AN EVALUATION OF INTERNATIONAL COMPETITIVENESS OF TURKISH ELECTRICAL MACHINERY AND EQUIPMENT

by

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Identification of industries with export potential is an increasingly important planning problem. But one can not decide on the international competitiveness of a sector without having some measures of export performance.

The purpose of this study is to evaluate the international competitiveness of Turkish electrical machinery and equipment sector on the basis of given competitiveness measures.

Chapter 1 gives some basic concepts about these products. Chapter 2 examines the past history from the point of view of production and exports and their future prospects. Chapter 3 tries to construct the conceptual framework about the competitiveness measures in world markets. In Chapter 4, a detail analysis in regard to the production, technology and costing, pricing and export marketing aspects of Turkish electrical machinery and equipment is presented. Chapter 5 considers the world trends in these products. In Chapter 6 an import and export models are suggested and first applied to Turkey and W. Germany. Chapter 7 summarizes the findings

and states the conclusions and implications.

We conclude that Turkish electrical machinery and equipment sector is sufficiently competitive by the given incentives against developed countries.

We found that in the determination of export values, the import model using the statistics of target markets gave better guidelines in estimating future exports when export statistics have not shown a smooth trend.

Owing to the presented findings we think that this study will be a good guide to design appropriate entry strategies to target markets.

TÜRKİYE'DE ÜRETİLEN ELEKTRİK MAKİNALARI VE DONATIMININ ULUSLARARASI REKABET GÜCÜ ÜSTÜNE BİR DEĞERLENDİRME

İhracat potansiyeline sahip sanayilerin belirlenmesi gitgide daha çok önem gösteren bir planlama sorunu olmaktadır. Bir sektörün uluslararası rekabet gücüne karar verebilmek için elimizde, ihracat başarısını ölçen bazı kriterlerin olması gerekir.

Bu çalışma, Türk elektrik makinaları ve donatım sektörünün uluslararası rekabet gücünü, belirtilen kriterler çerçevesinde değerlendirmek için yapılmıştır.

Birinci bölümde, incelediğimiz ürünlerle ilgili bazı kavramlar verilmiştir. İkinci bölüm, sektörün tarihsel gelişimini üretim ve ihracat açısından incelemekte ve geleceği hakkında düşünülen hedefleri sunmaktadır. Üçüncü bölüm, Dünya pazarlarında rekabet gücü kazandıran ölçüler hakkında bilgi vermektedir. Dördüncü bölümde, Türk elektrik makinaları ve donatımı üretim, teknoloji, maliyet ve fiyat, ve dış pazarlama durumu açısından detaylı bir şekilde incelenmektedir. Beşinci bölüm, bu malların Dünya'daki ticaret trendlerini incelemektedir. Altıncı bölümde, ithalat ve ihracat modelleri önerilmekte ve bu modeller Türkiye ve Batı Almanya'

ya uygulanmaktadır. Yedinci bölümde bulgular özetlenmiş, sonuçlar ve öneriler belirtilmiştir.

Bulunmuştur ki, Türkiye'de üretilen elektrik makinaları ve donatımı, verilen teşvikler sayesinde, gelişmiş ülkelere karşı yeterli rekabet gücüne sahiptir.

Düzgün bir ihracat gelişimi gözlenmeyen hallerde, ihracat miktarının belirlenmesinde, hedef pazarın ithalat rakamlarının, önümüzdeki yıllardaki ihracat miktarı hakkında daha iyi bir fikir verebileceği bulunmuştur.

Bu çalışmanın, sunduğu bulgular sayesinde, hedef pazarlara girme stratejisi belirlemede yardımcı olabileceğini düşünmekteyiz.

