR MACHINE TOOLS

- 3.2.1 The forecasting models for machine tools demand mostly depend on the latter's relation with economic development of the country. A high demand is usually one of most important indicators of economic growth. In most developing countries where the economy depends on agriculture, the level of demand stays low.
- 3.2.2. The reliability of the techniques used for demand forecasting is closely related to the country's economic structure. Because of this, selection of forecasting methods becomes as important as selection of the most suitable indicators. The method to be used must recognize the current situation in a realistic way and also be able to reflect the effect of sudden changes that may take place in the economy.
- 3.2.3. Considering the present state of development of this industry in Turkey, the most important indicators that could be used for making the machine tool demand forecast are, the past year's total demand and GNP. These two factors are closely related to each other and both of them have shown similar trends in recent years.
- 3.2.4. One indicator of machine tools' demand in Turkey previously used was the quantity and type of the machine imported. These were used for projection of future demands.



This was not considered relevant because a high import may in fact saturate the market and lead to a reduced demand rather than an increased demand which would result from a straight projection of import figures to determine future demands. Similarly if a projection is made on the basis of very low imports in recent years, the machine tool demand will gradually decrease in the years to come. Either way, projections made only on the basis of imports, will not realistically represent the future pattern of demand which must follow the anticipated pattern of economic development. Accordingly, import figures have been analysed in this study ONLY to determine the TOTAL PAST CONSUMPTION of machine tools by individual types according to specification Turkey's import of machine tools in the years 1967-1980, has been investigated according to machine groups, both by quantity and value.

3.2.5. In the "Machine Tool Industry" Publication of United Nations, economic structure and machine tool consumption of more than 80 countries has been studied. Even though the correlation coefficient is higher for some economic indicators than for GNP, it was decided to use only the latter because of difficulties in obtaining relevant data for others. With high correlation coefficient between GNP/capital and Machine tool capita, GNP was accepted as a logical indicator.



3.2.6. Turkey currently is trying to solve its special economic problems with measures suited to its socio-economic environment and it was decided that it would be more realistic to calculate correlation coefficient and trend equations by using actual data valid for Turkey. A comparison however has been made with figures for "Developed-Developing Countries" the category in U.N. statistics that is applicable to Turkey.

3.2.7. In order to understand the relationship between GNP and machine tools' consumption and to use this relation to make demand forecasts for future, first of all the machine tool consumption per capita during the years 1967-1979 was studied. On the assumption that the total machine tool consumption is imports plus domestic production, the country's leading machine tool producers' actual production figures were found and their value calculated on the basis of 1968 dollar prices. The machine tool consumption between the years 1967-1979 was calculated by adding values for machine tools' imports on the same basis. The machine tool consumption per capita was then determined by dividing this value by population for each year.



- 3.2.8. During 1967-1980, values of GNP per capita were calculated on the basis of data taken from State Statistics Institute. In order to find the correlation coefficient and the linear relation between these two variables, regression method was used.
- 3.2.9. In order to project the machine tool consumption figures to years 1982-2000, GNP values and population in these years were estimated. A 2.27% growth rate of population has been assumed.
- 3.2.10. With the background of planning for full utilisation of installed capacity, two sets of projections were made for the 'Turkish Model' used in this study - one with normally expected growth rate of GNP and the second with lower figures for calculating the absolute minimum demand. It was felt that where high levels of investment are involved, it would be better to have the initial capacity installed on the basis of the minimum demand and expand it as market conditions warrant.
- 3.2.11. While 15 digit codes have been evolved for all machine tools for the purpose of this study however, only the first 9 digits have been used - i.e. SITC code, basic machine, major specification (capacity) and one more specification. These adequately represent the depth to which it is necessary to pursue this research at this



point. The balance will be used at the time of feasibility studies when more details are necessary to be recorded and analysed.

3.3. METHODOLOGY FOR DIESEL ENGINES

3.3.1 PROJECTION OF VEHICLE PARKS

3.3.1.1. Double logarithmic reression analyses were carried out between park figures and GNP over the period 1966-80 for each of the four types of automotive vehicles, namely minibuses, pick-ups, trucks and buses. Data used and regression equations obtained are given in the Technical Report No.VIII. Diesel Engine Industry in Turkey. In all four cases explanatory variables were significant and coefficients of determination were suitably high for use in projecting.

3.3.1.2. For projecting vehicle parks, two patterns of GNP growth were considered. In the first pattern GNP was taken to grow at a constant rate of 3.5% all through the period 1981-90 and this was taken to represent minimum demand conditions. In the second pattern, GNP growth rate was taken at 3% for the year 1981 and was increased by 0.5% each year until 1985 and then was kept constant at 6% from 1986 onwards.



3.3.1.3 Vehicle parks predicted by this method were calculated for both alternatives. It was noted that minibus population has the highest coefficient of elasticity with respect to GNP and a 3.5% rise in GNP results in a 7.21% rise in minibus park. Pick-ups, trucks and buses have lower elasticity coefficients, in decreasing order, and hence smaller percentage growths are projected.

3.3.2 ESTIMATION OF REPLACEMENT DEMAND

3.3.2.1 Replacement demand was calculated from past sales of vehicles assuming a useful life of 12 years for all four types of vehicles. Three-year moving averages were taken to allow for variation of useful life.

3.3.3 TOTAL DOMESTIC DEMAND

3.1.3.1 Domestic demand has been obtained by the addition of replacement demand figures onto park increase figures calculated from predictions of vehicle parks. Domestic demand projections for each of the four types of vehicles for the period 1983-90 are given in the technical reports Nos III, V, VI and VIII.



CHAPTER IV

ACTIVITIES AND OUTPUTS

4.1. ACTIVITIES PLANNED

4.1.1. Briefly the project consisted of:

- (a) determining the capital goods requirement of selected sectors of industry,
- (b) analysing available and already planned capacity in the state sector to meet their requirements
- (c) recommending steps for optimising its utilisation
- (d) study of selected existing proposals for investment in the capital goods sector
- (e) making recommendation on policy considerations of technology in the capital goods industry.

