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6. Education.

The various Training Centres offering courses covering requirements from Craft Training to Graduate Integration in Industry should be used to ensure sound education is given in the following subjects.

A. Preventative maintenance of machine tools.

B. Servicing and re-grinding of cutting tools.

C. Methods of manufacture.

D. Jig and fixture design.

E. Programming and servicing of numerically controlled machine tools.

7. Jigs and Fixtures.

The design and manufacture of fixtures is a highly specialised subject.

This is a major bottleneck in commencing manufacture of new products in the countries of the Region. In addition to educational work which can be carried out at the training centres a study should be undertaken to ascertain the most suitable means of expanding production of fixtures, within the industrial economic structure adopted in each country.

8. Machine Tool Rebuilding.

Centres for rebuilding machine tools should be established, especially in countries where restrictions are imposed on the importation of new machines.

Assistance in this operation will undoubtedly be required by some countries.

9. Sub Contract Exchange.

In some countries there is an acute lack of information concerning facilities for supply or manufacture of components existing within the country. A service to assist inter-trading between companies would improve productivity by encouraging companies to specialise. (One such unit has been established in Istanbul).

10. Numerical Control of Machine Tools.

The lack of knowledge of latest developments is preventing the introduction of this equipment for work where it is eminently suitable.

Assistance with the introduction of equipment and the techniques required for its successful operation should be given.

MISSION REPORT - TURKEY.

The single greatest factor affecting every aspect of the economy of the country is the second Five Year Plan which commenced at the beginning of January, 1968. Within the framework of the mixed economy where approximately half the industrial capacity is controlled by State enterprises which comprise mostly large corporations while the other half is controlled by private industry which mostly consists of comparatively small firms.

In the statement promulgating the Plan the Government stated "the basic objective underlying the development plan is to make the Turkish citizen prosperous, happy and contented, in order to achieve this, one should, above all have competence. We are entirely confident that we shall achieve the goal of a developed and prosperous Turkey without being daunted by any difficulty and without wavering before any obstacle. We believe that our nation and our country possesses the potential for a steady, rapid and balanced development by making maximum use of the Turkish citizens creative power and by mobilizing all the resources of the State within the system of a mixed economy."

The Plan is of an imperative nature in the case of the public sector and of an indicative nature in the case of the private sector. During the second Five Year Plan period, Turkey's national income will increase by 7% each year and the per-capita income will rise from TL.2,600 to TL.3,200. The Plan constitutes an important step forward leading Turkey away from a primitive economic structure in which raw materials are sold and manufactured products are bought, to one which is industrialised and where manufactured products are both produced and sold. During this period we shall benefit from all the possibilities afforded by modern technology and from the knowledge and experience of other countries.

Significance of the Five Year Development Plan.

In order to ensure that the full significance of the Five Year Plan on the industrial development of the country is appreciated, certain of the important physical targets have been listed in Appendix 'A'. Production and value added targets for the manufacturing industry, together with the proposed investments in manufacturing industry have also been included. As a further indication of the anticipated expansion of the engineering industry, the domestic demand estimates and production targets for the iron and steel industry have been given at Appendix 'B', together with the metal products industry and automotive industry, domestic demand estimates and production targets.

It should be specifically noted that the production of machine tools, accessories and equipment is scheduled to increase from 49,000,000 TL in 1967 to 110,000,000TL in 1972, but in spite of this increase in production imports are estimated to rise from 83,000,000 TL in 1967 to 191,000,000 in 1972.

The Machine Tool Industry of Turkey.

The principal companies manufacturing machine tools are reported to be M.K.E. at Kirikkale which is a Government owned company and four companies in the private sector namely - Tezsan, Bimak, Turk Makine and Mehmet Aydagone. While it was only possible to visit the first named company in the time available, these companies appear to form the nucleus of a machine tool industry which could be rapidly expanded so as to meet both in quantity and in variety the range of machines which will be required for the expansion of the Turkish engineering industry. The M.K.E. Company is undoubtedly the largest, and builds three sizes of engine lathe, two sizes each of a horizontal, vertical and universal milling machine, a bench drilling machine, a pillar drilling machine and a medium sized shaping machine. All these machines being built under

Licence from Fritz Werner in Germany. It appears that the milling machines were part of a Fritz Werner standard range and therefore all the manufacturing data, together with jig and fixture drawings were made available to M.K.E. In the case of the other machines apparently this information was not available which has caused serious inconvenience and delays in manufacture. Machine acceptance specifications were laid down by Fritz Werner but these appear to be based on the old Slezenger standard. The factory was well equipped with predominently modern machines imported from Germany. Castings were produced from their own foundry adjacent to the factory and these appeared to be of excellent quality. The capacity of the foundry is stated to be 6,000 tons per annum which is clearly far in excess of their present requirements and they also have an electric furnace for the production of spheroidal iron. Forgings are produced by their Associate Company and of those seen the geometric definition was good. All bearings are imported as there is no anti-friction bearing industry in Turkey and apparently the majority of the electric motors also being imported. It is understood that their total output is in the order of 500 machines per annum.

Tezsan manufacture under Licence from the Czechoslovak Company Polytechna Tos and manufactures four sizes of engine lathes and a drilling machine. They appear to have considerable investment in building and manufacturing plant, output in the current year is expected to reach 400 lathes and 200 drilling machines.

Bimak, who it is also understood manufacture under Licence, also appear to have similar substantial investment in buildings and plant and are expected to produce 300 lathes of a single size.

Turk Makine manufacture a hydraulic hacksaw, which is understood to be of their own design and have a total of 41 employees.

Mehmet Aydagone make a mechanical hacksaw which it is also understood is of their own design and have 30 employees.

Duty on importation of complete machines is at the rate of 50 which also applies to the importation of parts. There is apparently no licensing required for the importation of parts so that certain companies find it more economical to import many of the more complex components for the machines in their construction programme.

Manufacturing and Acceptance Standards.

It is highly desirable that standards should be laid down covering the major areas of machine tool manufacture. Experience elsewhere has shown that production methods and quality become harder to change as industry becomes more complex so that no time should be lost in adopting standards which will meet the future needs of the industry in the years ahead. UNIDO Publication ID/22 covers the selection and acceptance testing of metal cutting machine tools. This document could well form the basis for the establishment in Turkey of machine tool standards. While it is accepted that at this time considerable effort would be required to draw up the whole range of standards which are required, it should be appreciated that the task will become progressively more difficult the longer it is left before a start is made, furthermore, the amount of work which is put into preparation of the standards at this time will bear considerable dividents in the future by way of improved efficiencies and reduced manufacturing costs.

In view of the importance of this subject this may be an area in which UNIDO could give assistance through the provision of expert advice.

Market Research.

As had been indicated in the Report on the production of individual compahies, the main effort of machine tool manufacture in Turkey has been directed towards building engine lathes. This policy had the advantage that the current needs of the engineering industry for these types of machines could be fully met from local production

and at the same time the machine tool manufacturing companies were able to gain experience in manufacturing machines which were relatively uncomplicated but required a number of important machine tool manufacturing techniques to be developed. These techniques included the machining of the bearing ways and the methods of achieving machine alignments, the fitting of precision bearings into the bearing housings so that the bearings are not distorted, thereby reducing accuracy and causing premature failure. The manufacture of long precision screws and the production of gears and assembly of gear boxes.

As the engineering industry of the country develops it will be necessary to increase the range of machines which are manufactured, particularly as it is the Government's intention to orient small scale industry towards a production system to complement and supply large scale industry and to enable it to benefit from large scale industrial markets through sub-contracts. Production methods and technologies implemented in the large scale industry should therefore be closely followed by the smaller organisations. If co-operation is realised between the small and large scale industries manufacturing in the small scale industries will naturally increase along with the progress of the large scale industries.

If the national resources are not to be wasted through the manufacture of machines which are unlikely to be required at the present level in the years ahead, a painstaking and thorough review of the anticipated future requirements of the engineering industry should be undertaken as a matter of urgency. The review should, in particular, consider the following machines:-

Tool and cutter grinding machine.

Reciprocating table surface grinding machine.

External cylindrical grinding machine.

Medium sized knee type milling machine.
(To complement the smaller sizes already manufactured).

Bed type milling machine.

Turret lathes - 2 sizes.
(The smaller machine should probably be of the Ram type turret).

Numerically controlled drilling machine ($2\frac{1}{2}$ Axis).

Drill sharpening machine.

The problems associated with the introduction of the numerically controlled drilling machines may appear formidable but the advantages to be gained will be commensurate with the effort involved. Due to the relatively small scale of production in Turkish industry the numerically controlled drilling machine offers considerable advantages by allowing freedom of component design and the elimination of complicated and expensive drilling jigs, the cost of which can seldom be economically justified unless there is an adequate volume of production, although it may be technically imperative that they be used.

Market Research in the engineering field and especially in machine tools is an unusually complex operation and cannot be undertaken by the normal market research organisations. It is essential that the survey is undertaken by a unit with a complete understanding of the capabilities of the machine tools and the associated operations to be covered by the survey, in addition, a knowledge of the developments which are taking place throughout the industrialised world in the machining field are also extremely important as the decisions which are to be taken from the survey report will commit the company to a manufacturing programme which cannot easily be changed or reversed and may often cover a programme for a period of ten years or even more.

In view of the fact that the State industries and the private industry are together supplying machines to be used throughout Turkish industry, it is most desirable that some liaison committee should be formed with representatives from every machine tool manufacturing company where a free interchange of ideas can take place regarding the

future requirements of the entire Turkish manufacturing industry. This kind of liaison often exists in the trade associations of the developed countries. It is suggested that UNIDO should supply an expert to assist with the establishment of a market research operation of this kind.

Research and Development.

It is noted that the Government and the State owned industry are of the opinion that at this time it is preferable to undertake manufacture of machine tools to the design of a foreign manufacturer under a Licence Agreement. This arrangement certainly offers considerable advantages during the initial establishment of a machine tool industry, however, there seems little reason why some machine tool design, particularly for simple machines, like the tool and cutter grinder or the surface grinder, should not be undertaken locally. It is understood that the Government are establishing a research organisation which could perhaps form the nucleus for the formation of a Machine Tool Design Team, together with the necessary test and proving facilities. Alternatively, the private industry machine tool companies might consider setting up a communal design office which would look to the Government Research Department to undertake specific research projects on their behalf or other test programmes which may be required.

The establishment of the Design Office and research work is another field where UNIDO may be able to give valuable technical assistance.

At a meeting with Yavuz Yilmaz of the State Planning Organisation the hope was expressed that the Seminar would give advice as to whether the organisation of design for machine tools should be located at the individual factory or central office. Also which machines should be designed first and the reasons for this recommendation, together with the views of the experts on the types of machines which will be built in

future to meet the rapidly changing needs of the highly industrialised countries.

Education.

Primary education is for a period of five years, so that the majority of boys complete their education by the time they are eleven or twelve when they commence work which is usually for about 60 hours per week. Many of these boys go into the private sector industry as apprentices but the standard of craft training in these industries is reputedly extremely low. Such training however is a considerable advance on the alternatives which exist for the boys remaining in the rural areas where their tasks may be no more exacting than tending the sheep in the mountains.

A select few continue to secondary education which covers a further five year period. The majority of these are anxious to go on to University but there are insufficient places for all those wishing to do so, resulting in a long waiting list for vacancies. The Government consider that there is a serious shortage both of graduates and even more so, of technicians in industry and have prepared a new Secondary Education Plan in order to remedy the large gap in middle education. The provision of secondary education in technical schools will be organised under the new plan and these boys will be expected to go direct into industry on completion of their schooling, in order to meet the requirement for more technicians in industry. The working hours which boys are permitted to undertake are also to be restricted in the future. Some concern has been felt about the introduction of virgin graduates direct into industry from the Universities. A pilot scheme is being organised at the M.K.E. factories under Government auspices with the assistance of UNIDO whereby the graduate will obtain practical experience in a wide range of production disciplines within the various factories. M.K.E. are in a

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MISSION REPORT OF THE MACHINE TOOL INDUSTRY IN IRAN, IRAQ, LEBANON, SYRIA AND TURKEY

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unique position to provide this facility in view of their perameters of manufacture ranging from steel making through batch and mass production technologies. The number of graduate engineers in the machine tool industry is extremely small and reputedly in the private sector there are only a total of five. These numbers would clearly have to be raised if the industry is to continue expanding even if it does not undertake design on their own account but continue to buy designs from abroad. It is imperative that the best modern technology be used in the production methods of manufacture and this is only likely to be introduced where the responsibility rests on a graduate engineer.

It would be extremely beneficial if some of the young graduate engineers, who have already entered the machine tool industry and gained some experience of the industry's actual requirements, could be given the opportunity of a fellowship to visit Members of the machine tool industry in the developed countries.

Tool Servicing.

In the M.K.E. factory at Kirikkale there was a properly organised tool servicing section for the regrinding of drills, milling cutters, carbide turning tools, etc. This however, appears to be the exception as the Report by the I.L.O. Tool and Die Expert discloses that in the factories that he visited tool servicing was virtually non-existent. The importance of the subject both as regards the increased manufacturing time taken through the use of incorrectly ground or blunt cutters, and in respect of the greatly increased tool costs due to increased wear and premature failure of the tool itself does not appear to be fully appreciated. Short term remedial action could be taken through In Plant Training schemes of the type undertaken by the I.L.O.

A long term and permanent solution however is required as the magnitude of the problem will increase rapidly as industry continues to

expand. The subject should therefore be included in the curriculum of the technical colleges in order that the new generation of technicians should be fully conversant with the subject.

Fixtures and Die Making.

The State industries report an acute shortage of design and manufacturing capacity for both fixtures and dies. This conflicts with the report of the private industry sector where there are reputedly a number of companies engaged in this field. The former report is probably more correct as it was confirmed by the I.L.O. expert, but there probably are a number of small companies operating in this field, but only achieving output of a low quality. One of the reasons given for the preference of taking a Licence from an established manufacturer of machine tools in a foreign country was the availability of proved jig and fixture designs, this would appear to indicate not only a shortage of design capacity but a lack of confidence in the quality of local design. In a country which is rapidly developing its industrial capacity it is essential that this field be adequately developed if product design is not to stagnate due to the inability of introducing new component designs on the shop floor to meet changing requirements. It is believed that there is considerable talent available among the younger artisans who have returned to their country after working for a period of a few years in Germany. As the jig, fixture and die manufacturing companies in most of the industrialised countries of the world are relatively small specialist firms, the problem should be capable of rapid solution if a catalitic action could be generated to bring together the existing talent and adequate capital to acquire the specialist modern machinery which is needed for the efficient production of this type of equipment together with a small team of competent designers who during the early period would benefit from some expert technical assistance.

Preventative Maintenance and Rebuilding of Machine Tools.