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LIST OF ABBREVIATIONS

CU	:	Copper
FOB	:	Free on Board
HP	:	Horse Power
IEC	:	International Electric Commission
MVA	:	Mega Volt Ampere
PVC	:	Polyvinylchloride
R and D	:	Research and Development
SIS	:	State Institute of Statistics
TEK	:	Turkish Electricity Board
TSKB	:	Industrial Development Bank of Turkey
VDE	:	Association of German Electrical Technicians
XLPE	:	Cross Linked Polyethylene

I. INTRODUCTION

1.1. Purpose of the Study

In recent years, new economic policies have been adapted to cope with prevailing economic problems of Turkey such as inflation, balance of payments deficit. In the attempt of integration of the domestic industry to the world markets, expanding exports is taken to be a national goal to finance the economic development. Recession in the domestic market coupled with various incentives granted by the state to improve export operations and to increase export revenues directed Turkish manufacturers to export markets.

"Given the importance of exports, government planners and corporate planners are facing closely related sets of problems. For the government planners the problems are the identification of primising industries and the design of appropriate incentive systems to aid investment and growth in the right industries. The major planning problems from the standpoint of a single business are to: (1) identify products having a sufficient potential in world markets; (2) rank order lucrative national markets for these products and (3) design appropriate entry strategies for these markets."[1]

When we look into the current problems of Turkish industry we observe that the energy problem was one of the main obstacles in the way of development. Production and consumption of electric energy which is taken to be an indicator of the level of development of a country, can only be materialized by utilizing necessary machinery and equipment. These electrical machinery and equipment, therefore assume strategical importance in the process of development.

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1 Ayal, Igal. "Industry Export Performance and Predictions", Journal of Marketing, Vol 46 (Summer 1982), 54-61.

On the other hand, researches taking into consideration factor endowment theories and the international product life cycle concept show that the international competitiveness in electrical machinery and equipment has shifted in favor of developing countries. In Turkey, during the past years, quite substantial investments have been made to introduce modern technology into this sector. The size of the domestic market does not allow the exploitation of the full capacity in the sector.

Therefore, taking all these aspects into consideration, the potential of Turkish electrical machinery and equipment in world markets has been chosen as our target of analysis. The study focuses on the first of the above-mentioned three stages which the planners face, although we will deal partly with potential markets and entry recommendations as well.

So the purpose of this study is to evaluate the international competitiveness of the Turkish electrical machinery and equipment sector from the view point of worldwide competitiveness measures in the sector, production and technology, costing and pricing, broadly export markets and marketing. In addition a handy tool of forecasting of export values for managerial planning purposes will be also developed.

1.2. Content and Procedure

This study is not aimed to be an export marketing survey which requires extensive field work in potential export markets. It has been prepared to become a basis for such a survey.

Chapter 1 includes an introduction to the subject, content and procedure of the study, and methodology and definitions of key terms. In Chapter 2 developments of Turkish manufacturing industry and the subsector of electrical machinery and equipment will be studied. Developments in the

exports will be examined. The past history of the sector, increases and decreases in the values of production and export in recent years will be explained. Chapter 3 will be aimed at making the reader acquainted with machinery manufacturing industry. Some general competitiveness measures in this sector will be explained and some marketability criteria will be stated as specific competitiveness measures in our products. Chapter 4 will enter into details in regard to production and technology, costing and pricing and export marketing aspects in the sector. Chapter 5 will present world trade patterns and structural characteristics of electrical machinery and equipment sector to strength the export business. W. Germany will be paid special attention to as a representative of developed countries which have lost their competitiveness against less developed countries. In Chapter 6 import and export models will be suggested. These models will be applied to W. Germany and Turkey to obtain future estimated values of Turkish exports in electrical machinery and equipment. Chapter 7 will summarize the findings and state the conclusions and implications.

Literature about the Turkish electrical machinery and equipment is very scarce. Most of the available ones have practically lost their relevancy to the present situation. Fortunately, a producer survey[2] in electrical machinery and equipment sector prepared recently by TSKB research team with collaboration of foreign experts is available. The fourth chapter is based mostly on the findings of this study.

Our approach, except for the fourth chapter, will be basically general; that is, we will not deal with specific items of machinery and equipment. Evaluations and results will relate to all sector, not to a particular group of machinery and equipment. Machinery and equipment that will be considered as a part of the sector is defined in section 1.4.

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[2] TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983.