4.1.2. The activities planned for determination of fields in the capital goods sector where additional investment is needed, are given below:-

4.1.2.1. Pilot activity to determine a coding system for process industries. This part was undertaken by TSKB for milk and milk products, meat and meat products, beer, animal feed, vegetable oil, non-alcoholic beverages,



vegetable and fruit canning grain mill products and some bakery products. This activity was completed in December 1980. No UNIDO inputs were originally visualised. In view of its linkages with other activities however, CTA coordinated with TSKB during the progress of the pilot study and developed the coding system and the complete methodology for application to other sectors. Details of the unique methodology as applied in various sectors have been given in Technical report No 1 by CTA.

4.1.2.2. After methodologies suitable for each sector were developed, selected industries and their capital goods were classified and profiles made of each industry through questionnaires and where necessary factory visits. Since it was anticipated that most of demand for complex capital goods will in the future be from the state sector, this activity covered only the public sector.

4.1.2.3. From these data, by using a computer, a matrix was derived in which industry sectors form the columns and the types of capital goods needed form the rows. Entries are the number of capital

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY



goods or their values. The capital goods market can be determined in physical and financial terms. The capital goods market will be represented as under:

<u>C Matrix (A₃)</u>				<u>t vector</u>	<u>R vector</u>
Industry				Industry	Capital goods
				Production	market (in money terms)
				Targets	
Codes	X1	<u>X2----Xn</u>			
01	C ₁	a ₁₁ P ₁	a ₁₂ P ₁ --a _{1n} P ₁	Q ₁	a ₁₁ P ₁ Q ₁ a _{1n} P ₁ Q ₁
011					
012					
		a ₁₁ P ₁	a ₁₂ P ₁ a _{1n} P ₁	Q ₁	a ₁₁ P ₁ Q ₁ a _{1n} P ₁ Q ₁
		m ₁₁ m ₁₂ m _{1n}		m	m ₁₁ l ₁₁ l _{1n} m _{1n} m _{1n}

a number of capital goods required by unit production
 p prices of capital goods
 Q₁ production target of the industry defined in terms of unit production



As may be understood, this gave only the requirement of capital goods for new investments. However, existing industries' replacement and expansion demand is as important as new investment demand. The sum of these partial demands gives total demand. In such industry sectors where demand has already been translated into specific well-defined projects, capital goods requirements were worked out from the project data. For replacements, since in most case, they are in the form of parts and components, they can only be added as a percentage of total installed equipment.

4.1.2.4. At the same time, the capacity planned to be created for capital goods in the state sector in the next 10-15 years was to be determined both in public and private sectors. This has been done for the state sector but some data for the private sector is likely to be available only by April '83 from TSKB.

4.1.2.5. Demands of capital goods in quantitative terms for process industries have to be computerised and analysed from the point of view of manufacturing capacity. This activity has not yet been completed on account of nonavailability of counter-part personnel and computer facilities, in time.

UNITED NATIONS DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY



4.1.2.6 Profiles for Railways, a service industry, and its capital goods have been developed,

(The master transport plan had been finally approved by the Government on Sep 82.)

4.1.2.7. Machine tools, industrial machinery and infrastructure for capital goods have been classified and their demand analysis carried out.

4.1.2.8. In order to find the magnitude of total investment needed in the capital goods industry two basic factors should be analysed. These are prevailing capacity utilisation rates in the user industries as well as the capital goods industry. These however cannot be projected since data on capacity, most of which is in the private sector, is not yet available.

4.1.3. The state enterprises which were nominated for provision of part time experts for different experts are as follows.

<u>Subactivity</u>	<u>Agency</u>	<u>Industry Sector</u>
(Under Para heading 4.1.2. above)		
2,3,4,5	SPO-TEK	Power generation, distribution transmission



<u>Subactivity</u>	<u>Agency</u>	<u>Industry Sector</u>
2,3,4,5	SPO-TEMSAN	Industrial machinery, distribution
2,3,4,5	SPO-ETİBANK	Non-ferrous mining
2,3,4,5	SPO-TKI	Coal mining
2,3,4,5	SPO-TDCI	Ferrous mining
2,3,4,5	SPO-SEKA	Pulp and paper
2,3,4,5	SPO-ÇİMENTO	Cement
2,3,4,5	SPO-PETKİM	Chemicals and petrochemicals
2,3,4,5	SPO-AZOT	Fertilizers
2,3,4,5	SPO-TOBZMK	Pesticides
2,3,4,5	SPO-Şeker Makina Fabrikası	Sugar
6,8	SPO-TCDD	Railways
7,8	SPO-TAKSAN	Metal cutting and metal forming machine
7,8	SPO-MKEK	Casting and forgings
7,8	SPO-TÜMOSAN	Diesel and petrol engines
5,8	SPO-GERKONSAN	Steel fabrication
2,3,4,5,6,7,8	SPO-Machinery and plant planning	All
2,3,4,5,6,7,8	SPO-Investment promotion division	All
2,3,4,5,6,7,8	SPO-Ministry of Industry	All



4.1.4 ANCILLARY INDUSTRIES

4.1.4.1 A broad survey was undertaken by TSKB for the components produced in private ancillary industry. A consultant firm engaged by TSKB to carry out pilot study on ancillary industry survey and establish a component and process data bank, completed the study. This components and process framework has been developed by TSKB into a data bank which can identify the capacity for manufacture of components in private ancillary industry for principal capital goods manufacturing units in public and private sectors.

4.1.4.2 This it is hoped will be used in determining production programmes of ancillary industries for optimal resource utilisation of existing and proposed capital goods projects.

4.2 PROJECT OUTPUTS

4.2.1 The outputs planned for the project were as under:-

- (1) Classification and codification of all capital goods based on Standard Industrial Trade Classification designed to suit needs of selected sectors in Turkish industry.



(ii) Classification and codification of parameters of selected industries based on adaptation of International Standart Industrial Classification to suit Turkish Industry.