Unfortunately even in many of the highly industrialised countries preventative maintenance is a subject which frequently receives little more than lip service. However, the efficiency of industry can be enormously improved even if it is only conducted on the most elementary scale. The waste of foreign exchange and of national resources not to say the funds of the individual company will be considerable if this technology is not developed to keep pace with the industrial expansion. It is not sufficient to allocate the responsibility for maintenance to a shop supervisor together with a few mechanics. Where this is done, the results are at best haphazard and may prove totally ineffective. Carefully planned routine maintenance based on properly maintained records is essential, in its simplest form this may consist of no more than ensuring that routine lubrication and oil changes, normal adjustments are carried out at the specified intervals of time. As experience grows, it will be desirable to include simple tests to ensure that the alignments and accuracy of the machine are maintained and where necessary to undertake the necessary corrections and adjustments. In its more sophisticated form detailed inspection of components and assemblies will be made and where necessary components replaced, it may even be found desirable that after specified periods of hours or years of service, certain components should be replaced regardless of their condition as the failure of certain vital components may lead to the serious damage to the entire assembly or to the machine as a whole resulting in expensive and time consuming major repairs. After a period of many years service the general accuracy and condition of the machine may have deteriorated to the point where it is no longer regarded as being adequate for continued production. In many instances there have been no fundamental design changes to the type of machine which would

cause obsolescence so that the rebuilding of the old machine to its original standards would be fully justified and it would then be capable of the same productive capacity as a new machine of the same class. The cost of rebuilding is usually less than half the cost of a new machine and the majority of the major components will be salvaged even though some reworking of them may be required, it is an especially worthwhile operation where labour costs are low and it must furthermore be remembered that in many instances the rebuilt machine will have greater stability than a new machine due to the ageing effect of the main castings. It is however important that this type of work should be undertaken by a firm specialising in the subject as a complete understanding of machine tool manufacture is necessary if the rebuilding is to be successful. Complaints are often made about rebuilt machines being unsatisfactory but these can usually be traced to a company undertaking the work with little concept of the real task in which they are engaged. These companies rate the importance of the external appearance of the machine above the need for maintaining the quality of the working parts and of the machine alignments. There do not appear to be any companies in Turkey specialising in this field, so that the establishment of one or two firms of this nature is most important, generally it is desirable that these companies should be located close to the industry which they are serving but this should not be regarded as a fundamental issue if there are other considerations which may make alternative locations desirable. Management, skilled labour and suitable factory facilities are the key to success.

Industrial Estate - Gaziander
(Established under UNIDO auspices)

During discussion with the Chamber of Industry it was suggested that this Industrial Estate might be a suitable location for the jig fixture and die making factory. The geographical location would seem

to be a serious disadvantage to an operation of this type together with the probable difficulty of maintaining adequate numbers of technicians and artisans of the required standard in an area which is so distant from the remainder of the Turkish manufacturing industry. Usually Industrial Estates established in a rural area are more suitable for repetitive operations requiring only semi-skilled labour which can be trained to the specific job in a limited period of time.

The Istanbul Sub-Contracting Exchange (UNIDO)

The establishment of this Exchange could play an important part in the development of the machine tool industry and also of the jig, fixture and die making industry of Turkey. In the industrialised nations these particular industries frequently rely to a large extent on the facilities for specialist manufacture of neighbouring companies. It is often uneconomic for a company to maintain the special machinery needed to undertake every kind of operation but, on the other hand, the parts may not be capable of being produced to the quality standards required unless the specialist equipment is utilized. The Exchange could therefore play a most important part in establishing contact between companies requiring limited productive capacity of a highly specialised nature.

The People's Bank (Halk Bankasi) could play an important part in the successful establishment of the Exchange as the majority of their clients are small businesses who would stand to gain most from the successful operation of the Exchange. The Exchange could also play a useful part in the establishment of a rebuilding service and a small company undertaking this type of work in the early days will need to establish contacts with many suitable sub-contractors to manufacture the various parts which it may be impractical to obtain from the original manufacturers of the machine due to the inevitable delays associated

with importation. The Exchange would also play a further part which may not have been originally envisaged in its constitution, namely by informing companies that a rebuilding service is available. It must be particularly born in mind that the highly productive machines are usually in need of the most frequent rebuilding and many companies with long experience of operating machines such as single spindle autos consider that these must be rebuilt at least every five years. The demand and the importance of rebuilding will therefore grow at a rapid rate commensurate with the rate of increase in the machine tool population of the country.

Sources of Statistics.

State Planning Organisation.

Chamber of Industry.

TABLE 148 — Important Physical Targets

	Unit	1962	1967	1967 Index 1962 = 100	1972	1972 Index 1967 = 100
	(1)	(2)	(3)	(4)	(5)	(6)
Agricultural Sector						
Wheat	Thousand Tons	7,395.0	7,935.0	107.3	9,200.0	115.9
Cotton Fibres	" "	245.0	362.0	147.8	455.0	125.7
Sunflowers	" "	60.0	315.0	525.0	452.0	143.5
Corn	" "	700.0	930.0	132.9	1,760.0	189.2
Meat (Including Chicken)	" "	480.4	544.3	113.3	709,3	130.3
Milk	" "	2,823.0	3,234.0	114.6	4,040.0	125.0
Sea and Inland Water Products	" "	115.0	155.0	134.8	240.0	154.7
Fire - Wood	Thousand Cubic Metres	3,155.0	4,495.0	142.5	7,185.0	159.8
Tree Planting	Thousand Hectares	22.0	33.0	150.0	50.0	151.5
New Fields Open to Irrigation	Thousand Hectares	53.0	81.5	153.8	126.8	155.5
Metal Products and Petroleum						
Copper Ore	Thousand Tons	769.0	1,270.0	165.1	4,070.0	320.4
Iron Ore	" "	813.0	1,800.0	221.4	3,200.0	177.8
Chrome Ore	" "	527.0	525.0	99.6	610.0	116.2
Coal (Coke)	" "	3,893.0	5,000.0	128.4	6,250.0	125.0
Coal (Lignite)	" "	2,979.0	5,600.0	188.0	8,500.0	151.8
Crude Petroleum	" "	595.0	2,400.0	403.4	6,000.0	250.0
Electrical Power						
Power Production	Million Kilowatts	3 559	6 250	175.6	11 850	190
Manufacturing Industry						
Sugar	Thousand Tons	390	620	159.0	860	138.7
Vegetable Oils (Including Margarine)	" "	214	380	177.6	590	155.3
Industrial Fodder	" "	17	77	452.9	151	196.1
Cotton Textiles	Million Metres	530	730	137.7	1 090	149.3
Woollen Textiles	Thousand Metres	21,000	23,500	111.4	28,500	121.2
Timber	Thousand Cubic Metres	1,426	1,900	133.2	2,850	150.0
Kraft Paper and Kraft Liner	Tons	—	—	—	60,000	—
Paper (Total)	"	104,000	122,000	117.3	308,000	252.5
Soda	"	—	—	—	85,000	—
Soda (Caustic)	"	1,973	12,000	608.2	46.000	388
Sulphuric Acid (100 %)	"	22,800	50,000	219.3	1.000.000	2,000
Nitrogenous Fertilizers	Tons	104,180	160,000	153.6	1,500,000	938
Phosphorous Fertilizers	"	60,430	250,000	413.7	2,430,000	972
Chemical Fertilizers (Total)	"	1,321	1,700	128.7	11,500	676
Synthetic Filaments	"	—	2,700	—	18,500	685
Polyvinylchloride	"	—	—	—	27,000	—
Cement	Thousand Tons	2,323	4,400	189.4	9,670	219.7
Steel Bar Ingots	Thousand Tons	279	980	351.3	1,650	168.3
Blister Copper	Thousand Tons	26	29	111.5	58	200.0
Alumina	Thousand Tons	—	—	—	125	—
Aluminium Billets	Thousand Tons	—	—	—	25	—
Steel Construction	Tons	4,000	12,000	300.0	26,000	216.7
Tractors	Number	2,574	8,000	310.8	15,000	187.5
Harvesting Machines	"	—	50	—	600	1,200.0
Electrical Motors						
Up to 0-2 HP	"	5,000	160,400	32,080,0	246,600	153.8
Up to 2-10 HP	"	500	6,800	1,360.0	13,300	195.6
Telephone Exchanges	Line Quantity	—	4,900	—	47,000	959.1
Transformers (10 - 10,000 KVA)	KVA	100.000	270,000	270.0	827,000	306.3
Trucks and Buses	Number	3,580	9,500	265.4	15,900	167.4
Cars	"	870	6,000	689.7	16,500	275.0
Diesel Locomotives	"	—	—	—	36	—
Educational Targets (1)						
Number of Primary School Students	Thousand	3,407	4,593	134.8	5,836	127.1
Number of General Secondary School Students	"	336	560	165.7	1,331	237.7
Number of High School (Lycée) Students	"	95	151	158.9	360	238.4
Number of Students in Secondary Level Technical and Vocational Schools	"	85.5	105.3	123.2	173.5	164.8
Number of Students in Technical High Schools	"	10.2	26	254.9	65	250.0
Number of Students in General High Schools	"	38.2	88.6	231.9	117.7	132.8

(1) Primary school teacher training schools, vocational educational institutes, agriculture, health and technical schools are not included.

Appendix A-2

TABLE 197 — Production and Value Added Targets for the Manufacturing Industry (Million TL) (At 1965 Prices)

Industrial Branches	Production			Value Added		
	1967	1972	Index 1967 = 100	1967	1972	Index 1967 = 100
1. Tobacco	2 440	2 890	118.4	1 490	1 700	114.1
2. Beverages	647	927	143.2	430	580	134.9
3. Food	17 041	22 860	134.1	3 130	4 300	137.4
4. Textiles and Clothing	7 900	12 060	152.7	3 900	5 900	151.3
5. Wood Products	1 920	2 851	148.4	580	860	148.3
6. Paper	370	889	240.2	170	350	205.9
7. Printing	450	830	184.4	230	380	165.2
8. Hides and Leather	300	440	146.6	90	120	133.3
9. Rubber	980	1 590	162.2	520	810	155.8
10. Plastic	360	800	222.2	150	330	220.0
11. Chemicals	2 220	5 800	261.2	1 000	2 600	260.0
12. Petroleum	2 997	4 816	160.6	1 570	2 750	175.2
13. Ceramics	112	206	183.9	75	120	160.0
14. Glass	467	808	173.0	305	520	170.5
15. Cement	682	1 540	225.8	380	850	223.7
16. Cement and Baked-Clay Products	540	786	145.5	350	500	142.9
17. Iron and Steel	2 420	4 500	185.9	1 160	2 200	189.7
18. Non-Ferrous Metals	780	1 460	187.2	420	700	166.6
19. Metal Products	2 060	3 920	190.2	1 040	1 850	177.9
20. Machinery	1 315	3 500	266.1	905	2 000	248.4
21. Agricultural Machinery and Tools	373	885	237.2	175	370	211.4
22. Electrical Machinery	518	1 352	261.0	290	690	237.9
23. Electronics	212	515	242.9	120	280	233.0
24. Road Vehicles	1 874	3 230	172.3	644	1 260	195.6
25. Railway Vehicles	310	450	145.1	180	240	133.3
26. Ship Building	140	420	300.0	60	230	383.3
27. Aircraft Repair and Maintenance	16	30	187.5	6	10	166.7
Total	**49 444**	**80 355**	**162.5**	**19 270**	**32 560**	**168.7**

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Appendix A-3

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TABLE 198 — Import and Export Estimates for the Manufacturing Industry (Million TL) (At 1965 Prices)

Industrial Branches	Imports (CIF)			Exports (FOB)		
	1967	1972	Index 1967 = 100	1967	1972	Index 1967 = 100
1. Tobacco and Cigarettes	—	—	—	826.0	980	118.6
2. Beverages	6.0	20	333.0	5.0	16	320.0
3. Food	155.2	60	38.6	1 253.3	1 385	110.5
4. Textiles and Clothing	66.0	80	121.2	68.0	350	514.7
5. Wood Products	5.0	10	200.0	10.0	50	500.0
6. Paper	140.0	140	100.0	—	—	—
7. Printing	20.0	19	95.0	2.0	5.5	275.0
8. Hides and Leather	20.0	30	150.0	74.0	120	162.1
9. Rubber	130.0	160	123.0	—	—	—
10. Plastic	—	—	—	—	—	—
11. Chemicals	1 650.0	2 000	121.2	35.0	110	314.0
12. Petroleum	109.2	175	160.2	28.2	—	—
13. Ceramics	0.3	—	—	2.1	13.5	642.0
14. Glass	23.3	10	42.9	22.9	40	174.6
15. Cement	20.0	—	—	—	25	—
16. Cement and Baked-Clay Products	—	—	—	—	—	—
17. Iron and Steel	400.0	970	242.5	—	—	—
18. Non-Ferrous Metals	230.0	270	117.3	200.0	480	240.0
19. Metal Products	200.0	300	150.0	5.0	40	800.0
20. Machinery	1 854.0	3 300	177.9	14.0	84	600.0
21. Agricultural Machinery and Tools	47.0	60	127.6	—	—	—
22. Electrical Machinery	317.0	500	157.7	26.0	100	384.6
23. Electronics	145.0	310	213.7	4.5	10	222.0
24. Road Vehicles	385.0	225	58.4	—	—	—
25. Railway Vehicles	60.0	50	83.3	1.0	-12	1,200.0
26. Ship Building	75.0	60	80.0	—	—	—
27. Aircraft Repair and Maintenance	110.0	140	127.2	—	—	—
Total	**6 168.0**	**8 889**	**144.1**	**2 577.0**	**3 821**	**148.3**

Appendix A-4

TABLE 199 — Investments in the Manufacturing Industry

(Million TL)
(At 1965 Prices)

	Industrial Branches	Investments in the First Plan Period	Investments in the Second Plan Period	Index First Plan = 100
		(1)	(2)	(3)
1.	Tobacco and Cigarettes	209.3	190	90.8
2.	Beverages	159.0	320	201.3
3.	Food	994.4	1 850	186.0
4.	Textiles and Clothing	1 563.3	2 400	153.5
5.	Wood Products	269.0	440	163.6
6.	Paper	317.2	1 850	583.2
7.	Printing	161.5	200	123.8
8.	Hides and Leather	46.9	150	319.8
9.	Rubber	430.4	700	162.6
10.	Plastics	108.3	235	217.0
11.	Chemicals	1 829.0	4 250	232.4
12.	Petroleum	782.0	1 150	146.9
13.	Ceramics	290.4	40	13.8
14.	Glass	173.9	240	138.0
15.	Cement	632.9	950	150.0
16.	Cement and Baked-Clay Products	191.2	60	31.0
17.	Iron and Steel	2 752.1	4 200	152.6
18.	Non-Ferrous Metals	114.6	1 500	1,308.9
19.	Metal Products	667.3	1 150	172.3
20.	Machinery	301.7	1 550	513.8
21.	Agricultural Machinery and Tools	33.8	150	443.8
22.	Electrical Machinery	272.0	450	165.4
23.	Electronics	29.5	150	508.5
24.	Road Vehicles	151.6	350	230.9
25.	Railway Vehicles	136.7	110	80.5
26.	Ship Building	85.0	350	411.8
27.	Aircraft Repair and Maintenance	17.0	15	88.2
Total		**12 721.3**	**25 000**	**196.5**

In the enterprises possessing the character of an industrial complex, all intermediary units will not be required to be established at the same time. Intermediary units will be established and the necessary intermediary goods will be imported paralliel to the increase in the volume of demand for the final product.

3. The cost of industrial products is generally high in Turkey. The factors causing an increase in cost prices may be listed as follows: Manpower productivity is generally low, enterprises are not operating at the minimum economic capacity, customs taxes on imported investment goods are very high and the price of certain basic goods and services is excessively higher than international market prices. In order to reduce the cost prices of industrial products, customs taxes and duties on the imported investment goods and the prices of certain basic goods and services will have to be readjusted.

4. In determining import priorities, the main criteria will be to ensure the utilisation of the existing capacity at a level to meet the demand and to enable the rapid realisation of the programmed investments.