1.3. Methodology

In the study, statistical data are gathered from secondary sources such as State Institute of Statistics (SIS), Industrial Production Statistics of Turkey; State Institute of Statistics (SIS), Foreign Trade Statistics of Turkey; Statisches Jahrbuch für die Bundesrepublik Deutchland; U.N. Statistical Yearbooks of Trade; and OECD Economic Surveys. The other facts about the sector were compiled from several sources of literature. International trade concepts and competitiveness issues shaped the framework of the study. After assessing our competitive position in world markets, to have a handy tool of forecasting of exports for managerial planning purposes, a model of import and export were developed. Each variable that will be influential on the amounts of imports and exports was tested to see their explanatory powers.

Regression analysis was conducted for the imports of electrical machinery and equipment of W. Germany and for the exports of Turkey in the same category to W. Germany. The import figures of W. Germany together with the Turkish market size of the products considered in the W. German market was used in estimating the Turkish export values.

1.4. Definitions of Key Terms

In this section, we will accentuate the differences between consumer goods and industrial goods. And we will explain the types of machinery and equipment included in the study.

"Goods and services of a consumer nature are purchased for the personal satisfaction of the purchaser and/or his family. The physical form of consumer goods is such that no further commercial processing is necessary"... Industrial

goods and services, on the other hand, are destined to produce or become parts of other goods and services, or to facilitate the operations of business, public, and nonprofit enterprises. Goods which can be included in the category are machinery, materials, and components"[3]

"It must be admitted that consumer satisfaction in the industrial area is not based on the same set of criteria as it is in the consumer area. Typically, the industrial buyer is an expert whose buying decisions are for more rational than the ultimate consumer's. Therefore, product superiority in the form of cost saving, better technical performance, and perhaps superior producs service become his major considerations as against the more emotional and self-rewarding personal reasons, the pride, social acceptability etc. of the typical consumer buyer"[4]

Electrical machinery and equipment sector is a subsector of electrotechnical industry which broadly contains electrical capital goods and durable consumer goods. Electrical machinery and equipment belongto the electrical capital goods.

Electrotechnical industry is defined as the manufacture of equipment for power generation, transmission, distribution and consumption such as steam boilers, steam and water turbines, generators, transformers, switchgears, drive motors, power condensers, measurement devices, insulated cables and consumer durables.

When we look at commodities exported in these category we see that mostly cables, transformers, electric motors and switchgears have been exported from Turkey. So we took this group of machinery and equipment to be examined in the study. This group of machinery and equipment are classified and shown in commodity indexes for the Standard International Trade Classification (SITC) by United Nations. According to the second revision, SITC indexes 716.1 and 716.21 stand for

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[3] Dodge, H.Robert. Industrial Marketing. New York, McGraw-Hill Book Company, 1970, pp.4.

[4] Risley, George. Modern Industrial Marketing. New York, McGraw-Hill Book Company, 1972, pp.9

electric motors, 771.11 and 771.18 for transformers, 773.1 for cables and 772.1 for switchgears.

Detailed descriptions of these products are given in Appendix A.

II. TURKISH ELECTROTECHNICAL INDUSTRY

"The serious production of these machinery and equipment dates back to not more than twenty years before now. In spite of this, in recent years, most of the demand has been met increasingly by domestic production".[5] Yet the electrical machinery and equipment sector is still at a stage of development. "Unfortunately, in Turkey in this sector, in constrast to the powerful, large and integrated establishments on the world, small, badly distributed and single product producing plants were established"[6].

On the one hand, most of these establishments in Turkey have concentrated on durable consumer goods consisting mainly of domestic electrical appliances. The reason why the durable consumer goods are chosen is that the market for these type of goods has developed very fast and the rate of return on capital has been higher and the education of qualified personnel has been realized in less time and less cost. On the other hand, because electrical machinery and equipment which are capital goods or investment goods need large sources of know-how and large capital investments and because the market for these goods are developing slowly, firms with high capacity could not enter the sector by recent years. Only in recent years, substantial investments have been made introducing modern technology into this sector.