(iii) Demand of capital goods as classified and codified, year by year, for the following priority sectors:

Power

Mining (ferrous, non-ferrous, coal and chemical)

Cement

Sugar

Petrochemicals

Fertilizers

Railways

Metal cutting machine tools

Diesel engines

(iv) Analysis and recommendations for master planning for the following state enterprises:-

GERKONSAN for steel fabrication

TÜMOSAN for diesel engines and transmissions

TAKSAN for machine tools

MKEK for earth moving machinery and industrial plant

TEMSAN for electromechanical industries

including studies to aid in feasibility determination as necessary

(v) An assesment of existing capacity for the production of capital goods in the state sector (a parallel assesment for the private sector will be



carried out by TSKB at a matching level of detail. This exercise is however not co-terminal with the project).

- (vi) Computer output of national demand of capital goods for sectors specified in (iii) above from the point of view of desired manufacturing facility.
- (vii) Recommendations for policy considerations affecting development of capital goods industry.
- (viii) Complementing existing Data Bank(s) with information generated in the course of the project which, if updated, can be used to produce above outputs periodically.

4.2.2 PROCESS INDUSTRIES

4.2.2.1 After the methodology had been conceptualised by CTA, classification and codification of capital goods based on SITC Rev.2, was taken up. This work involved technical discussions at Senior levels and the codes evolved, keeping in view not only the fact that they will be applied to the project's activities in all industries in Turkey but also the possibility that they could be applied to similar projects in other countries. Simultaneously they could be applied in Turkey and other countries for a variety of detailed statistics concerning manufacturing industry. The elaboration of 5 digit SITC codes to 15 digit codes for defining Capital goods has been done to provide for their major specifications and types, their



manufacturing characteristics and also whether they are imported or indigenously produced.

4.2.2.2 Similarly the elaboration of ISIC codes made by this project for identifying products could be used for other statistical purposes in addition to their application for capital goods projects in other countries. The elaboration of 4 digit ISIC codes to 9 digit codes, defines the product, stages of production, technology and plant sizes.

4.2.2.3 Based on these codes and using simple computer models, the following have projections been made FOR EACH YEAR UPTO YEAR 2000.

- (i) Quantitative demand as per 15 digit codes for each projected plant
- (ii) Value of demand as per 15 digit codes for each projected plant
- (iii) Quantitative demand as per 15 digit codes for the entire industry
- (iv) Value of demand as per 15 digit codes for each projected plant
- (v) Quantitative demand as per 5 digit SITC codes for each projected plant
- (vi) Value of demand as per 15 digit codes for each projected plant

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

- (vii) Quantitative demand as per 15 digit codes for the entire industry.
- (viii) Value of demand as per 15 digit codes for the entire industry.

4.2.2.4. These details have been worked out for the following industry sectors, and sub-sectors:-

- (i) Power generation.
- (ii) Power transmission
- (iii) Power distribution
- (iv) Sugar
- (v) Petrochemical-15 units
- (vi) Fertilizer 9 units
- (vii) Mining-Ferrous
- (viii) Mining-Chemicals
- (ix) Mining-(Non-Ferrous)
- (x) Mining Coal
- (xi) Pulp and Paper

4.2.2.5. AGGREGATION OF DEMAND.

Arrangements were been made in Feb, 1983 for computer facilities for aggregation of the data for all industries from the point of view of manufacturing characteristics. Computer outputs are now available for analysis for determining demand-capacity balances. While product mix and master plans of all the machine building state

enterprises have been finalised, this exercise will be necessary to further refine and define their future projections of capacity building-up. A computer programme has already been worked out to get national totals of the demand. This will also provide the much needed direction to the private sector machine building industry. A report will be possible only after data has been analysed.

4.2.3. MACHINE BUILDING INDUSTRIES

- 4.2.3.1. Very detailed analysis of demand and capacity have been made for
- (i) machine tools and
 - (ii) diesel engines

In both cases master plans have been prepared and presented to the Government.

4.2.3.2. STATE ENTERPRISES

- 4.2.3.2.1. Master Plans have been developed for
- (i) Cerkonsan (Steel fabrication).
 - (ii) Tumosan (Diesel Engines).



CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

(iii) Taksan (Machine Tools)

(iv) Temsan (Electromechanical Industry).

(v) MKEK (for earth moving machinery and industrial machinery).

4.2.3.2.2. Reports have been accepted by the managements of these enterprises and SPO.

4.2.4. REPORTS

4.2.4.1. The reports so far produced by the projects are as under:

(i) Report on pilot study for industry survey by TSKB.

(ii) Development of Capital Goods Industry in a Mixed-Economy- The Turkish Case.



- (iii) Report on data bank for ancillary industries.
- (iv) Technical Report No.I-Methodology or planning of Capital Goods Industries in Turkey
- (v) Technical Report No.II-Role of Gerkonsan in meeting demand for steel fabrication.
- (vi) Technical Report No.III-Manufacture of Diesel Engines in Turkey.
- (vii) Technical Report No.IV-Capacity and Potential of Consultancy Organization in Turkey.
- (viii) Technical Report No.V-Tractors and Tractor Diesel Engines.
- (ix) Technical Report No.-VI-Light Duty Diesel Engines.
- (x) Technical Report No.VII-Transmissions.
- (xi) Technical Report No.VIII-Diesel Engine Industry in Turkey.
- (xii) Technical Report No.IX-Capital Goods Demand for Cement Industry.
- (xiii) Technical Report No.X-Capital Goods Demand for Sugar Industry.
- (xiv) Technical Report No.XI-Capital Goods Demand for Petrochemicals Industry.
- (xv) Technical Report No.XII-Capital Goods Demand for Fertilisers Industry.
- (xvi) Technical Report No.XIII-Machine Tools with special reference to Taksan.

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

- (xvii) Technical Report No. XVII-Demand for Capital Goods for Coal Mining (2 volumes).
- (xviii) Technical Report No. XVIII-Demand for Power Generation, Transmission and Distribution equipment.
- (xix) Technical Report No. XIX-Demand for Capital Goods on earth moving machinery with special reference to MKEK's project for manufacture of these machines.
- (xx) Technical Report No. XX-Demand for capital goods for Electromechanical Industry with special reference to TEMSAN.
- (xxi) Technical Report No. XXI-Policy Guidelines for promotion of capital goods sector.
- (xxii) Technical Report No. XXII-Capacity for capital goods manufacture in State Enterprises-Sugar Machinery Manufacturing Plants.
- (xxiii) Technical Report No. XXIII-Demand for capital goods in Fertilizer Industry. (Rev.1)
- (xiv) Technical Report No. XXIV-Demand and capacity for rolling stock in Turkish Railways.