STEEL

Appendix B-1

TABLE 281 — Domestic Demand Estimates

(Million TL)
(At 1965 Prices)

Commodity Groups	1962	1967	First Plan Annual Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Increase (%)
	(1)	(2)	(3)	(4)	(5)	(6)
Finished Products Demand	1 015.3	2 273	17.5	4 290	189	13.6
Semi-Finished Products Demand	263.3	547	15.8	1 180	216	16.6
Total	**1 278.6**	**2 820**	**17.2**	**5 470**	**194**	**14.2**

TABLE 282 — Production Targets

(Thousand Tons)

Commodity Groups	1962	1967	First Plan Annual Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Increase (%)
	(1)	(2)	(3)	(4)	(5)	(6)
Rods	170.0	324	14	580	176	12
Heavy Beams	46.0	25	17	25	100	0
Light Beams		75		100	133	6
Railroad Equipment	13.7	10	3	10	100	0
Wire	38.0	60	10	108	184	13
Sheets	3.5	13	30	30	226	18
Hot Plate	22.2	80	29	120	166	11
Cold Plate	—	50	—	120	240	19
Galvanized Plate	—	—	—	40	—	—
Tin Plate	—	35	—	68	194	17
Strips and Bars	—	—	—	15	—	—
Seamed Pipes and Equipment	21.1	60	25	111	185	13
Rolled Steel Pipes & Equipment	—	—	—	22	—	—
Machinery and Tool Steel	27.0	40	10	80	200	15
Pig Iron & Equipment	22.0	28	5	35	127	5
Pig Casting Parts	50.0	115	18	205	179	12
Steel Casting Parts	—	14	—	35	259	21
Tempered Spherical and Similar Casting Parts	—	2	—	10	500	38
Others	1.2	2	11	4	166	11
Total	**414.7**	**933**	**18**	**1,616**	**174**	**12**

Appendix B-2

TABLE 307 — Production Targets

(Million TL)
(At 1965 Prices)

Commodity Groups	1962	1967	First Plan Annual Rate of Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Rate of Increase (%)
	(1)	(2)	(3)	(4)	(5)	(6)
1. Steam and Gazogene Equipment	—	78.0	—	230.0	294	24.0
2. Construction, Road, Mining and Excavation Machinery, etc.	6.4	86.0	68.0	330.0	382	30.6
3. Internal Combustion Engines and Other Power Generating Machinery	2.5	17.0	47.0	280.0	1 650	75.0
4. Heavy Industry Machinery and Equipment	—	41.0	—	200.0	486	37.4
5. Machine Tools, Hand Tools, Accessories and Equipment	8.2	49.0	38.3	110.0	224	17.5
6. Compressors, Ventilators, Pumps and Turbines	13.0	24.0	30.0	220.0	916	55.8
7. Food and Beverage Processing Machinery	18.0	36.0	14.8	130.0	361	29.2
8. Air Conditioning and Heating Installations and Machinery	—	39.0	—	70.0	179	12.3
9. Textile Machinery	5.0	45.0	55.0	210.0	466	37.0
10. Intermediary Goods for Production	—	53.0	—	240.0	454	35.4
11. Consumer Goods	252.0	410.0	10.3	730.0	178	12.2
12. Others	156.7	437.0	22.6	750.0	172	11.3
Total	**462.0**	**1 315.0**	**23.2**	**3 500.0**	**267**	**21.7**

CONTENTS

Appendix B-3

TABLE 308 — Import Estimates

(Million TL)
(At 1965 Prices) (CIF)

Commodity Groups	1962	1967	First Plan Annual Rate of Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Rate of Increase (%)
	(1)	(2)	(3)	(4)	(5)	(6)
1. Steam and Gazogene Equipment	35.0	83.0	18.8	287.6	347	28.0
2. Construction, Road, Mining and Equipment	273.6	264.0	— 1.0	596.0	226	17.7
3. Internal Combustion Engines and Other Power Generating Machinery	217.5	231.0	1.2	271.4	117	3.2
4. Heavy-Industry Machinery and Equipment	122.0	155.0	2.1	480.0	310	25.5
5. Machine Tools, Hand Tools, Accessories and Equipment	87.1	83.0	— 1.0	191.0	231	18.2
6. Compressors, Ventilators, Turbines and Pumps	77.0	163.0	16.1	358.0	219	17.0
7. Food and Beverage Processing Machinery	50.0	93.0	13.2	113.4	121	3.9
8. Air Conditioning and Heating Installations and Machinery	26.0	47.0	7.2	67.5	144	7.6
9 Textile Machinery	125.0	153.0	1.2	102.7	67	— 7.7
10 Intermediary Goods for Production	72.0	133.0	13.1	236.4	179	12.4
11 Consumer Goods	14.0	34.0	19.4	71.0	210	16.0
12. Others	583.3	415.0	— 6.6	600.0	144	7.5
Total	**1 682.5**	**1 854.0**	**2.1**	**3 300.0**	**178**	**12.2**

Appendix B-4

TABLE 330 — Internal Demand

(Million TL)
(At 1965 Prices)

Commodity Groups		1962	1967	First Plan Annual Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Increase (%)
		(1)	(2)	(3)	(4)	(5)	(6)
Trucks and Pick-up Trucks	Number	14 817	7 500	— 14.6	12 000	160	8.9
	Value	445	488	2.0	780	160	8.9
Buses and Mini-buses	Number	3 329	2 000	— 10.6	3 900	195	14.2
	Value	391	316	— 4.4	616	195	14.2
Passenger Cars and Four-wheel Drive Cars	Number	4 050	16 000	31.5	31 000	194	14.1
	Value	90	288	26.0	844	293	24.2
Others Major Overhauls and Repairs		905	1 168	5.2	1 215	104	0.8
Total		1 831	2 260	4.3	3 455	153	8.4

TABLE 331 — Production Targets

(Million TL)
(At 1965 Prices)

Commodity Groups		1962	1967	First Plan Annual Increase (%)	1972	Index 1972 1967 = 100	Second Plan Annual Increase (%)
		(1)	(2)	(3)	(4)	(5)	(6)
Trucks and Pick-up Trucks	Number	7 354	7 500	. .	12 000	160	9.9
	Value	88	488	. .	780	160	9.9
Buses and Mini-buses	Number	2 230	2 000	— 2.4	3 900	195	14.2
	Value	352	316	— 2.4	616	195	14.2
Passenger Cars and Four-wheel Drive Cars	Number	877	6 000	. .	16 500	275	22.4
	Value	25	168	. .	462	275	22.4
Others Major Overhauls and Repairs		785	902	2.9	1 372	152	8.8
Total		1 250	1 874	8.5	3 230	172	11.4

Appendix 'C'

TURKEY

Names of persons with whom discussions were held.

Mr. Selcuk Maruflu.	State Planning Organisation.
Mr. Mehmet Gölhan	Head of Industrial Sect. Ministry of Industry.
Mr. Rahmi Önen	Deputy Director General, People's Bank (Halk Bankasi)
Mr. Rifat Ylmaz	Head of Machine Production, Makina Kimya Endustri Kurumu.
Mr. Yavuz Yilmaz	State Planning Organisation.
Mr. Muhittin Gürbuz Mr. Dögan Burat Mr. Tashkern	Chamber of Industry.
Mr. Güngör Uras	State Planning Organisation.
Mr. Erdinc Cennetoglu	Assistant Manager, People's Bank.
Mr. Barry White	Commercial Consul, British Embassy.
U.N. Officials.	

MISSION REPORT - LEBANON

Was briefed at the Unesob Office concerning the situation in the region by Mr. Jowhari and Mr. Abdelmoneim and was given sight of the Hartley Reports together with the most recent field promotional reports on Iraq and Syria.

The situation regarding Lebanese participation in the Seminar was not fully clarified so visited Dr. El-Halfawy the UNIDO Senior Industrial Development Advisor at the UNDP Office. A telephone call to Dr. Khlat at the Industrial Development Bureau of the Ministry of National Economy ascertained that the Government proposed nominating two delegates and that an official letter would be sent to the UNDP Office by Mr. Zoghbi. A telephone call to Mr. Zoghbi revealed that Dr. Khlat's instructions had not yet been passed to him so that no official confirmation had yet been prepared. It was felt that it would be useful to meet the two proposed delegates so the U.N. Office made the necessary arrangements.

Mr. Dantziguian is a qualified engineer assisting his father run their company, which was established 35 years ago and today manufactures aluminium window frames and doors. They have just moved to new premises but the number of machine tools used is only some 5 or 6 and are of a most elementary nature.

There is unfortunately no body of professional engineers such as exists in most industrialised countries where the exchange of knowledge and ideas can take place and it appears that any information gained by an individual is regarded as strictly for his personal benefit.

The second proposed delegate is Mr. Jean Toutounji who owns a small company manufacturing perforated sheet metal and expanded metal. He has developed over the past fifteen years a number of special machines for performing these operations, his company employs 6 workmen, he is not an engineer and has no contact with other engineering companies in the country beyond sales-activity relationships.

From records available it appeared that Messrs. Kassardjian are the largest engineering manufacturing company in the Lebanon and arrangements were made to meet Mr. Kassardjian the Chief Executive. Their operations are principally an iron and a non ferrous foundry. The production from their two foundries is principally machined by themselves and they have some twenty machine tools machining iron castin for valve bodies including a large trepanning lathe and 5 horizontal borers; and forty machines on the products from the non ferrous foundry, which are principally taps, gate valves and mixers, together with the associated parts. Mr. Kassardjian himself is trained in business administration, although he employs a number of engineers and technicians. It is suggested that Mr. Kassardjian himself, or one of his senior engineers would be the most suitable delegate for the Lebanon if this could be arranged.

A visit was also made to the Middle East Airlines Maintenance Establishment, where we were received by Mr. Khaled Mousfi the Vice-President of Engineering. The standard of their facilities were of a very high order but the machine shop was limited to some twelve machines. The ingenuity and skill with which many of the tasks were being tackled were exemplary but it was not felt that a representative of this Organisation would benefit from the Seminar especially as they have many opportunities of exchanging technical information with airlines from other countries.

The Lebanese industry works with a minimum of Government interference and there exists a fierce independence which was forcefully exhibited by each of the companies visited and a refusal to share experiences which may be of common interest lest a competitor should benefit from such information. It makes it therefore difficult to see that a delegate from the Lebanon will be able to widely disiminate any of the information gained from participation in the Seminar and for this

reason it is strongly recommended that the delegate should be selected from the company with the largest number of machine tools in operation which will therefore derive direct benefit and through example may have some indirect benefits to other companies.

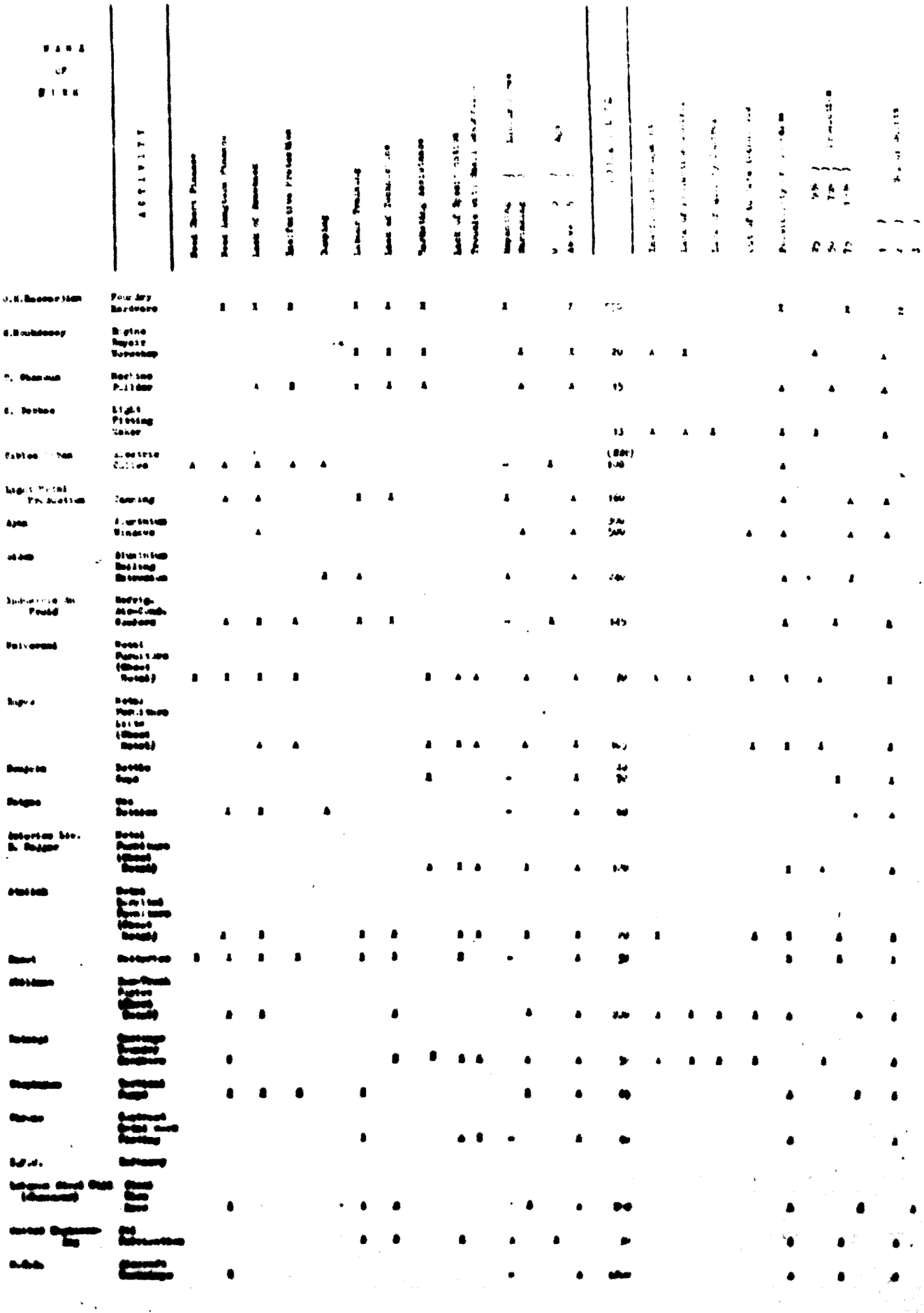
A brief summary of the Lebanese engineering industries is included at Appendix 'A' together with a more detailed summary of the principal companies at Appendix 'B'.

Appendix 'A'

Lebanon.

Metallurgical Industries			
No. 10	Employ 739	Capital	L.L. 23.0M.
Metallic Manufacture			
304	4,413		60.2M.
Machining			
103	646		9.6
Electric Products			
47	996		13.1
Transport Equip.			
70	3,400		46.2

APPENDIX B



MISSION REPORT - IRAN.

The Iranian mechanical engineering industry can be divided into three main groups:-

A. Government owned industry controlled through the Industrial Development and Renovation Organisation of Iran (IDRO).

B. Large engineering enterprises which in the majority of cases have been set up in collaboration with a major foreign company specialising in the field concerned.

C. Small scale engineering shops employing only relatively few operators, usually located in primitive premises, these are commonly referred to as the bazaar industry.

Statistics of the engineering industry, have been included at Appendix 'A'.

From these appendices it will be noted that a major engineering industry has already been established and from sheet A-3 it will be seen that the numbers employed increased considerably between 1962 and 1967.

The Industrial Production Index and the Economic Indicators on sheets A-4 and 5 also emphasises the rapid growth in nearly all sectors.

Perhaps the most striking presentation of this growth is given in the graph on sheet A-7 are running at 240% of the 1967 rate, by the end of 1970.