4.3. CONCLUSION

It may be seen from the above that the immediate objectives as outlined in the revised project document have been achieved. Analysis of aggregation of demand of all the sectors that have been studied from the point of view of manufacturing characteristics would also have been completed had there not been a delay in availability of necessary computer facilities.



CHAPTER V

FACTORS RELATED TO ACHIEVEMENT OF IMMEDIATE OBJECTIVES

5.1 INPUTS

5.1.1 The entire project was designed on the basis of availability of FULL TIME EXPERTS with effect from Oct 79. Due to a variety of reasons there were delays and a National project Coordinator was appointed in Aug 80. CTA had recommended to the Govt. that the national experts may be from State enterprises (in preference to their recruitment) so that advantage could be taken of the data and other facilities available with them. While this basic recommendation was accepted the state enterprises were able to spare the few experts who could understand English only on a part time basis. These experts had frequently other more pressing assignments from their managements and during May to September, their annual leave in accordance with their company's programmes. The fact that inspite of these handicaps so much has been done speaks volumes of the dedicated work of these experts, young engineers who were willing to learn and operate as a team. There were however a few areas where experts could not be spared by the organizations nominated.

5.1.2 It is felt that for similar projects there should be a core of FULL TIME carefully selected national experts



who should be attached to the international team and who could be backed up by a larger number of experts working in nominated enterprises, preferably full-time, even if they operate for limited periods.

5.2 METHODOLOGY

5.2.1 The first objective was to design a scientific flexible methodology for projecting sectoral demands of Capital Goods based on international codes including all general purpose and special purpose machinery for selected priority industries and Railways as well as infrastructure.

5.2.2 This objective has been fully met in as much as a methodology has been developed, tested and applied to the project's activities using simple computer programmes. Individual details of sectoral demand of capital goods, have been furnished to the Government.

5.3 CLASSIFICATION AND CODIFICATION OF CAPITAL GOODS

5.3.1 The basis was the 5 digit SITC code and a 15 digit code evolved for all Capital Goods covered by the project, incorporated their nomenclature, major specifications, manufacturing characteristics and origin. This was a very complex exercise involving not only a thorough technical knowledge of the characteristics of machinery and plant used in different industries but also coordination of data from them so that the codes once evolved, could be used by all the



industries. These codes form the crux of the methodology followed and their finalisation was the most time consuming activity.

5.3.2 During the execution of this detailed exercise certain anomalies were noticed in the SITC codes. These will be conveyed to the relevant UNDP agency.

5.3.3 Copies of codes evolved have been supplied to the counterpart agency and all the State enterprises who participated in the project as well as to UNIDO Headquarters.

5.4 CLASSIFICATION AND CODIFICATION OF PROCESS INDUSTRIES

5.4.1 All the process industries including Power (Generation, distribution and transmission) Mining (Ferrous, Non-ferrous, Chemicals and Coal) Pulp and Paper, Cement, Sugar, Petrochemicals and Fertilizers have been codified to a 9 digit code based on the 4 digit ISIC code. The expanded codes incorporate productomenclature, production stages, technology and plant sizes.

5.5 STATE ENTERPRISES

5.5.1 In-depth studies have been completed and reports submitted in respect of all the major units namely:-
(1) Tümosan-dealing with manufacture of diesel engines and tractors.



CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

- (ii) TAKSAN- dealing with manufacture of metal cutting machine tools.
- (iii) GERKONSAN- dealing with steel-fabricated heavy equipment.
- (iv) TEMSAN, dealing with manufacture of electro-mechanical equipment.
- (v) MKEK for their earth moving equipment project and industrial machinery project.

5.6. DEMAND PROJECTIONS

5.6.1. These have been computed, printed and made available for

Cement

Sugar

Petrochemicals (17 different plants)

Fertilizers (4 " ")

Mining (Iron)

Mining (Non-ferrous)

Mining (Chemicals)

Mining (Coal)

Pulp and Paper

Railways

5.6.2. Projections have been made for Machine Tools and Diesel Engines (derived from demand of relevant automotive sub-sectors computed by the Project).

5.6.3. SPO entrusted the work of data collection on demand and capacity for castings and forgings on the lines suggested by CTA, to a private sector consultancy organisation. This was available in July 83. Suitable recommendations have been made for this area.

5.7. AGGREGATION OF DEMAND DATA

5.7.1. The counterpart agency decided in 83 this work should be carried out in the State Institute of Statistics and the computer files later transferred to SPO.

5.7.2. There are three other prerequisites for this activity:-
(i) completion of data for all sub-sectors
(ii) availability of trained staff for computer programming
(iii) availability of counterpart mechanical/industrial

5.7.3. All the sectoral data has been computerised and aggregated in Nov.83. This will need now to be analysed to determine investment needs and priorities.



CHAPTER VI

PHASING OF CAPITAL GOODS INDUSTRY

6.1. PLANNING

Production programme of Capital Goods units depends upon:-

- Product requirements;
- Product design;
- Product technology;
- Requirement of raw materials and bought-outs/labour skills and productivity.

6.2. In order to determine the requirements of the product, particularly where capital goods are involved, national requirements were worked out in the context of overall economic development programmes. For example, taking coordinated view of future new process plants, it was necessary to determinate the time-frame in which requirements of plant and machinery for them would materialise. Additionally consideration was given to different phases of development, erection and commissioning in order to determine the time periods in which the different types of equipment will need to be taken up for manufacture.

6.3. A relevance of this aspect of phasing would be evident when one considers that the different stages before equipment is available for process plants are variegated and involve different disciplines. Prerequisites for efficient production of Capital Goods for process industries as concerned can be briefly summed up as under:-

- Total requirements of the finished products.
- Distribution of finished products amongst different plants both new and old, some of which may need modernisation or expansion.