IDRO was established by Act of Parliament in 1967 and in the engineering field controls four companies each of which, at the present time, is due to commence production in the near future. The effect of these companies on the industrial life of Iran when they do become operational will be of tremendous magnitude. The four companies concerned are:-

1. Tabriz Metallurgical & Engineering Plant Inc. (Machine SAZI). This plant will manufacture machine tools, electric motors, pumps and small diesel engines.

2. Iran Tractor Company Tabriz.

This plant is scheduled to manufacture in the initial phase 5,000 tractors of 65 h.p. per annum, ultimately the plant is scheduled to increase production to 10,000 tractors per annum. These tractors are manufactured under a Licence from Rumania and are of a very antiquated design. It is understood that investigations are being made into the possibility of manufacturing a tractor of modern design.

3. Arak Machine Building Plant Inc.

The plant located at Arak has been constructed under Russian technical guidance and is entirely equipped with Russian plant and machinery. The buildings are of extremely heavy construction and it has therefore been decided that some of the lighter fabrications which were scheduled to be produced in the building should be eliminated in favour of heavier types of equipment. The main specifications of the plant, together with the machines due to be installed therein, are given at Appendix 'C'. The Company is scheduled to manufacture pressure vessels, belt conveyors, mine cars, steel bridges, package boilers, heat exchangers, equipment for food and sugar industries, lift crabs for cranes, construction earth moving and road making machinery, technological structures for petro-chemical industries, steel and iron castings, manganese steel balls and pressed steel parts.

4. Iran John Deere Company.

This Company will manufacture agricultural implements and industrial equipment to the design of the John Deere Company of U.S.A. The plant is located in Arak adjacent to the Arak Machine Building Plant. The operation will be principally one of assembly in the early stages but it is anticipated they will ultimately take a considerable volume of fabrications from their neighbour company.

The sector of private industry associated with foreign partners includes companies such as Mercedes Benz, Leyland, Dorman and S.K.F.

which are recently established major manufacturing operations. There is also major assembly operations with limited local manufacture by companies such as Chrysler (Hillman) and American Motors (Rambler). Production of consumer durables such as refrigerators, air conditioners, etc., is also undertaken using imported compressors and electric motors but locally manufactured housings and other components.

The other section of private industry, generally referred to as the bazaar industry, covers many thousand of small companies which are often no more than single rooms on the main streets of the towns.

The establishment of the training centres and the development of the large State owned companies will undoubtedly appreciably assist the development of this sector of small private industry. The State companies will need to purchase many items from local suppliers and will establish higher standards of quality than hitherto existed, furthermore, a great number of the trainees from the schools will ultimately find their way into the small private companies. It has already been noted that some of the students in the industry training schools come from good local families who undoubtedly intend ultimately to set up in the engineering industry on their own account.

In the short term this may not be helpful to the establishment of the State companies but undoubtedly it will be of considerable benefit to Iran, they will have been trained to much better standards of quality and workmanship, to the use of standards and accurate measurement, and it is hoped, in the proper maintenance of machine tools.

The small companies normally employ less than 10 men and may only use two or three machine tools. There are no reliable figures as to how many companies exist but there are certainly several hundred and the total number of machines in use is greater than those in the very large new companies. The possibility of assisting them with a rebuilding centre to restore their machines to original accuracies and productivity should certainly be investigated.

Introduction.

During the four week period, Monday the 14th June to Friday, the 9th July, visits were made to the following countries:-

Turkey.

Lebanon.

Iran.

Iraq.

Syria.

The state of the industrial development, and therefore the requirements of each of these countries varied considerably, but despite this many of the problems encountered in one country were also found in the others, although the degree of importance attached to the particular problem showed considerable variation.

It was found necessary to emphasise, on a number of occasions, that the Seminar to be held in Varna was not solely for the purpose of assisting an already established machine tool industry or, even of assisting with the setting up of a machine tool industry in the country concerned. The effective utilisation for machine tools already installed or to be installed in the country is of paramount importance to the industrial progress of the country and these aspects are therefore to be a major feature of the Varna Seminar.

The need for industrial efficiency versus the requirement to employ surplus labour in the country, frequently imposes an almost insoluble dilemma in management and Government circles. It should however, be remembered that metal working is predominently a labour intensive industry and therefore a continuing and the most rapid possible expansion of this industrial sector will be the most effective means of creating the desired employment.

Machine [illegible]I

As this Company is the only one scheduled to manufacture machine tools in Iran it is given special attention in this report. Brief details of the Company employment, capacity and proposed product range in the machine tool field is given in Appendix 'B'.

Production has been organised in the Company on the basis of producing specified types of parts within each section of the factory, the system often referred to as family grouping, whereby all shafts for instance are produced in one section, and all gears produced in their own section from the raw material stage to the completely finished component. Exceptions, are however to be made in the case of the production of the electric motors which will be produced in a self-contained section of the shop.

The machine tools to be built by the Company are to the designs of T.O.S. of Czechoslovakia and these therefore have the advantage of having been proved in operation, all jig and fixture designs are available together with all production method data. Supply of materials apparently is however proving particularly difficult especially where limited quantities of special steels are needed and in the case of the many small factored parts which in an industrialised country could be easily purchased from many local sources.

Supplies of cutting tools are also reported to be difficult as the volume of their requirements are still unknown and especially with trainee labour, breakages are liable to be at a higher rate than normal.

Mr. Tavakoly, the General Manager, explained the many difficulties being experienced in getting a plant of this size and diversity into production, expressed considerable disappointment with the Czechoslovak experts, who under the terms of the Contract have the responsibility of training their counterparts at the factory, and advised that he had

already submitted to his Government a request for expert assistance from UNIDO in the field of standards. He noted that the delegate to the Seminar is required to submit a report, especially covering possible UNIDO assistance, and he expressed the view that he would like to have UNIDO experts to assist him in quickly achieving a satisfactory level of production, he particularly mentioned assistance in the areas of:-

Industrial engineering;

Production engineering;

Quality control;

Tooling design and production;

Marketing and Financial administration and control.

He felt that the UNIDO experts would be far more effective in guiding his staff and achieving production and financial targets.

Before submitting his report the candidate Mr. Ghassemlou has agreed that he will again carefully discuss with his General Manager the areas in which UNIDO assistance would be of the greatest benefit to their commencing machine tool production.

The potential of this plant is very considerable but the present management are seriously inexperienced in the effective control of such a large and complex manufacturing operation. The Czechoslovakian advisers appear to be more desirous of establishing a very large team of their own staff in the factory instead of assisting and guiding the local national staff. This has resulted in antagonism and reduced the effectiveness of the advisers who are working in the plant. There is a terrific need for assistance which must be undertaken with tact and thoughtfulness for the feeling of the existing management.

Many of the machines have already been installed for 12 months, but there is no prospect of them commencing productive operation in the foreseeable future. The very scale of the undertaking might daunt even

experienced management.

However, the determination to succeed exists, so that provided the right assistance can be given, volume production could commence quite rapidly. The machine tool manufacturing industry does incorporate many problems which do not occur in other parts of the engineering industry, so that some of the advisers should be fully experienced in machine tool production.

Education and Training.

Primary education covers a period of six years and the majority of boys undertaking work of an unskilled nature receive no further education. Those who receive a further three years of secondary education can expect to be trained for semi-skilled and skilled jobs, while those who complete a total of six years secondary education can expect to be trained as technicians.

A large number of students continue to University (ten universities in Iran) and it is stated that there is no shortage of qualified engineers, whereas a much more serious shortage exists at technician level.

Both at Machine SAZI Tabriz and the Machine Building Plant at Arak top grade craft and technical training schools have been set up. There are places for 240 boys at Tabriz and 400 at Arak. Sections for training on each class of machine tool together with fitting and maintenance training as well as foundry and forging practice are covered by these schools. The one at Arak, which was set up by the Russians and the local instructors trained by Russian instructors, is outstandingly good. Above the workshops at Arak lecture rooms have been provided and these are equipped with all appropriate models for the subject covered by the lectures in that room. The students spend alternate days in workshops and theoretical studies. It is usual not

to take boys for training until the age of 18, as below this age they are considered too immature to assimilate the training quickly and permenantly. The training covers a period of either one or two years depending on the class of work or the responsibility which the student will be expected to undertake. Military training for these students is postponed until completion of their course and is then restricted to six months instead of the usual two years. Graduate students are considered to lack practical training and to have an excessively theoretical approach to the problems which are presented to them. There appears, therefore, to be definite scope for a suitable training programme in order to effectively integrate students into industry before they are allowed to undertake management responsibilities.

Machine Selection.

During a visit to the Iran Tractor Company the General Manager, Mr. Badakhshan, advised that his Company were having difficulty in establishing the most advanced type of machines to purchase to meet their requirements for tractor manufacture. They have therefore asked the Industrial Management Institute at Teheran, another section of IDRO, to act as consultants and ascertain the information for them. He believed that there was no source of comprehensive information on the subject available in the country.

There is a definite need to establish a centre where technical information can be given and full library facilities set up, covering the complete range of machine tools which may be required in the country and the various sources of supply for such equipment.

It is not suggested that such centres would in any way eliminate the normal relationship between the purchaser and the domestic or foreign supplier of machine tools and other productive equipment. The function of the centre would be to ensure that the user was able to establish

contact with every possible supplier of appropriate equipment and thereby ensure that which was most suitable for the particular requirement was obtained.

Market Research.

Machine SAZI claim that they have an effective market research section, and that a scientific assessment of the market requirements was undertaken before they decided on the types and models of machines which should be manufactured by their Company. There was however, no evidence that any detailed study had been made of actual current requirements let alone future needs of the Iranian engineering industry. In all probability the decisions for the production programme had been taken and based on outdated statistics covering machine tool imports. This view was endorsed by Mr. Abu El Haj, the UNIDO expert.

An example of their failure to undertake proper market research is given by the selection of the bench drilling machine which was put into production, this machine was of comparatively heavy construction and greater accuracy than is usually expected from a small bench drill. As a result of these characteristics the cost of manufacture is high and the market has shown considerable resistance to accepting the product.

A cheap Japanese drill has therefore been purchased and the design department instructed to copy the design. This new lighter model is more likely to meet market requirements, provided it can be produced at the right price, however, it is difficult to see how a large organisation with the capability of manufacturing a wide range of components of sophisticated characteristics and with heavy administration costs can succeed in a highly competitive product.

Machine Tool Maintenance.

It is understood that both at Arak and at Tabriz the Russian and Czechoslovak suppliers of the machine tools have provided details and precise instructions for programmes of preventative maintenance on all the machines supplied.

As all the machinery in these plants is new the equipment should remain in excellent condition for a considerable number of years provided the instructions from the suppliers are adhered to strictly. The other large engineering companies, due to their foreign connections are likely to be persuing adequate maintenance programmes. The difficulty exists with the small companies where maintenance is likely to be of the most rudimentary kind and the condition of most machines at best is doubtful.

Educational programmes are unlikely to influence these companies at the present time but in the long term the large engineering organisations recently established should have a considerable influence for the better on the small companies. As reported elsewhere it is likely that a number of the trainees from these new organisations will ultimately move into the small scale industry and the practices which they have learned in the new companies will therefore be widely felt throughout Iranian industry. For this reason it is vitally important that the new organisations should tackle the requirements of machine and equipment maintenance on a fully scientific basis.

Industry Protection.

An embryo machine tool industry will certainly be in need of Government protection during its early years if it is to have a reasonable prospect of success and become viable. It is understood that at the present time the following charges apply to imported machine tools:-

Customs Duty - 10%

Commercial Profits - 5%

Bonus on Import - 1%

Insurance - 1%

Bank Charges - 5%

Transport to Djibouti - 3%

Other miscellaneous charges - 2%

However, on purchases by Government establishments the first two items are omitted.

These rates do not appear to provide the protection which will be necessary to support the company until it has become productive and efficient and able to withstand reasonable competition from third countries.

UNIDO Assistance.

The areas in which UNIDO assistance could bring immediate benefit to the machine tool manufacturing capacity of the country lie principally in the following areas:-

1. Assistance as enumerated earlier which is required by Machine SAZI.
2. The establishment and adoption of machine tool standards including machine acceptance standards.
3. Market Research needs to be conducted on a much more scientific basis.
4. Practical training of Graduate Engineers and their integration into the engineering industry.

Appendix 'A'

Iran.

Engineering Employment 1966.

		Employees	No. of Establishments
341	Iron & Steel Basic Industries	65	20
342	Non-ferrous Basic Industries	757	25
350	Manuf. of Metal Prod. ex machy.	77,122	21,039
360	Manuf. of Machy. except Elect.	102	12
370	Manuf. of Elect. Machy.	3,426	44
381	Ships Building & repair	44	16
382	Manuf. of Equip.	1,321	29
383	Manuf. of Motor Vehs.	1,672	243
384	Repair of Motor Vehs.	1,892	7,689
385	Manuf. of M/cycles and bicycles	7,671	5,034
389	Manuf. of Transport Equip.	204	104
39	Misc. Manf. Industries	14,727	7,285
38	Manuf. of Transport Equip.	42,492	12,489

TABLE 1- SUMMARY STATISTICS ON [illegible] IN IRAN 1967 (1346) [illegible]

TYPE OF ACTIVITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL MANUFACTURING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Food Manufacturing Industries	21950	122707	4390904	659901	[illegible]	41134800	[illegible]	+ [illegible]
Beverage Industries	56	5048	[illegible]	[illegible]	[illegible]	1396170	[illegible]	[illegible]
Manufacture of Tobacco and Tobacco Products	9	3033	838036	[illegible]	[illegible]	[illegible]	5806797	+ [illegible]
Manufacture of Textiles (including Carpets & Gelims)	20330	107431	4500344	[illegible]	[illegible]	[illegible]	[illegible]	+ [illegible]
Manufacture of Footwear Wearing Apparel and Made up Textile Goods	43038	107510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Manufacture of Furniture & Fixtures of all Materials	15538	41540	210975	[illegible]	[illegible]	[illegible]	[illegible]	+ [illegible]
Manufacture of Paper and Paper Products	[illegible]	2771	174550	199228	[illegible]	1001332	710373	+ [illegible]
Printing, Publishing & Allied Industries	1170	6522	307256	[illegible]	[illegible]	[illegible]	[illegible]	- 35695
Manufacture of Leather and Leather Products	1344	5077	173745	11003	1455770	1637642	[illegible]	- 93550
Manufacture of Rubber & Rubber Products	1061	8201	470544	81150	[illegible]	1195040	[illegible]	+ [illegible]
Manufacture of Chemicals & Chemical Products	865	8753	541804	[illegible]	[illegible]	2340608	[illegible]	+ [illegible]
Manufacture of Petroleum & its Products (excluding NIOC Plants) and Coal	7	640	57476	6856	[illegible]	[illegible]	[illegible]	[illegible]
Non-Metallic Mineral Industries	4472	30091	1525001	896478	[illegible]	10057276	5946379	+ [illegible]
Basic Metal Industries	1340	6415	[illegible]	20141	[illegible]	[illegible]	1355365	[illegible]
Manufacture of Metal Industries	19570	58550	1110125	[illegible]	7005046	[illegible]	[illegible]	1074
Manufacture of Machinery (except electrical)	1828	7904	156360	105310	312547	[illegible]	[illegible]	+ [illegible]
Manufacture of Machinery & Electrical Equipment	3857	36184	612600	138993	[illegible]	6907708	2645760	47097
*Transport Equipment	10084	34311	920250	597257	5106195	9177721	3091526	+ 127048
Miscellaneous Manufacturing Industries	5603	36501	207349	30052	1496677	2294253	837576	+ 9691
Electricity, Gas &Steam	438	8059	608979	124100	2098139	4214590	2100060	
Units engaging more than 50 persons Total(large ests.)	8508	223456	13604951	8232346	78537526	113813467	40073981	+ 5093175
Units engaging between 10 to 50 Total(10 to 50)	3934	85330	2440804	3436790	23053000	38744906	15003096	- 2059208
Units engaging less than 10 persons Total(small ests.)	156225	480091	6001409	1304513	34003072	60045109	25561317	+ 619549

* 1- As it has been described in previous years publications, the Bureau of Statistics held fix the number of industrial establishments as 112 Th. (figure relating to 1342). But as for development plannings it was necessary that the number of establishments should be reviewed in 1346 the Bureau of Statistics, Ministry of Economy has estimated the number of establishments in the cities as mentioned on page " ". Evidently the figures inserted in this publication are more exact.
2. One per thousand difference between 168723 and 168576 establishments inserted on page " " is due to difference between the time of two surveys and also the sampling errors of small establishments.
3. Value added has been calculated in factory price except in tobacco products.

TABLE 6 VALUE OF OUTPUT (SHIPMENTS, ELECTRICITY, WATER AND SERVICES SOLD TO OTHERS) IN INDUSTRIAL ESTABLISHMENTS IN IRAQ 1967-68 (IN '000 ALS)

TYPE OF ACTIVITY	TOTAL VALUE OF OUTPUT	SHIPMENT	ELECTRICITY	WATER	CONTRACT WORK DONE FOR OTHERS	GOODS SHIPPED IN SAME CONDITION AS PURCHASED	MISCELLANEOUS RECEIPTS
TOTAL MANUFACTURING	184056056	169766761	45720	57081	5969547	3924922	1297713
Food Manufacturing Industries	61340969	57305460	1463	500	1083927	1000137	119307
Beverage Industries	1894420	1878964	-	-	-	-	18456
Manufacture of Tobacco, Tobacco Products	6594401	6497576	316	-	-	26000	70009
Manufacture of Textiles (including Carpets & Kelims)	33211064	32002718	32041	8578	606830	199923	199965
Manufacture of Footwear, Wearing Apparel and Made-up Textile Goods	10488182	7893351	378	3730	2139505	303003	57535
Manufacture of Furniture and Fixtures of all Materials	4811592	4235937	2738	130	300011	163000	30003
Manufacture of Paper & Paper Products	1901332	18362 02	-	-	90643	5100	2307
Printing, Publishing & Allied Industries	1643230	1073318	-	-	542700	10007	10047
Manufacture of Leather & Leather Products	1957943	1847344	103	-	40065	30700	3773
Manufacture of Rubber & Rubber Products	3395409	3341618	-	-	42133	2300	9958
Manufacture of Chemicals and Chemical Products	7340646	7162750	-	-	30617	79906	70006
Manufacture of Petroleum and its Products (excluding INOC Plants) and Coal	631007	600006	-	-	-	30003	1310
Non-Metallic Mineral Industries	10037270	9667937	3704	913	90087	70304	107071
Basic Metal Industries	4417903	4370070	-	-	13011	31600	4314
Manufacture of Metal Industries	10093636	9617336	-	5722	650630	311467	100091
Manufacture of Machinery (except electrical)	701304	439900	-	-	170191	134172	13063
Manufacture of Machinery and Electrical Equipment	6067700	6448814	-	-	300613	116796	30406
Transport Equipment	9177731	7531901	110	900	1100612	410009	[illegible]
Miscellaneous Manufacturing Industries	2206303	1010417	-	-	309137	64700	60000
Electricity, Gas Steam	4854290	4451507	3900	31670	8071	-	150465
Large Establishments							
Total	133615467	110101012	45323	34750	2334792	2227004	799477
Establishments, between 10-30 persons engaged							
Total	30704000	[illegible]	3000	14519	902361	1460050	730113
Small Establishments							
Total	60465100	51300960	307	17814	6436756	1697016	900346

It is not suggested that the most advanced forms of automatic manufacturing methods should be employed, but unless reasonable efficiency is achieved, through using suitable production methods, the demand for the product will be stultified or met through imports and expansion of the industry retarded or halted.

The extent of organisational experience and skill which is required for the setting up and operation of large industrial complexes has been seriously underestimated. Where these operations were being guided by men with considerable past experience of industry in this category, progress was notably more rapid, resulting in more effective use of financial resources and more rapid expansion of effective employment.

It has been customary for workers from many of the developing countries, after learning the rudiments of the trade in their own country, to take up employment in industrialised countries of the world, notably in Denmark, Germany and Switzerland. This practice is often looked on with dismay by the Government of a developing country, but if the results are analysed more carefully it will be observed that considerable benefits accrue. At the present time large numbers of workers from Turkey are going to the industrialised countries mentioned. During the period they are resident abroad they remit considerable sums of money back to their families, which produce foreign revenue equivalent to a major export industry. Of even greater importance however is that after a period on average of five years, they return to Turkey and are able to offer employers much higher degree of skill than when they originally left the country.

Some of the more enterprising, having made substantial savings during their period abroad, return home to set up small businesses specialising in the trade which they practiced overseas. It is reported

APPENDIX A-3

TABLE C - NUMBER OF WAGE AND SALARY EARNERS AND THEIR ANNUAL SALARY IN RECENT YEARS, BY ACTIVITY IN URBAN AREAS OF IRAN (EXCLUDING OIL AND ELECTRICITY)

ITEM	1962 (1341)	1963 (1342)	1964 (1343)	1965 (1344)	1966 (1345)	1967 (1346)
BASIC METALS INDUSTRIES						
Total workers	1 126	3 154	2 781	2 998	2 999	4 [illegible]
Total wages and salaries	32 953	66 683	94 919	69 698	108 405	214 938
Annual per capita wages	29 240	21 125	34 7[illegible]7	23 268	36 081	44 209
METAL PRODUCTS INDUSTRIES						
Total workers	17 813	19 207	21 970	28 697	31 118	30 397
Total wages and salaries	453 761	470 916	690 408	868 615	898 040	1110 189
Annual per capita wages	25 474	24 839	30 439	30 101	28 798	31 413
MACHINERY AND ELECTRIC APPLIANCES INDUSTRIES						
Total workers	1 707	3 104	4 043	4 886	7 394	11 923
Total wages and salaries	99 388	98 996	148 884	209 734	271 379	612 886
Annual per capita wages	36 738	29 180	36 896	43 409	30 409	31 380
MACHINERY (NON - ELECTRICAL) AND TRANSPORT EQUIPMENT INDUSTRIES						
Total workers	17 694	18 605	20 203	28 349	22 676	45 097
Total wages and salaries	609 743	546 907	997 336	895 829	936 744	1885 629
Annual per capita wages	34 539	29 377	37 682	39 908	41 306	42 287
MISCELLANEOUS INDUSTRIES						
Total workers	2 399	3 439	2 909	3 474	3 880	9 497
Total wages and salaries	56 199	83 396	78 875	69 210	79 311	207 309
Annual per capita wages	23 426	24 838	26 988	19 988	20 771	30 946

APPENDIX A-4

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TABLE 2 - [illegible]

ACTIVITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1968 (1969) April	May	June	July	August	September	October	November	December	1969 (1970) April	May	June	July	August	September	October	November	December
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Food manufacturing industries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Beverages	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Textile industries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Clothing & [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wood and furniture	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Paper & cardboard	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Leather & hide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rubber	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chemicals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Construction and non-metallic mineral products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Basic metal industries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Metal products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Machinery (non-electrical)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Machinery electrical	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Transport equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous industries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Electricity	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1 - This index has been [illegible] [illegible] quantities [illegible] production after adjustments of changes in [illegible].

2 - [illegible] and printing and publishing industries are not included.

3 - In the preparation of these indices, average [illegible] production in [illegible] has been taken equal to 100.

SHORT PERIOD OF IRAN ECONOMIC INDICATORS

INDICATORS	UNIT	LATEST REPORTING MONTH	CUMULATIVE FOR PREVIOUS YEAR	CUMULATIVE FOR CURRENT YEAR	INDEX OF CHANGES
Export of crude oil(consortium) -	'000 Cu. Mt.	March 70	16193	17709	113.3
Export of crude oil(all companies)	'000 Cu. Mt.	March 70	175957	19864	112.8
INDICATORS OF PRODUCTION & DISTRIBUTION IN ECONOMIC SECTORS					
Consumption of chemical fertilizers (production and import)	Ton				
Standardized skin for export	'000 pieces	March 70	3288	3515	106.9
Standardized casing for export	'000 case	March 70	3233	3731	115.4
Standardized gum tragacanth for export	Ton	March 70	752	455	60.5
Standardized green raisins and raisins for export	Ton	March 70	359	595	277.1
Crude oil production	'000 Cu. Mt.	March 70	206043	227625	110.4
Stock ratio (against 100 units of sale)	Percent	December 69	72	61	84.7
Sale of oil products in the country					
-Kerosene	'000 Cu. Mt.	January 70	1833	1850	100.9
-Fuel oil	'000 Cu. Mt.	January 70	2431	2747	112.9
-Gas oil	'000 Cu. Mt.	January 70	2339	2584	110.4
-Motor oil	'000 Cu. Mt.	January 70	933	1060	113.6
Growth index of industrial products	1967 = 100	December 69	123	139	113.0
-Food industries	1967 = 100	December 69	104	115	110.5
-Textile industries	1967 = 100	December 69	108	120	111.1
-Chemical industries	1967 = 100	December 69	180	288	160.0
-Construction material industries	1967 = 100	December 69	113	127	112.4
-Metal product industries	1967 = 100	December 69	132	146	110.6
-Transport industries	1967 = 100	December 69	179	263	146.9
Electrical industries	1967 = 100	December 69	171	231	135.0
Electricity generation	Mill. KW.Hour	February 70	2763	3712	134.0
Import of iron beams	Mill. Rls.				
Sale of cement (for internal consumption only)	'000 ton	February 70	2158	2372	109.9

APPENDIX A-6

PART I

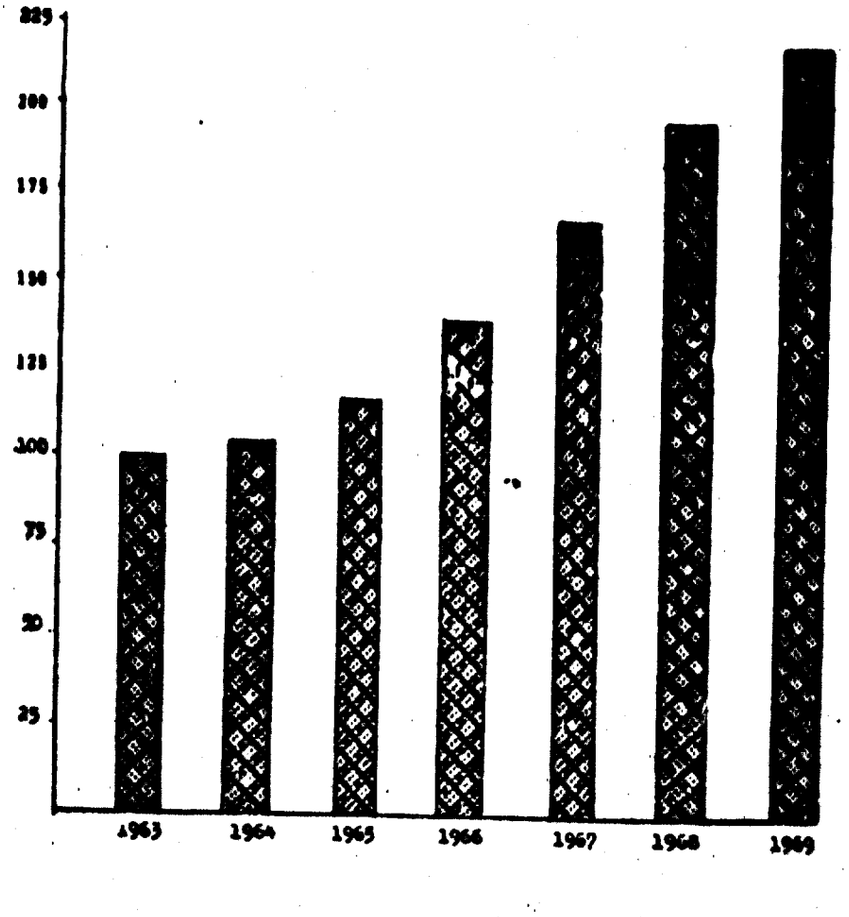
INDUSTRIAL STATISTICS

TABLE 1 -VALUE ADDED IN INDUSTRIAL GROUP OF IRAN

1962(1961) = 100

	COEFFI - CIENTS OF VALUE ADDED IN 1964	1963	1964	1965	1966	1967	1968	1969
Petroleum	59.1	100.0	105.6	119.2	134.5	146.3	186.2	217.9
Manufacturing	36.1	100.0	104.4	118.8	139.4	160.9	183.3	208.0
Mine	1.8	100.0	110.0	130.0	140.0	160.0	200.0	236.0
Electricity	3.0	100.0	118.7	134.4	165.6	200.0	240.6	303.2
Index of industrial production	100.0	100.0	105.6	119.7	137.3	158.2	187.3	215.0

Explanation : This table has been prepared for international comparison.

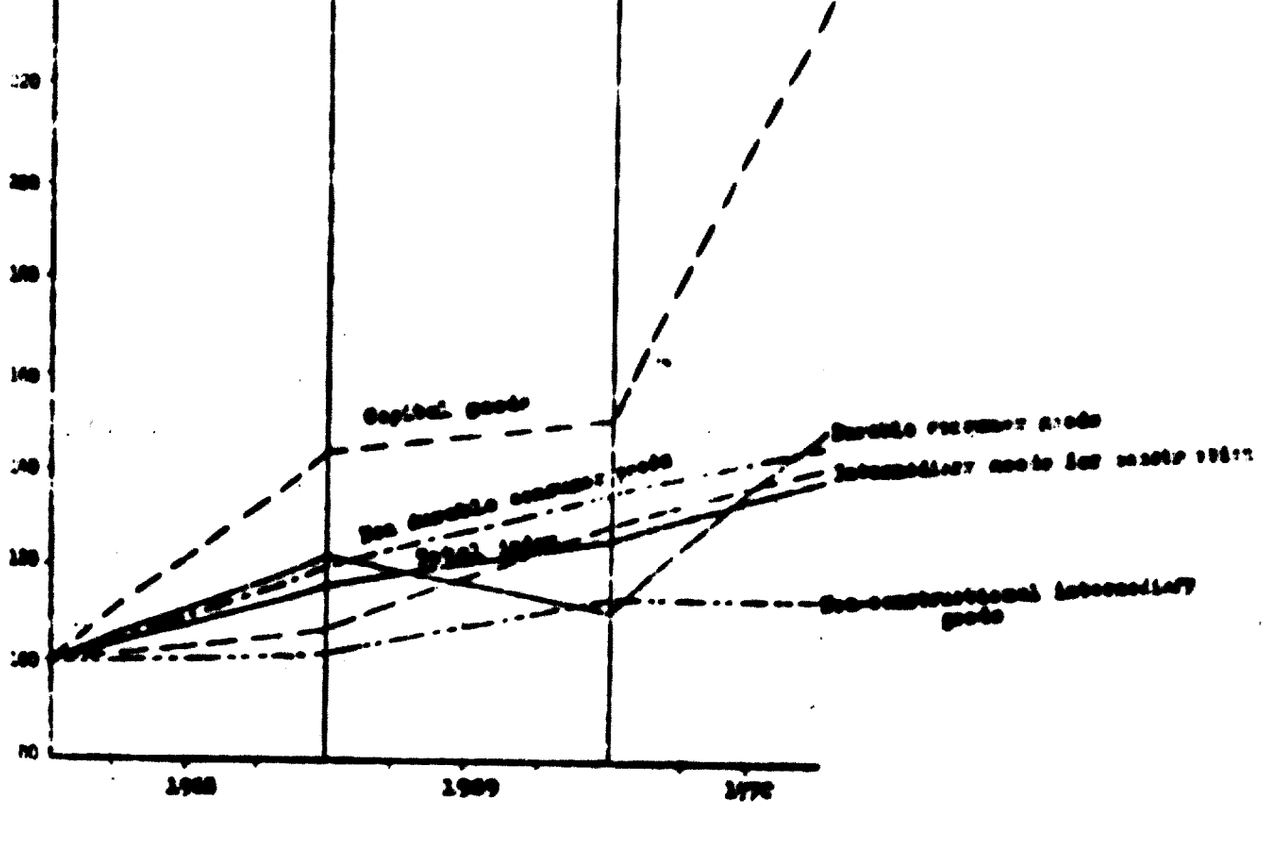


APPENDIX A-7

TABLE 3 - MANUFACTURING PRODUCTION OF IRAN BY CAPITAL, INTERMEDIATE AND CONSUMER GOODS

	CO-EFFI-CIENTS	1967	1968	1969	AVE. OF THE LAST [illegible]	AVE. OF THE LAST [illegible]	[illegible]
Total index	1.00	100	114	126	123	139	119.6
Non-durable consumer goods	0.46	100	118	136	138	146	126.6
Durable consumer goods	0.18	100	122	141	131	149	129.7
Non-construc-tional inter-mediary goods	0.24	100	102	114	107	118	114.0
Intermediary goods for construction	0.11	100	107	129	118	101	113.5
Capital goods	0.01	100	144	151	109	240	148.0

INDUSTRIAL PRODUCT CHART OF IRAN IN GROUPS, INTERMEDIATE & CONSUMER GOODS



SUMMARY LIST OF PRODUCTION UNITS OF MACHINERY/PLANT/EQUIPMENT IN A.M.B.P.