- Selection of process, design and development of plant/factory.
- Development of specifications of machinery and equipment.
- Equipment designing.
- Development of production technology for each item.
- Decision regarding which items should be manufactured indigenously and which imported.
- Decision on which item should be manufactured in ancillary industries.
- Development of skills for undertaking manufacture of those items which have to be manufactured indigenously at a given point of time.
- Timely availability of raw materials and other bought-outs from indigenous sources.

6.4. It has been suggested that development of capacities and capabilities for manufacture of capital equipment will have to be interrelated with a number of other factors. In case of new process plants to be set up, it will be necessary to determine the exact requirements and specifications of plant and machinery to manufacture different products so as to ensure that in point of time, the capital expenditure on such facilities is comparable with the development plans for the capital machinery building industry.



CHAPTER VII

RECOMMENDATIONS FOR INCREASING PRODUCTIVITY OF CAPITAL GOODS MANUFACTURING ENTERPRISES

7.1 Based on personal discussions and observations, a brief account of factors that may be taken into account for improving productivity of Capital Goods manufacturing units, particularly those in the state sector, as submitted in various reports, is given below:-

7.1.1. Modern Productivity Techniques: Modern productivity techniques have become an important tool for better utilisation of investment and increasing outputs. Introduction of these techniques including scientifically designed production incentives schemes will lead to marked increase in outputs in existing workshops.

7.1.2 Impact of short supply of infra-structure particularly transport and power should be quantified based on a proper management information system.

7.1.3 DESIGN AND STANDARDISATION

7.1.3.1 Non-availability of designs of all types of heavy engineering equipment required in the country is acting as a major deterrent to optimum utilisation of already installed equipment capacities. To some



extent this is also related to the questions of standardisation of equipment as a whole for use in the country. It is necessary that this aspect of the problem should also be taken up and studied in depth. Action should be initiated at the earliest possible moment to identify the specific shortages and to take appropriate steps to make available the necessary to product designs, the selected manufacturers. Product design and production documentation for complex items may be initially imported if necessary and technical personnel trained in design and manufacture.

7.1.3.2 STANDARDISATION

In capital building industry, standardisation of designs has an extremely important role to play, affecting as it obviously does, the level of productivity which can be achieved with a given set of resources. There is often a danger when there is emphasis on imported technology, some times in the interest of saving time, that designs and even the equipment are imported through different concepts. It is recommended that a long term view may be taken and such precautionary measures introduced as will ensure that standardisation of designs and equipment is taken up as a national policy and implemented effectively.



7.1.3.3 Standardisation of end-use product and its impact on increased productivity of end-user industry on the one hand and capital machine building on the other, needs a study.

7.1.4 PRODUCT MIX AND ORDER BOOK

7.1.4.1 The large facilities available in capital goods manufacturing plants are by their very nature capital intensive and their best utilization lies in the manufacture of high technology items. Lower technological categories such as storage tanks, simple conveyors and elevators, normal types of cranes etc. are uncompetitive and best left for manufacture by smaller fabricators in the private sector.

7.1.4.2 In any diversification programme the variety of products should be kept limited keeping in view the existing facilities and other manufacturing units since demand is limited. Duplication of manufacture in state enterprises for similar items should be avoided.

7.1.4.3 Every effort should be made to avoid import of equipments which can be manufactured in the country. This will not only reduce dependence on foreign resources but will also help to increase the work-load on existing plants which is vitally necessary to speed up the build-up of



technical know-how and personnel skills to say nothing of build up of managerial capacities in the large manufacturing units.

7.1.4.4 Rationalisation of product mix and coordination of production between existing units and cooperation between them for a horizontal transfer of technology must be controlled and encouraged.

7.1.4.5 Effect of a balanced order book policy decisions are frequently necessary to direct at least state enterprises to get their machinery and plant from SEE's capable of supplying them in preference to imports.

7.1.5 TOOLING

7.1.5.1 A very important aspect of the development of the capital goods industry is that of proper tooling which is to necessarily take into account other available skills. There is at times an undesirable emphasis on mechanisation of operations and this, quite apart from being in many cases inappropriate for the economy of the country also presents serious problems in the maintenance of such equipment for which heavy costs may have to be incurred in employing foreign technicians. With the rapid development of technology, in the developed world and the speed of obsolescence this aspect has special relevance in Turkey. It would be useful to take UNIDO's help in



obtaining experience in methods, procedures, tooling and other aspects of manufacture of capital goods from other developing countries with mixed economies.

7.1.6 QUALITY CONTROL

7.1.6.1 On the face of it, a mention of quality control as a factor affecting productivity of manufacture is extraneous. Lack of stage quality control particularly in heavy engineering equipment seriously affects plant productivity because, besides extra time frequently taken in initial manufacture of individual components, time is taken to repair them. Even more important poor quality of equipment can have serious effect ^{on} commissioning schedules and later, on production and performance of process plants. It is felt that formal procedures for control of quality at operation and finishing stages should be promoted.

7.1.7 OPERATIONAL RESEARCH—should be introduced in the headquarters of state enterprises as a tool for better planning of activities individual units.

7.8 MAINTENANCE

7.1.8.1 Realisation of production plans depend. To a fair extent on the effectiveness of the procedures and methods ^{for maintenance} of machinery and plant. There could be greater emphasis on maintenance procedures.



7.1.9 Number of shifts operated should be increased to minimum 2 and 3 in bottleneck areas and the level of efficiency in each should be assessed by the Industrial Engineering departments as a matter of routine.

7.1.10 MANPOWER

7.1.10.1 PRODUCTION PLANNING AND CONTROL

In general there is insufficiency of staff in the discipline of production planning and control. It is recommended that these should be organised so that areas of under-utilisation of capacity are analysed and remedial steps taken as a matter of course.

7.1.10.2. INDUSTRIAL ENGINEERING

It has been noted during visits to manufacturing plants that unfortunately, this discipline has not had the kind of attention it deserves. Industrial engineering needs to be formally introduced as a management discipline for not only determining the norms of production to suit local conditions but also to ensure a continuous review for optimal use of men, machinery and raw materials in keeping with constantly changing pattern of availability of these resources.

7.1.10.3 QUALITY CONTROL

Quality control engineers and operators should be trained for this function and should be independent of production management. The department should be responsible directly to the head of the plant.



7.1.11 MANAGEMENT INFORMATION SYSTEMS

Sound MIS need to be introduced so that the management is continuously aware of all aspects of performance in the immediate past as well as possible areas of trouble in future. In larger establishments (eg MKEK) they should be computer based and should include not only production planning but also various aspects of costing and financial results.

7.1.12 TRAINING PROFILES

It has been seen particularly in many developing countries that plants with excellent machinery and equipment have not been able to meet the demand of the countries as a result of inadequate emphasis on training—the most important factor for production efficiency of labour and managers. This factor has an extremely important bearing on production economies needs to be given serious thought at policy making level if plans have to produce projected results. Training profiles need to be developed for different disciplines as recommended, by the Consultation on Capital Goods in Brussels in Sept 81.

7.2. ORGANISATION

An indepth study of organisation of each S&E should lead to their suitable alteration so that it results in

- (i) high level of technological management in production,
- (ii) definition of authorities and responsibilities at each level,



- (iii) quantification of targets for each individual (performance budgetting)
- (iv) induction in adequate numbers and / or requisite quality of engineers in service functions including industrial engineering, production planning and control, quality control, maintenance, inventory management and design and of suitable, qualified managers in financial (costing, budgetting & accounting) and personnel disciplines.

7.3. PROCEDURES

7.3.1. Procedures for management should be laid down to remove ambiguity but without undue constraints on initiative of managers. These would cover different areas of production management, personnel and finance. The objective would be uniformity as far as policies are concerned but with sufficient room for individual managers to develop and display their capabilities in improving efficiency and productivity.

7.3.2. Scientific procedures for developing work norms-and where possible based on them, introduction of systems of payment by results are recommended.

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 70

CHAPTER VIII

- 8.1. Government of Turkey have placed considerable emphasis on promotion of exports. The machine building sector has to compete with well-established firms in developed and developing countries in terms of design, quality and cost and it is necessary for this sector to start gaining experience of international marketing by setting up small data collection cells in the principal machine building units. International marketing is however a costly exercise and it has been recommended that Turkey should promote an umbrella organisation only for marketing of capital goods—this organization can provide the missing link between competent local manufacturers and foreign buyers on a selective basis.
- 8.2. There is considerable scope for exports of castings and forgings from Turkey to Europe and Middle East since this is an area becoming increasingly unpopular with workers in the West and adequate facilities for high quality complex castings is not available in many developing countries. If necessary, facilities could be set up in an export zone for 100% export-oriented units.
- 8.3. It has been recommended that there is ample scope for export of capital goods as a part of projects won by Turkish contractors in other countries. There is however considerable ground to be covered by machine builders firstly for infusing confidence amongst the Turkish contractors and secondly through them, in the foreign customers.



DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 71

8.4. It is also felt that Government may support the efforts of this sector in bilateral or multilateral contracts at official level, in different forums, in general, in particular with three groups of countries,

namely RCD group
Islamic group
and Middle East countries.



CHAPTER IX

UTILISATION OF PROJECT RESULTS

9.1. In the technical reports prepared by the Project, fresh master plans were drawn up for the machine building factories in the State sector and short term investment and manpower plans were drawn up for each of them in the context of these master plans. Care was taken to gain acceptance of the recommendations made by the Project, from the managements of the State enterprises as well as the State Planning Organisation in series of discussions at the senior-most level so that there was no delay in their implementation.

9.1.1. The State enterprises covered are:-

GERKONSAN	for Steel plate fabricated equipment and transmission towers
TUMOSAN	for diesel engines, transmissions and tractors
TAKSAN	for metal cutting machine tools
TEMSAN	for power generation, transmission and distribution machinery
MKEK's two projects	for (i) earth-moving machinery (ii) for heavy industrial machinery

9.2. In addition other projects in the pipeline, for or related to capital goods in the State sector have been studied by the project, suitable recommendations made in consultation with the State enterprises and concerned Government officials.



DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 73

9.3. The SPO have set up a cell for capital goods developments consisting of national experts who were involved with the testing and application of the unique methodology developed by CTA and which involved establishment of linkages between 9-digit industry codes for process industries based on ISIC and 15-digit capital goods codes based on SITC (Rev.2), both conceptualised by CTA and evolved by the Project. These are capable of being used internationally.

9.3.1. Certain anomalies have been noticed in ISIC and SITC (Rev.2) codes during the progress of the work of classification and codification. It has been recommended to UNIDO that they may take this up with UNDP.

9.4. Simple computer programmes have been developed for these linkages for each currently-visualised project in process industries upto year 2000.

9.5. These concepts can be used for more accurate INDUSTRIAL PLANNING.

9.6. For the purpose of demand-capacity analysis, national demands of all capital goods have been aggregated separately for steel fabricated equipment and other machinery. The programme for the fabricated equipment provides permutation and combination of three most important parameters of manufacturing capacity - weight, material and plate thickness. In the case of machinery the first 11 digits of the 15 digit output provide the essential details of broad specification of each item of machinery.

9.7. Data for the following sectors has been either transferred or is being transferred to the computer files in the State Institute of Statistics.

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 74

Power
Mining-Ferrous
Mining-non ferrous
Mining-Coal
Mining-Chemicals
Petrochemicals
Fertilisers
Sugar
Pulp and Paper
Railways

- 9.8. These files will be transferred to SPO when the latter's computer starts functioning and will be used for periodic updating of demand-capacity balances whenever there are changes in priorities and modification and definition of proposals concerning capacity and/or technology in the capital goods sector becomes necessary.
- 9.9. As a follow up of the capacity-survey of the machine building State enterprises recommendations have been made for their modernisation and expansion where necessary.
- 9.10. Specific recommendations have been made for a variety of measures needed to improve productive efficiency and productivity.
- 9.11. Policy guidelines including the lines on which project proposals should be drawn up have been suggested for future development of this sector in particular for promotion of foreign and local investment.
- 9.12. A separate long-term plan for developing the infrastructure of castings and forgings in terms of codified parameters of weight, material and complexity prepared by a consultant under the guidance of CTA has been included in the Master plan for Steel sector drawn up by SPO.