MACHINE/PLANT/EQUIPMENT, DESCRIPTION	NUMBER/UNITS ALLOCATED FOR PRODUCTION	MAINT. & T.R.
SECTION I - Metal Cutting Machines:		
1. Lathes, bench & engine	28	25
2. Turret & Capstan Lathes	16	-
3. Automatic Multi-spindle lathes	2	-
4. Turning & Boring Lathes/Ver. Borers	4	1
5. Drilling Machines	47	20
6. Centering Machine	1	1
7. Horizontal Boring Machines	3	2
8. Grinding Machines (a) Circular	5	4
(b) Surface	1	3
(c) Internal	1	2
(d) Miscellaneous	41	24
9. Gear Working Machines	5	2
10. Thread Cutting & Nut Tapping	4	-
11. Milling Machines	13	14
12. Planing & Shaping Machines	2	6
13. Slotting Machines	2	1
14. Broaching Machine	1	-
15. Cutting-Off Machines	8	11
TOTAL	184	116

MACHINE/PLANT/EQUIPMENT, DESCRIPTION	NUMBER/UNITS ALLOCATED FOR PRODUCTION	SECT. TOTAL
SECTION II - Metal Pressing Equipment:		
Group 1. Hammers	5	
2. Presses (a) Hydraulic	7	
(b) Mechanical	19	
(c) Screw Friction	5	
3. Forging, Punching, Shearing Cropping	8	
4. Straightening & Bending rolls & other M/C	12	
4a. Accessory Forge hearth portable	1	
		57

TIG BORING M/C.

9.3. Bucket elevators

Appendix 'B'

Tabriz Metallurgical & Engineering Plant Inc.
(Machine SAZI)

Total Employment 2,327

Grade	Gen. Management	Financial Div.	Commercial Div.	Technical Div.	Production Div.	Personnel Div.
Technician	53	16	42	103	124	35
Admin. Worker	11	50	41	19	16	17
Direct "	-	-	-	-	948	-
Indirect "	84	-	115	338	245	69
Apprentices	-	-	-	-	-	238
	148	66	198	460	1,373	359

Foundry - Capacity.

Grey Iron	10,000	Tons P.A.
Non-Ferrous	200	" P.A.
Steel Castings	100	" P.A.
Forgings	700	" P.A.

Electric Power.

Max. Theoretical Consumption	20,000 K.W.
Demand	6,500 K.W.
Annual Consumption	145 M. K.W. Hours.

Water Consumption 314,000 Cu. Meters P.A.

Total Site area	540,000 Sq. Meters.
Shop area	115,000 " "
Future Expansion	900,000 " "

Total Investment I.Rials 5,900 M. (U.S. $ 80M).
incl. Working Capital.

Cost of Machinery & Equipment.
I.Rials 1,600 M. (U.S. $ 23M).

Total No. of Machine Tools installed 600 - includes 70 in Training School.

Total Weight of Production 9,750 Tons P.A.

Production.

Electric Motors	50,000 - 1.1 to 10 K.W.
Small Pumps	8,000
Small Diesel Engine.	Future Product.

Machine Tools. 2,500

Lathes.	SN 40 & 50/2000	500 P.A.
	SU 63A/2000	50 P.A.

8.8.73

that many of these small businesses are extremely efficient and offer a high degree of technical competence.

In the countries which are building machine tools collaboration in their production programme with other countries in the region would enable the product to become much more competitive with foreign imports due to each type of machine being produced in much greater quantity if there was a market outside the producing country. The Regional Agreement between Turkey, Iran and Pakistan might be a suitable instrument for establishing co-operation in the machine tool field.

Statistics are generally of a global nature, which makes detailed analysis of these difficult if not impossible. Accurate statistics are an important tool amongst many others, in undertaking effective market research. Improvements in this area would therefore reduce the risk of unsound projects being undertaken.

The advantages of using some of the simpler machines such as drilling machines equipped with numerical control in small scale manufacture has not been appreciated. Considerable developments have taken place during the past few years both in the simplicity of programming these machines and in the reliability of the controls, these machines offer considerable advantages by the elimination of complicated jigs and from the freedom given to incorporate design changes without the delays associated with jig modifications.

TURKEY AND IRAN.

Both countries are making rapid strides in their industrial development and both have, or are at an advanced stage of developing, an effective machine tool industry. Both these countries in their industrial development have appreciated the advantages which can be gained through having a foreign partner in the development of their industry who is financially involved in the success of the project.

The provision of proven management in the specialised field involved has ensured rapid progress. The setting up of large industrial complexes creates many difficulties which might have been avoided if operations on a smaller scale had initially been commenced. Considerable expert support is required for these, which may either be obtained through direct contracts with a company, by foreign experts engaged by the Government or through the assistance of the United Nations.

Though these countries are already making rapid industrial progress and this is likely to gain momentum as the major industrial units become fully effective. The scale of operations in these countries is such that proper selection of machine tools for specific requirements can be regularly undertaken and it is entirely feasible for properly organised preventative maintenance to be carried out on their machine tools and other industrial equipment.

The types of machine tools to be built in these countries requires further study as mistakes in this area have been made. Suitably qualified engineers and supporting staff are available for the research and development necessary for the introduction of the simpler types of machine tools of their own design.

There was reported a considerable shortage of fixture and die making capacity which could most effectively be resolved by the establishment of small to medium sized companies specialising in this class of work.

There is a very wide discrepancy in the scale of industry in Iran from the large industrial complexes at one end of the scale to the small open fronted shop on the city streets at the other end of the scale.

LEBANON.

There is comparatively little industrial activity in the engineering field, the companies are privately owned and the largest

of these has 60 machine tools in operation.

IRAQ AND SYRIA.

There is no large scale engineering industry established in either country but in each there is one very large engineering plant in the course of being established. Great difficulties are being encountered in this development and experienced observers familiar with the country question whether these operations will ever become productive.

Government policy precludes partnership operations with foreign companies. Both countries have comparatively large numbers of the small open fronted bazaar type workshops engaged in a variety of production and repair activities.

Manufacture of water pumps and repair of vehicles is however, the predominent operation. There is a resistance to the acceptance of new ideas even among engineers, and even senior managers will avoid at almost any cost the making of a decision where the consequence will be profound. In these cases they prefer to rely on the advice of a foreign expert. The excessively low labour costs and the desire to create maximum employment are major retardents to increasing efficiency. Due to the lack of large or medium sized companies in operation it will be difficult to effect any rapid improvements in efficiency, but an educational programme in tool servicing and machine tool maintenance at the craft training centres will ultimately prove very beneficial.

In view of the large numbers of very ancient machine tools in operation in small companies with little or no facility for effective major reconditioning it is suggested that a rebuilding centre be established where machines could be taken for complete rebuilding. The major cost in machine tool building is in labour and as this is available both abundantly and cheaply in these countries, the cost of this work which uses little in the way of materials, would in this case be extremely low.

RECOMMENDATIONS.

1. Technical Information Centre.

Establish in each country preferably as a section of an existing Organisation, a Technical Information Centre to provide information to the industry of the country on the most suitable methods of machining, bearing in mind local requirements, sources of suitable machines and information on latest manufacturing techniques.

2. Standards.

The adoption of Acceptance Standards for machine tools appropriate to the National requirement should be arranged. Standards for other relevant items should also be established. In most countries a suitable body to undertake this work already exists but Expert advice may be necessary.

3. Statistics.

The collection and publication of more detailed statistics would assist in the basic preparatory work of Market Research.

4. Market Research.

Even in industrialised countries this subject is often imperfectly executed in the engineering capital goods field. It appears to be virtually non-existant in the countries visited in spite of assurances to the contrary.

Advice on how this work should be undertaken is required.

5. Research & Development.

Too much reliance has been placed on Foreign advice and Licences which sometimes results in unsuitable products for the local market. It is also necessary to be able to update designs to meet changes in Technology.

Establishment of this function at a central industry unit or at individual companies should be undertaken.

2 OF 2

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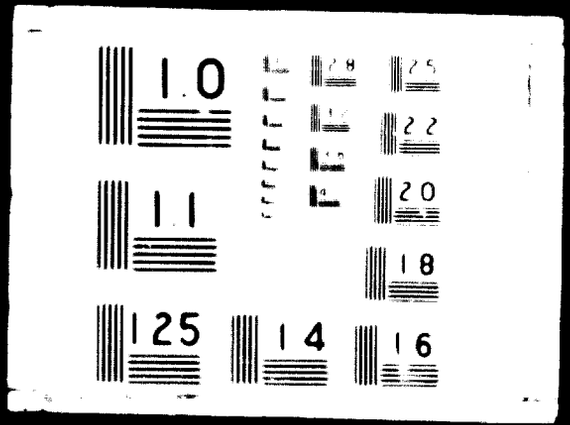


Milling M/cs.	FA3A Horiz. Vert & Universal	100 P.A.
Shaping M/cs.	40A & 63A	160 P.A.
Drilling M/cs.	Bench 4 Sizes	325 P.A.
	Column 2 Sizes	125 P.A.
	Radial 1 Size	50 P.A.
Double ended Floor Mounted Grinder 2 Sizes		1,000 P.A.
Presses Eccentric. 20-40 & 63 Tons		350 P.A.

Total No. of Workers and Technicians Trained in school up to 1971 — 550

No. of Engineers, Technicians and Workers trained in Czechoslovakia — 104

Housing for Staff - 20 Units
10 Houses and 10 Blocks of Flats.

Housing for workers - under consideration.

Project Finance.

Loan from Czechoslovakia U.S. $ 15 M.
Remainder Iranian Govt. Plan Organisation.

Machine Tool Rebuilding Programme.

Due to the age of many of the machines at the Railway Workshop, these have become inefficient, but for the class of work being undertaken could be fully restored if a major rebuilding programme was undertaken. It is suggested that advice on the most suitable method of conducting a rebuilding programme to cover such a wide range of machines, would be extremely helpful. In many instances the work performed would not justify the cost of more modern types of machine tools and the skill for operating these machines, as well as the skilled fitters for a rebuilding programme, are available although guidance would undoubtedly be needed.

Preventative Maintenance.

At both Iskandyria and the Electric Manufacturing Company, there is an urgent need to set up an effective preventative maintenance programme if serious damage to the machines is not to be incurred. The utilisation of machines at both these establishments is of a very low order.

The candidate for the Seminar is the Production Manager of the Electric Manufacturing Company, so the opportunity was taken to discuss with him in detail the desirability of improving utilisation through re-layout and re-organisation of the production planning. He agreed that his Department had on several occasions considered initiation of improved methods and re-layout of the plant but they have always decided that this cannot be done either because the machines are in continuous use or because the present layout was given to them by the Consultants when the factory was established, and they would not like to change it even though they are producing a product range which is far removed from the original intention of the plant. He felt that his own staff could not make satisfactory proposals in this area and thus if any change was to be made they would require advice from foreign experts.

Selection of Machine Tools.

A visit was made to the Industrial Research and Development Institute for Engineering Industries as it was thought that this body might be able to give assistance in machine tool selection to companies. The principal work of this body however is almost entirely devoted to chemical analysis with a very small section devoted to structural testing. The Institute also undertakes feasibility studies for the Government but as a result of recent re-organisation has no capacity for undertaking this work on behalf of either State or private companies. There is therefore a very real need for a body to be set up to give advice in this area as individual companies clearly do not have the expertise to undertake this work.

Numerically Controlled Machines.

There is a complete lack of understanding of the benefits which can be derived from the simpler types of numerically controlled machines such as vertical drilling machines. They have been regarded as a product purely to be used by mass production industry in highly industrialised countries. The fact that an N.C. drill is invaluable in a batch production shop by eliminating the need to make large quantities of expensive jigs and the flexibility of design changes which this brings about, have been completely overlooked.

Many components which could have been cheaply and quickly machined on an N.C. drill were being labouriously and at enormous cost produced on jig boring machines. Furthermore, the improvement in reliability and the simplification in servicing requirements which have resulted from developments in the electronic field in the past few years has not been noticed.

A UNIDO project for the education of production managers in this topic could do much to facilitate improved efficiency and reduce reliance on foreign supplies in these countries.

Tool Grinding.

A great deal of education is still required in this area as the standard of tool servicing generally leaves much to be desired. Increased production could undoubtedly be obtained from many of the machines if better quality tools properly serviced were utilised. Feeds and speeds being used were normally much slower than one would expect to see in an industrialised country, due either to the tools not being capable of operating faster or, where the tool was properly ground, to a desire to prolong the life to the maximum before regrinding would be necessary.

Appendix 'A'.

IRAQ.

Statistics.

Industrial Employment.

152,522 persons are employed in Industry according to Ministry of Planning in 1967.

89,024 persons in 1,383 Enterprises employing 10 or more persons.

63,498 " " 15,549 " " less than 10 persons.

This represents 6% of the employed population.

Employment in enterprises of 10 or more persons.

Size.	No. of Establishments.	No. of Workers.
10 - 19	698	8,291
20 - 99	482	19,353
100 - 199	128	17,662
200 & over	76	43,718

Note: These figures cover all types of industry.

I.L.O. estimate there are 3,560 workers in the metal industry in enterprises employing 10 or more persons excluding Iraqi Railway Workshop, Transport Workshop and the State Engineering works at Iskandyria.

Official figures for vehicle registrations in Iraq 1967

Trucks and Lorries	30,054
Buses	9,100
Taxis	18,373
Private Cars	42,393

IRAQ.

Long Term Technical Assistance UNIDO Mission Feb/Mar. 1971.