DEVELOPMENT PROGRAMME IN TURKEY
CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

Page 75

9.12. Industry and capital goods codes developed by the project can be used as a basis for unifying multiple codes currently used by Government agencies and private sector for expeditious and more accurate industry statistics.

CHAPTER XCONCLUSIONS AND RECOMMENDATIONS10.1. CAPACITY

- 10.1.1. Turkey has all the necessary skills to rapidly develop the capital goods industry.
- 10.1.2. In heavy and/or complex machinery the gestation period is long and evolution of new designs and developments in other countries rapid. Generally speaking, therefore, the private sector is shy in investing in these areas — more so when the local demand is limited. State participation in these areas has been promoted in recent years. In other areas of simple machinery, infrastructure and parts and components, the private sector has shown considerable initiative and drive.
- 10.1.3. In general, the capacity in this sector including the ancillary industry is under-utilised — the two principal factors being shortage of power and finance.
- 10.1.4. Capacity as represented in industry statistics in certain areas (eg. tractors, earthmoving machinery) exists mainly for assembly — a considerable portion of complex parts and subassemblies being imported. Value added for these items needs to be improved by gradual but definite plans and policies for integration.
- 10.1.5. Production of heavy engineering items at present imported should be promoted after an analysis of the economy of manufacture vs imports and providing for the capacity already available or being set up.

10.2. DEMAND-CAPACITY BALANCES

- 10.2.1. A technological analysis of the aggregation exercise giving the demands of capital goods from the point of view of manufacturing facilities and existing capabilities should be urgently completed to identify potential areas for investment - other than those already planned by this Capital Goods Project.
- 10.2.2. Demand for capital goods in the private sector may be taken up by TSKB with the assistance of UNIDO, as originally intended on a selective basis-particularly for those important industries for which substantial capacity is in the private sector.
- 10.2.3. Demand-capacity balances for capital goods as codified with codification, aggregation and analysis of demands, as codified and capacity in both private and public sectors is an effective tool for planning and should be struck periodically as a regular exercise.
- 10.2.4. Comprehensive plans for exports of capital goods by themselves or as part of projects taken up by Turkish contractors are recommended to be drawn up.
- 10.2.5. It is recommended that future feasibility studies may be coordinated by SPO to ensure that concepts worked out by the project are followed.
- 10.2.6. It is hoped that arrangements will be made by SPO to store and periodically update the data collected and computerised and use the outputs for effective planning of the industrial sector in general and capital goods in particular.

10.3. PRODUCTION MANAGEMENT AND PRODUCTIVITY

- 10.3.1. An indepth study of existing productivity of SEES and their potential will be relevant. In this context introduction of incentive schemes based on scientifically derived time standards is recommended.
- 10.3.2. Management procedures including modern concepts and practices for costing and financial accounting should be extended to all state enterprises.
- 10.3.3. There is ample scope to improve quality - a must for exports.

10.4. RESEARCH DESIGN AND DEVELOPMENT

- 10.4.1. A well-defined science and technology plan incorporating the specific needs of the capital goods sector is recommended.
- 10.4.2. R and D efforts already being made, need further fillip by creation of R and D institutes and suitable association with similar organisations in other countries.
- 10.4.3. Special efforts will be necessary to develop project designing and equipment designing capabilities.
- 10.4.4. Consultancy organisations in the country should be encouraged to take up original work of design and development - both of projects and products.

10.5. PERSONNEL

- 10.5.1. Some steps have been taken recently to stream line personnel policies to train, recruit and most important, retain good competent working engineers and managers in the state enterprises. These however need a system of continuous review to keep up with changing environments and working conditions in private sector and foreign employers who are always on the lookout for them.

10.5.2. Complexity analysis of capital goods to be manufactured to international standards should be urgently conducted in the context of present stage of technological development in Turkey leading to

(a) assessment of manpower requirement (managerial and artisan),

(b) training profiles for engineers and workers

This has been recommended in the first Consultation on Capital Goods in BRUSSELS in Sept.81.

10.5.3. There is need to educate, train and provide engineers in disciplines of production planning and control, industrial engineering, quality control and maintenance in the entire sector.

10.6. POLICY FRAMEWORK

10.6.1. Promotion of this sector will depend to a very large extent in formulation and effective implementation of Government policies. These have been dealt in Technical Report No. XXI by CTA and are summarised below.

10.6.1.1. Manufacture of capital goods products in Turkey must necessarily be viewed in the context of overall governmental policies and programmes since they always have a major impact on the industrial growth pattern and progress of import substitution.

10.6.1.2. The impact of governmental policies on import substitution in this sector has been relatively limited mainly because of the peculiar needs of this industry.

- 10.6.1.3. Since cost and quality of machinery and plant are a major factor in determining costs and prices of user products, manufacturers of consumer and intermediate goods have been resorting to imports when Turkish equipment was not competitive in prices and/or quality.
- 10.6.1.4. Integration being a crucial part of the import substitution strategy, the cost and quality of component items supplied by the ancillary industries have a major impact on production costs of the final machinery products.
- 10.6.1.5. A more selective and co-ordinated industrial growth pattern for which the country is poised at present has been projected by the Government.
- 10.6.1.6. It is recommended that comprehensive approach dovetailing various policy instruments into an integrated industrial policy aimed at productive efficiency of the manufacturing sector may be undertaken.
- 10.1.6.7. The demand for capital goods equipment and products will inevitably increase rapidly with the pace of overall industrial growth planned in Turkey and this will largely have to be met by imports of machinery and components unless integrated policy measures are taken in time to encourage and promote domestic manufacture.
- 10.1.6.8. A balance is necessary in allocation of investible resources, both domestic and foreign between consumer and intermediate products on the one hand and capital goods on the other.
- 10.1.6.9. Manufacture of capital goods machinery has special characteristics and problems which need to be recognised and appreciated.
- 10.1.6.10. In Turkey's present stage of development, leaving the ^{entire} capital goods sector to the operation of market forces is not likely to lead to the desired growth of this sector. Inter-sectoral priorities for capital goods and other subsectors in the context of a co-ordinated industrial

- development programme, will need a positive direction by the Government and institutional organizations.
- 10.1.6.11. In the capital goods manufacturing sector, initial capital outlays are usually higher and gestation periods normally longer than in most consumer-goods industries.
- 10.1.6.12. Investment Promotion in this sector will need
- (i) effective dissemination of data on possibilities in Turkey
 - (ii) pre-investment studies
 - (iii) defining the role of institutional agencies
 - (iv) co-ordination between governmental departments concerned, the financial agencies and the entrepreneurs.
- 10.6.1.13. It is essential to ensure adequate utilisation of existing capacity to reduce the gap between demand and capacity.
- 10.6.1.14. In many cases, production and quality gaps in the capital goods sector can be effectively covered by expansion, and modernisation of existing enterprises, and increase in productivity.
- 10.6.1.15. Flexibility and pragmatism, should be the cornerstone of policy decisions in foreign equity investment which may go upto 49 per cent depending on the nature of the project.
- 10.6.1.16. Simultaneously steps will need to be taken to arrange domestic financing for equity, loan capital and working capital.
- 10.6.1.17. Financial participation of TSKB, DYB and other such agencies may go up to 40 per cent in some cases.
- 10.6.1.18. Direct Governmental participation in certain major capital goods projects may be unavoidable, particularly where State enterprises are the principal purchasers of machinery and equipment.
- 10.6.1.19. In the case of capital goods sector, an acceptable balance has to be struck between productivity, level of mechanisation and computerisation (including numerical controls), skills required for maintenance and employment.

- 10.6.1.20. The correct strategy for maximum employment in Turkey is to select those technologies which maximise the direct plus linkage employment effects.
- 10.6.1.21. A detailed technology acquisition plan should invariably be drawn up.
- 10.6.1.22. Keeping in view the present practices, salient points which should be kept in view while proposing or approving a licence agreement have been recommended in Chapter IV.
- 10.6.1.23. It is recommended that in the capital goods sector, rate of the progress of domestic content should be scientifically determined on case-to-case basis and administrative steps taken to monitor and control it. At the same time in order to ensure efficiency, industrial licenses should be subjected to the stipulation, that if the price of locally bought-out materials and components is unduly high and exceeds the imported price of such components, say by 25 per cent or more, their imports may be permitted, subject to the availability of funds.
- 10.6.1.24. In general, protective policies give a stimulus to domestic industrial growth and import substitution, but if continued without flexibility they could bring about a falling of quality standards and higher costs.
- 10.6.1.25. It is recommended that the policy of import controls should be dynamic and its periodic review on a case-to-case basis, conducted by or with the help of qualified individuals.
- 10.6.1.26. A system of effective protection which promotes its productivity and efficiency, is essential for this sector.
- 10.6.1.27. The level of protection should be limited to 20% over the CIF price of comparable imported equipment.
- 10.6.1.28. Import controls for capital goods should be retained during the present stage of development of this sector facing 'teething' problems of quality and users' preference for foreign equipment.

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

- 10.6.1.29. Import controls should be limited to maximum of 10 years.
- 10.6.1.30. With high interest rates, the debt-equity ratio tends towards a relatively higher proportion of equity. This may require special governmental decrees to financing agencies for capital participation in machine-building projects.
- 10.6.1.31. It is recommended that as a matter of policy capital goods projects which are considered economically sound and essential for technological growth should be taken up by the state if private sector response is not adequately forthcoming.
- 10.6.1.32. When projects are financed through external credit sources, particularly through international organizations, there are generally specific provisions and conditions regarding procedure to be followed for equipment purchases invariably militating against domestically-produced equipment. A lot will depend on local negotiating strength and skill to reduce these constraints to a minimum.
- 10.6.1.33. Capital goods manufacture may be treated as a priority sector for the purpose of differential tax reliefs.
- 10.6.1.34. A deliberate national programme of exports has to be a basic component of capital goods development.
- 10.6.1.35. Combination of various enterprises having complementary production programmes and formation of consortia could be given a boost by the Government through incentives and selective credits.
- 10.6.1.36. A very important fiscal incentive is post-shipment export credits.
- 10.6.1.37. A freight subsidy may also be considered particularly for exports to Europe for which there is considerable potential in the field of labour intensive items.
- 10.6.1.38. Channeling of exports through export consortia and service firms needs to be considered and encouraged.

CAPITAL GOODS DEVELOPMENT PROJECT IN TURKEY

- 10.6.1.39. The Government may also consider setting up a council for promotion of machinery exports, consisting of principal present and potential machinery exporters which could work in close liaison with each other.
- 10.6.1.40. It is possible and desirable for Turkey to exploit its geographical and other advantages as an Islamic country to promote its exports in this area. Specific programmes should be drawn up for
- (i) RCD countries
 - (ii) Islamic group of countries
 - (iii) Other developing countries particularly Africa.
- These should be (i) for machinery and plant and (ii) as metal-manufactured items either by themselves or as a part of export projects.
- 10.6.1.41. Research and development for capital goods sector must form an integral part of a national plan for scientific and technological growth.
- 10.6.1.42. Steps recommended to be taken for promoting R and D by the Government SEE's private sector and Universities have been recommended.
- 10.6.1.43. The financial institutions play a pivotal role in the development of industry, particularly where it has to be on a planned basis according to the priorities of the State.
- 10.6.1.44. The pattern of assistance that should be rendered by an Industrial Development Bank is indicated below:
- (a) Direct assistance in the form of loans, underwriting and or direct subscription to shares and debentures of industrial concerns and provision of guarantees for a variety of purposes.
 - (b) Refinancing of industrial loans granted by banks and other financial institutions.

- (c) Rediscounting of bills arising out of sales of indigeneous machinery on deferred payment basis.
- (d) Medium and long term credit for exports which takes the form of
 - (i) direct loans and guarantees to exporters in participation with the banks as well as
 - (ii) refinancing of medium-term export credit granted by commercial banks; and
- (e) Assistance to other financial institutions by way of subscription to their shares and bonds.

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