1969 G.N.P. ID 879.6 M. Population 9.2 M. = per capita 265 U.S. $

Manufacturing Ind. ID 94.4 or 9.1%

No. of Establishments.	Public No.	Public 000 ID.	Private No.	Private 000 ID.
Basic Metallic	1	212	96	3,329
Production & Repair:				
Machinery	4	-	21	3
Electric Machinery	3	126	23	1,058
Transport Equipment	55	45	26	190

Planned Investment 1970-74.

Industry.		
Manufacturing	162,550	50,000
Electric	26,900	—
Transport & Communications	114,290	34,000

ISKANDYRIA. Tractor & Allied Engineering Factory.

Largest engineering complex in Middle East. Total cost 11 M. ID.

To employ 3,500 produce 38,00 tons machinery.

Estimated 600 companies in engineering field.

Industrial Research & Development Institute for Engineering Industries to expand this sector.

Appendix A-1

Survey covering one third of the industry.

- 63 -

APPENDIX 11

SUMMARY TABULATION OF WORKERS ACCORDING TO INDUSTRIAL SECTORS

Industrial Sector	Admin.	Eng.	Tech.	Sup/ Foron.	Skilled	Semi-Skled	Unsk.	Total
Public Works	242	248	10	392	2202	2601	6558	12253
Building	115	26	21	6	101	571	408	1248
Wood	9	-	3	3	30	22	42	109
Metal	113	31	65	25	315	255	310	1134
Motor Vehicles	81	3	7	7	160	110	78	446
Electricity-Radio/TV	60	35	10	34	253	208	124	724
Paper	62	-	2	6	51	212	94	427
Textiles	668	31	51	171	464	6106	924	8395
Shoes	23	1	1	6	11	254	18	314
Food	344	56	82	42	255	1125	4762	6666
Miscellaneous	155	54	143	40	122	706	357	1577
Total	1672	485	395	732	3964	12170	13675	33293

Results of a survey undertaken by I.L.O. covering approximately one third of those employed in industrial enterprises of 10 or more.

Industrial Sector Trade and Occupation	ISCO No.	Adm.	Eng.	Tech.	Sup/ Foren.	Skilled Worker	Semi-Skilled	Unsk.	Total
Metal									
Mechanical Engineer	0.24.10		99						99
Marine Engineer	0.24.40		6						5
Mechanical Engineering Technician	0.35.10			110	8				118
Chemists	0.11.10		2	1					2
	0.[illegible].90								1
Chemical Engineering Technician	0.36.10			2					2
Administrative Manager	2.29.40	1							1
Production Manager	2.12.10			10	21				31
Clerical and Related Workers	3.3/3.9 4.4/5.6	193							193
Draughtsman, Mechanical	0.32.20					5			5
Metal Moulder (Metal)	7.25.20					5	10		15
Metal Pourer (Foundry)	7.24.20					10	15		25
Furnace Man (Metal Reheating)	7.23.40					2	9		11
Metal Processers	7.2 7.00.30				9	4	82		86 9
Metal Press Operator	8.39.60						131		131
Metal Bending Machine Operator	8.39.70					10			10
Sub-total		194	107	123	38	36	247		745

Industrial Sector Trade and Occupation	ISCO NR.	Adm.	Eng.	Tech.	Sup/ Foreman	Skilled Worker	Semi-Skilled	Unsk.	Total
Sub-total carried forward		194	107	123	38	36	247		745
Machinery Erector and Installer	8.41.75					16			16
Blacksmith	8.31.10					26	10		36
Sheet Metal Worker	8.73.10					78	113		191
Tinsmith	8.73.40					7			7
Ship Plater	8.74.55					10	30		40
Pipe Fitters	8.71.10					19			19
Plumbers, Welders	8.7					60			60
Welders, Gas/Electric	8.72.10					136	55		191
Welder (Resistance)	8.72.35					6	22		28
Plater (Hot Dip Hand)	7.28.30					10			10
Solderer (Hand)	8.72.60					9			9
Manufacturing of Machinery and Metal Products	7.00.50				5				5
Lathe Operator	8.34.20					108	24		132
Planing Machine Setter Operator	8.33.40					5	10		15
Shaping Machine Operator	8.34.90					27	12		39
Milling Machine Operator	8.34.30					36	5		41
Machinery Fitter (Mechanic General)	8.49.10					270	120		390
Machine Tool Operator	8.34.10					43			43
Metal Making Machinery Operator	9.49.70						61		61
Sub-total		194	107	123	43	902	709		2078

Industrial Sector Trade and Occupation	ISCO NR.	Adm.	Eng.	Tech.	Sup/ Foreм.	Skilled Worker	Semi-Skilled	Unsk.	Total
Sub-total carried forward		194	107	123	43	902	709		2078
Mechanic Maintenance	8.49.70					92	60		152
Tool and Die Maker	8.32.20					18	10		28
Grinder, Machine Tool	8.35.30					13	7		20
Drilling Machine Operator	8.34.60					15	5		20
Metal Sawing Operator	8.34.75						3		3
Mechanical Product Tester	8.49.84				6				6
Mechanic, Air-conditioning	8.41.80					16	74		90
Refrigeration, Mechanics Operator	9.69.70						94		94
Metal Sprayer	7.28.50						14	2	16
Structural Steel and Ship Painter	9.31.30						50		50
Oiler and Greaser	8.49.80						2		2
Boiler Fireman	9.69.30						10		10
Labourers	9.99.10							595	595*
Motor Vehicles									
Auto-Mechanics	7.00.30				3				3
	8.43.30					125	102		227
Diesel Engine Mechanic	8.49.20					1			1
Auto-Electrician	8.55.40					24			24
Auto-Glazier	9.57.60					1			1
Labourer (Auto-Mechanic)	9.99.10							7	7
Total		194	107	123	52	1207	1140	604	3427

* Including 30 apprentices working at the Dockyard in Bascara

Principle employment by category in Iraqi Railways

Industrial Sector Code and Occupation	ISCO No.	Adm.	Eng.	Tech.	Sup/ Foren.	Skilled Worker	Semi-Skilled	Unsk.	Total
Iraqi Railways and Bus Transportation Co.									
Administrative Staff (Teachers)	1.3			3					3
"	2.19.40	1							1
Clerical and Related Workers	3.2/3.3 3.9/5.8	241							241
Engineers	0.2		18						18
Mechanical Engineer	0.24.30		14						14
Mechanical Engineering Technician	0.25.10			2	65				67
Diesel Engine Mechanic	8.49.20				24	40	100	235	399
Blacksmith	8.51.10					68	49		117
Sheet Metal Worker	8.75.10					96	125		221
Machinery Fitter	8.49.20				40	117	7		164
Machine Tool Operator	8.34.10					321	544		865
Lathe Operator	8.34.30					8	6		14
Welders	8.72.10					60	40		100
Metal Sprayer	7.26.50					57	32		89
Railway Engine Driver	9.83.20					181	248		429
Sub-total		242	32	5	129	946	1151	235	2742

Appendix 'C'

The Main Specifications of the Plant:

Plant Area	360,000 Sq. Meters
Covered Area	127,000 " "
Approximate number of Machineries	650 Units
Electric Overhead Travelling Cranes and other Material Handling Facilities	200 Units
Steel Furnances - Capacity	6000 Tonnes/Year
Cast-Iron Furnances - Capacity	2500 Tonnes/Year
Non-Ferreous Furnances - Capacity	60 Tonnes/Year
Forging Capacity	4500 Tonnes/Year
Oxygen Plant Out-put	60 C. Meters/Year
Compressed Air Out-put	12000 C. Meters/hour
Acetylene Plant Out-put	20 C. Meters/hour
Steam Consumption during winter	80 Tonnes/hour
Steam Consumption during summer	28 Tonnes/hour
Length of Internal Railway Lines	4029 M.
Length of Internal Roads	6500 M.
Electrical Consumption	51,6 Million KWH/Year
Installed Capacity	29,000 KWS.
Incoming Supply Voltage	11,000 Volts
Voltage of Utilization	6000 Volts & 380/220 Volts
Water Consumption	5132 Cubic Meters/Day
Number of Tube-Wells	11 Units
Capacity of Tube-Wells	80,000 C. Meters/Day

Important employers in the Iraq engineering industry.

Industrial Sector Name and Location	Type of Activity	Admin.	Eng.	Tech.	Sup/ Foren.	Skilled Worker	Semi-Skilled	Unsk.	Total
Metal									
Iron Industries Co., Baghdad	Cabinets, windows, tables	10	1	1	-	34	27	8	77
Metal Furniture Factory, Baghdad	Metal manufacturing	33	22	76	5	156	3	7	302
Light Industries Co., Baghdad	Kerosene Heaters-Stoves	30	3	2	-	27	24	36	24
Iraq Bicycle Co., Al-Sahneeliya	Bicycles	3	2	1	-	6	1	3	16
Hallcun Bros. and Co. Ltd., Baghdad	Heating and cooling equipment	2	-	3	1	20	10	22	48
Iraq Engineering Works, Baghdad	Air coolers-office furniture-vehicle springs	10	3	2	10	4	75	200	302
Iraqi Radiator Manufacturing Co., Baghdad	All types of radiators (tubes and blades)	2	-	-	1	-	27	-	30
National Radiator Factory, Baghdad	All types of radiators	2	-	-	1	-	24	-	27
Hilal Industrial Co.	Air coolers, vehicle springs-fleetcodes	21	-	-	6	5	56	32	120
Vehicle Buffer Factory	Buffers (exhausters) for cars	-	-	-	1	3	8	-	12
	Total	113	31	85	25	315	255	310	1134

Industrial Sector Name and Location	Type of Activity	Admin.	Eng.	Tech.	Sup/ Foreman.	Skilled Worker	Semi-Skilled	Unsk.	Total
Motor Vehicles									
Repair of trucks-autocranes, Baghdad	Repairs of motor vehicles	7	2	-	3	45	24	9	90
Repair of Buses, Baghdad	Auto-mechanics	55	-	1	4	65	84	62	271
Mercedes Garage, Baghdad	Repair of cars	19	1	6	-	50	2	7	85
	Total	81	3	7	7	160	110	78	446
Electricity-Radio/TV									
African Iraqi Corporation, Baghdad	Repair of Electrical-radio equipment	17	4	5	4	36	16	9	91
Radio and Television Co., Baghdad	Production of radio TV sets	2	6	2	-	30	-	5	45
General Company of Electrical Equipment, Baghdad	Manufacturing of transformers, and small motors	41	25	2	30	137	175	110	570
Al-Fokn-Radio/TV Assembly Factory, Baghdad	Radio/TV sets assembly	-	-	1	-	-	17	-	18
	Total	60	35	10	34	253	203	124	724

Alexandyria.

1. Need continuous production of repetition parts so that:
   A. Machine operators and fitters quickly become familiar with parts to be manufactured.
   B. Minimum number of jigs and fixtures are required.
   C. Facilitate production planning.
   D. Reduce load on production control department.
   E. Facilitate procurement of materials.
   F. Overall reduction of supervisory effort and administration requirements.

   Suggest complete Tractor Transmission Unit be manufactured.

2. If 1 is accepted
   A. Expert assistance must be obtained to reduce time factor.
   B. Jigs and Fixtures should be imported.
   C. Outside assistance be obtained to handle initial abnormal load on Production and Planning and Control Departments.

3. Modern shaft production methods should be installed in machine shop.

4. Certain additional machines should be added to match production of associated equipment already installed.

5. Machine repair workshop should obtain spares from original machine builders who should also supply proper preventative maintenance schedules for the machines.

6. In view of supervision shortages, Toolroom would be better utilised on producing 'standard' tools and specials be imported.

7. To facilitate uninterrupted production expert advice in organising procurement operation should be obtained.

8. Foundry quality control to be strengthened.

THE PLANNING BOARD AND THE MINISTRY OF PLANNING

Industrial Sector
Chapter Two

THE NATIONAL DEVELOPMENT PLAN FOR THE FISCAL YEARS (1970–1974)

SUMMARY OF ALLOCATIONS OF THE INDUSTRIAL SECTOR

(Thousand Dinars)

Section	Projects	Total Cost	Total Plan Allocations	Percentage
9	Chemical Industries Projects	52350	22450	17.0
10	Medical Projects	7000	1050	0.7
11	—	—	—	—
12	Foodstuff Industries Projects	11000	10100	7.7
13	Construction Industries Projects	6750	4900	3.7
14	—	—	—	—
15	Metal Industries Projects	10800	6500	4.9
16	Textile Industry Projects	24350	7300	5.5
17	Oil and Natural Gas Projects	23000	23000	17.4
18	Geological Survey Programme	1000	1000	0.8
19	Power Generation and Transmission Projects	21500	17900	13.5
20	—	—	—	—
21	Workshop Training Projects	2300	1520	1.2
22	Settlement of Accounts of Completed Projects	5000	5000	3.8
23	Minor Electrical Projects	15000	6500	4.9
24	New Industrial Projects	77950	24780	18.9
25	—	—	—	—
	TOTAL CHAPTER TWO	260000	132000	100.0%

Appendix C

Appendix 'D'.

IRAQ.

Names of persons with whom discussions were held.

UNDP

Kirdar Fikrat.

Mrs. Margaret Randquist.

Mr. G. Teunissen.

I.L.O.

Georges Hamnoui.

P. F. (Roy) Nailer.

Ali Al Hamdani. President. State Company for Engineering Industries.

Abdul Latife Al Alwan. Director General, Iskandyria.

Dr. Waleed. Production Manager, Iskandyria.

Mohamed Shakeeb. Chief Engineering Assistant, Railway Workshops.

Mr. Yasin Al Robaie. Production Manager, State Electricity Company.

MISSION REPORT - SYRIA.

Industry in the country is almost exclusively small open fronted shops on the city streets. The larger firms employ from 10 to 50 people, but it is estimated that there are no more than 50 such firms. In the case of the smaller shops employing 1 - 5 people only some 300 firms are engaged in metal working using machine tools, the remainder of the firms in the so called engineering industry are handcraft, relying on the skill of the workmen using hand tools.

Such statistics as it has been possible to find relating to the engineering industry are given at Appendix 'A'.

At the present time the most important machine tool using works are the Railway - 60 machine tools; Oil Field, Fertilizer - 20 machine tools each; Maintenance Workshops.

A large factory has been built at Aleppo which initially will be used for assembly of French built Someca tractors and it is ultimately intended that this plant should manufacture certain of the components used in the tractor assembly and may also produce ironmongery for the building industry. It had been suggested that this plant would also build machine tools, but if machine tool production is started it will be desirable for this operation to be undertaken in a seperate establishment.

An electric motor factory is to be established at Lattakia with a capacity of 25,000 motors per annum ranging from ¼ h.p. to 7½ h.p. a Bulgarian firm are the advisors on this project and the building is now complete. Adjacent to this factory a foundry and forge are to be located, the capacity of the foundry to be 25-30,000 tons of ferrous and non-ferrous castings and the forge 8-10,000 tons of forgings. The Metal Construction Company (Katsrailia) located North of Damascus manufactures a wide range of stationary and mobile storage tanks.

The textile industry, are to establish, at Damascus and Aleppo, a factory for the manufacture of spare parts required by the textile machines.

Education and Training.

Technical education is extremely limited but the demand for technicians in view of the type of small scale industry operating in the country is also severely restricted.

The need for improving the training of engineers has already been appreciated and it is proposed to establish an in-plant training centre for engineers to assist newly graduated engineers in obtaining sound shop practical experience and also for the purpose of upgrading engineers already working in industry in modern industrial methods and practices.

Craft training centres have been established at Damascus and Aleppo and these each have a capacity of 300 students when operated on a single shift basis, however, due to severe shortage of training personnel the centre at Damascus is only operating at half this capacity. Most of the trainees already have shop practice but attend the centre to improve their standard, they undergo a three month probationary period and at the end of this if considered satisfactory are given a further six months training. They are only taught a single skill and approximately 80% of their time is in the workshops and 20% in classrooms. There is a well equipped machine shop principally with engine lathes, electrical workshops, a small pattern shop and foundry.

Research.

An Industrial Testing and Research Centre is being established in Damascus with U.N. assistance. The expert guiding the setting up of the Centre is Mr. Barfety from France, who has included the establishment of standards in the work of the Centre.

Machine Tool Rebuilding Centre.

Most of the machine tools in use are of considerable antiquity, and being located in extremely small shops, the only maintenance these receive is routing lubrication. Repairs are carried out when the machine

actually breaks down and these are of a minimal nature in order to get the machine into operation again. The effectiveness of many of the machine tools used in the country could be greatly increased if these were rebuilt, so that original alignments are regained and slides and bearings properly refitted so that faster metal removal rates can be achieved.

It is suggested that UNIDO could give technical advice on the establishment of a centre and provide expert assistance during its initial operation. The Ministry, however, have suggested that UNIDO should be asked to equip the Centre with the necessary machines and measuring equipment and the Government would provide the buildings.

Tool Maintenance.

Tool grinding is usually carried out entirely by hand and there is little appreciation of the importance of accurate geometry. The most effective means of improving this situation although of a long term nature, will be to ensure that this subject is given full attention both at the Craft Training Centres and at the In-Plant Training Centre for graduate engineers, in order that an awareness of the importance of correct tool servicing should be created both at the engineer level as well as among technicians and craftsmen.

Machine Tool Maintenance.

In order that the importance of adequate and preferably preventative machine tool maintenance should become accepted in the larger engineering firms it is recommended that this subject should also be included in the curriculum for the In-Plant Training Centre.

Acceptance Standards.

The recently established Industrial Testing & Research Centre should become the focal point for the establishment of acceptance

standards for machine tools. These should be established in line with international practice but adapted where appropriate to local requirements.

Establishment of Machine Tool Industry.

The Government are considering the establishment of a small machine tool industry at the level of production specified in the Appendix. The low level of demand make it doubtful as to whether this would be an economical proposition at the present time but an association with a suitable company in a foreign country might enable them to commence part manufacture of certain simple machines.

During the visit to the Craft Training Centre at Damascus the possibility of manufacturing drilling machines at the Centre in order that the students would have some useful production work to undertake was discussed and the idea met with approval. It is understood that the Government will be considering requesting UNIDO to give assistance in finding a suitable partner with whom a bilateral agreement for assistance in the establishment of the small machine tool operation could be made. The suggestion that this might be included with the Tractor factory at Aleppo should be seriously discouraged as it is usually impracticable to manufacture machine tools in the same establishment as agricultural machinery where the standards are of a drastically different order.

Appendix 'A'.

SYRIA.

Statistics 1968/69.

Industry	Numbers Employed.
Food & Tobacco	32,000
Textiles, Leather & Clothing	42,000
Metal Working & Equipment Manufacture	8,000
Chemical excl. Petroleum	5,000
Transport Workers	35,000
Manufacture & repair of electric machinery	1,500
Man. & repair of Transport Equipment	4,200

Vehicles registered in 1969:

Cars	22,381
Taxis	5,789
Buses	1,719
Trucks	15,536
M/Cycles	7,179
Land Rovers	1,483
Total	54,087

Number of firms in engineering industry - from Survey Min. of Petroleum.

50 Firms employing 10-50 Workers with 10-20 Machine Tools.

3,000 Firms employing 1-5 Workers. Only 10% of these firms use machine tools.

Personnel:

The total number of employees when the plant reaches full production will be about 3000, made up as follows:

Engineers and Technicians	600
Office Workers	200
Skilled Workers	1100
Medium skilled and non-skilled workers	1100
Total	3000

Proposed Machine Tool Manufacture.

Production Programme per annum.

250 Lathes 30 cm. swing over saddle 1500 and 200 mm between centres.

200 Drills 15 mm capacity.

200 Drills 25 mm capacity.

250 2 wheel grinders - bench or stand model.

100 Hacksaw machines.

Appendix.

SYRIA.

People with whom discussions were held.

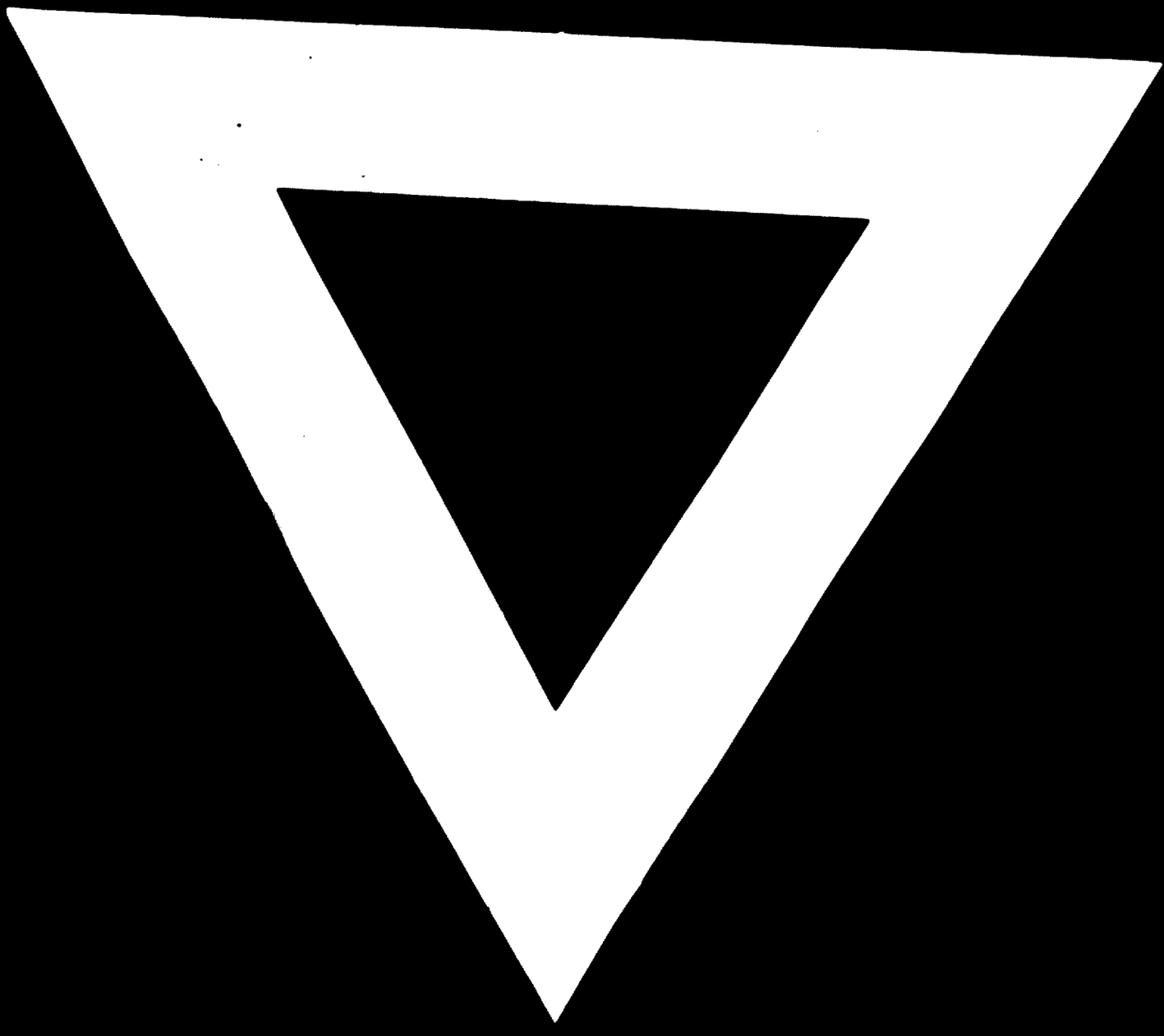
Mr. Walid Rihawi.

Mr. Esam Al Helou.

Mr. Wofrid Preissler.

Dr. Y. Kassab. U.N.

Mr. Barfety. U.N. Expert.



8.8.73

Names of people with whom discussions were held in Iran.

Mr. Tagi Tavakoly	General Manager of M.E.P.
Mr. Raza Niazmand	Executive Director IDRO.
Dr. R. F. Touba	Technical Consultant IDRO.
N. B. Satarawala	IDRO.
R. G. da Costa	Arak Project Manager.
Mr. Bayat	Assistant General Manager, Arak.
Mr. Prince	Commercial Consul, British Embassy.
Mr. Moghbeli	Assistant Director of Statistics Ministry of Economy.
Mr. Shahparaki	Planning Organisation. (Speaks superb English).
Mr. R. Abu El Haj	UNIDO Economist.
Mr. Jan Semsch	UNIDO Mechanical Engineering Advisor.
Mr. Ali Badakhshan	General Manager IDRO Tractor Factory.
Mr. Esmail Ghassemlou	Technical Director M.E.P.

MISSION REPORT - IRAQ

Statistics on Iraq industry are extremely limited but those that it has been possible to obtain from the National Development Plan from an I.L.O. Report and from the U.N. Long Term Technical Assistance Report prepared February/March, 1971, are given at Appendix 'A'. These include summaries of workers in industrial employment. Number of companies in the engineering sector, existing investment and planned investment during the period 1970-74.

The results of an I.L.O. Survey covering employment in industrial enterprises by trade and employment in Iraqi Railway workshops and other important engineering concerns.

Financial allocation by the Planning Board for 1970-74 are given in Appendix 'C'.

The total population of the country is 9.2 million and of the employed population only 6% work in the manufacturing industry and this sector of the economy contributes 9.1% of the gross national product.

There are stated to be 600 companies in the engineering field but nearly all of these employ less than 10 workmen. By far the largest operation is the engineering factory at Iskandyria which company employs 2,500 and is ultimately due to emplcy 4,000. Other important shops include:-

The Railway Workshops at Baghdad, which employ 1,000, with a comparatively large machine shop, the Transport Equipments Workshops at Baghdad, where public transport vehicles are completely overhauled employ 300 but only have a very small machine shop, and the Electric Manufacturing Company employing 800, producing fractional horsepower motors, cooling fans, compressors for air conditioners and various sizes of transformer.

Major industries such as oil, textiles, sugar refining, etc., have moderate sized maintenance workshops and it is understood that these in many cases are well equipped and efficiently operated.

In view of the lack of statistics and the virtual complete absence of any meaningful statistics of machine tool imports, an attempt was made through discussions with the engineers at various factories and with staff in Government departments to estimate the likely machine tool stocks in the country.

Machine Tool Stocks.

Iskandyria.	-	1,000
Electric Mfg. Co.	-	400
Railway Workshop, Baghdad.	-	200
Transport Equipment Workshop, Baghdad.	-	50
Maintenance Shops of Major Industries.	-	400
Small engineering shops.	-	2,000
Training centres at Iskandyria, Railway Institute and the Oil Company, Baghdad.	-	120
Recently established technical and vocational schools - total of 11 schools.	-	280

The machines at Iskandyria, the Electric Manufacturing Company and the major maintenance shops, as well as those at the Training Centres and technical and vocational schools are principally modern machines. Those at the Railway Workshop and in the small companies are mostly old machines from 15 to 50 years of age. Estimated total stocks - modern machines 2,200; old machines 2,200.

State Company for Engineering Industries.

The President of the Company, Mr. Ali Al Hamdani, requested that after my visit to Iskandyria and the Electric Company, I would make a verbal report to him on their operations.

The principal items discussed at Iskandyria are given at Appendix 'B' while for the Electric Company only a brief statement was made because they have a standard line of production and this only appears to require improved shop layout together with some revision of types of machines to make the operation efficient.

The majority of machines at Iskandyria are standing idle and it is difficult to reconcile the figure of 1,800 shop floor workers with the

appearance of the factory, even when those working in the foundry have been eliminated. The machines are stated to have been manufactured in 1961 although kept in a warehouse since that date until comparatively recently pending the completion of the buildings. In spite of the very short period of time in which these machines have operated, breakdowns are reported to be frequent and a major programme of manufacturers spare parts has been initiated. They state that no programme for preventative maintenance was provided by the Russian consultants when setting up the factory, nor have recommendations for spare parts been given. The Maintenance Engineering Department report that they, in conjunction with the Russian advisers, are now studying the Spare Parts Manuals for the machines with a view to compiling lists of likely requirements in the future and in many instances it is proposed that these parts should be made at the factory rather than importing from the original machine supplier.

The Electric Manufacturing Company, which has been operating for five years, is producing a considerable volume of the product range selected. There is however, considerable under-utilization of plant caused by:-

A. The plant being designed to produce not only fractional horsepower motors but electric motors up to 50 horsepower;

B. The use of outdated methods of manufacture and unsuitable machines for certain of the operations performed.

Railway Workshops, Baghdad.

These Workshops were established when the Railway was first built and with the exception of a new shop for the servicing of diesel locomotives and also one for carriages which is just on the point of completion, the premises and equipment are extremely antiquated. The newest machine tool at the present time is approximately 15 years old

whereas the majority range from 20 to 50 years old. A complete new installation, however, for wheel turning is due to be introduced shortly and it is stated that this new section will be five times as productive as the present set up. While the conditions of operation are antiquated in the extreme, there is undoubtedly a very high degree of skill exercised by operators and supervision alike. The general care of the machines is in the hands of the operators and they clearly take a great pride in keeping it well cleaned and oiled and in the best condition within their capability. There is however, no planned programme for preventative maintenance and repair work is only undertaken when the machine actually fails.

Transport Equipment Workshops.

The machine shop is comparatively small as the majority of the work is carried out in the fitting shops where vehicles are striped down and rebuilt primarily using replacement parts from the original manufacturer. They do however, undertake the metal spraying and regrinding of crankshafts and reboring of engines, as well as the limited manufacture of parts which are not readily available from the equipment makers.

Small Companies.

Driving down the main street of the engineering district it is possible to observe several hundred machine tools in the open fronted workshops. Most of these shops only have two, three or perhaps four machines operated by the owner and his friends or family. The majority of these machines are extremely antiquated but occasionally machines of less than ten years of age are to be seen. It is reported that there is a high degree of skill in these shops but this statement should be treated with reserve.

Training Centres.

There are three principal training centres established or in course of construction. The oldest of these is the Railway Institute which has been in operation for five years and is equipped with some forty modern machine tools. The emphasis at this centre is on practical work rather than theoretical studies which only account for a small part of the total curriculum.

The Oil Company at Baghdad have established an extremely modern training centre equipped with first class machine shops and excellent lecture rooms with all necessary models provided. The centre is due to become operational in the Autumn and a number of Russian instructors will be attached to it.

The third centre is at Iskandyria but the buildings for this centre are only in course of construction although the machine tools have already been delivered and are in store at the main factory.

Each of these centres will play an important part in training technicians and artisans for the industrial development of the country and it is important that machine tool utilisation and maintenance should be included in the curriculum.

Training Schools.

Eleven technical and vocational training schools are being established and on average each of these schools have around 25 machine tools. I.L.O. guidance is being given in the establishment of the training methods and curriculum and their expert Mr. P. F. Nailer, requested that if possible a firstclass book of machine tool maintenance should be sent to him so that he could have this translated into Arabic for use within the schools.