Nowadays, as a result of the decrease in fixed capital investments which heavily utilize electrical goods in Turkey, the domestic demand for these goods have diminished considerably. An abrupt decrease in the production was observed in 1982 (See Table 1). To overcome this problem of factories working in low capacity and encouraged by some incentive measures, export possibilities have been sought for machinery and equipment of sufficient quality and in accordance with

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[5] Tekinel, Hüseyin. "Ülkemizde Elektromekanik Sanayiinin Hızlı Gelişimi", Rapor, Nowember 1, 1982

[6] Ibid.

international standards. In this way, as the domestic production ameliorates in quality and comes up to the international standards, it will be able to serve both the domestic market and foreign markets.

As Tekinel points out "there is a physical relationship between the generation and consumption of electric energy and various electrotechnical machinery and equipment. It must be accepted that the production of electrical machinery and equipment should be taken to be the continuation, completion or a part of electrical energy generation, transmission and distribution"[7]

For this reason, the problem of electrical energy in our country, before everything, is the problem of the production of-and obtaining sufficient amounts of-these machinery and equipment.

The production of electrotechnical machinery and equipment is a branch of the manufacturing industry which requires high technological knowledge, experience and relatively intensive use of skilled labor.

2.1. Developments of Manufacturing Industry and the Subsector of Electrical Machinery and Equipment

The realized production from 1972 on and estimated developments of manufacturing industry and subsector of electrical machinery and equipment are shown in Table 1.

As seen in Table 1, there were continuously high rates of yearly increase in the manufacturing industry from 1972 to 1980. During these years, the average rate of increase was reaching 26 per cent. On the other hand, in the sector

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[7] Ibid.

of electrical machinery and equipment which is a subsector of manufacturing industry, even higher rates of yearly increase were observed. The increasing trend of this subsector continued on the average at 37.5 per cent yearly until 1982.

The investments which began to decrease after 1979 affected the developments of both manufacturing industry and its subsector. And a shrinkage in demand has come into being.

TABLE 1

Developments of Manufacturing Industry and Subsector of Electrical Machinery and Equipment

Year	(1) Manufacturing Industry production (000 US $)	Yearly increase (%)	(2) Electrical m/c and equipment production (000 US $)	Yearly increase (%)	(2)/(1) (%)
1972	2,477,600	-	21,191	-	0.86
1973	3,370,500	36.0	32,914	55.3	0.98
1974	4,775,700	41.7	41,450	25.9	0.87
1975	5,572,400	16.7	65,387	57.7	1.17
1976	6,237,200	11.9	85,244	30.4	1.37
1977	8,261,500	32.4	106,389	24.8	1.29
1978	9,592,400	16.1	159,877	50.3	1.67
1979	12,440,000	29.7	225,954	41.3	1.82
1980	11,452,500	-7,9	316,033	39.9	2.76
1981	11,744,200	2.5	372,456	17.9	3.17
1982	11,263,600	-4.1	227,733	-38.8	2.02
1983	11,595,100	2.9	235,676	3.5	2.03
1984 (Esti.)	12,344,100	6.4	253,564	7.6	2.05
1989 (Tar.)	17,528,700	7.3	402,493	9.7	2.29

Source: Calculated from Economic Report, Union of the Chamber of Commerce, Industry, Maritime Trade and Commodity Exchange of Turkey, 1978-1984; T.C. Resmi Gazete, October 7, 1984; S.I.S. Industrial Production Statistics of Turkey, 1972-1983

The rate of increase of manufacturing industry in 1980 realized as minus 7,9 per cent while the rate of increase was observed to be in the order of 2,5 per cent in 1981, and another drop of 4,1 per cent followed in 1982. A recovery period began in 1983 with a rate of 2,9 per cent. And in 1984, the rate of increase is estimated to be 6,4 per cent. According to the targets in the fifth five-year development plan, the rate of increase of manufacturing industry is determined to be 7,3 per cent yearly.

As to the electrical machinery and equipment industry, the diminishing investments showed their effects on the industry after two years with a very sharp decrease of 39 per cent in 1982.

After the year 1982, this subsector too has followed the increasing trend of manufacturing industry with higher rates of yearly increase. The increase of production realized as 3,5 per cent in 1983 and expected to be 7,6 per cent in 1984 (Resmi Gazete, November 7, 1984).

The electrical machinery and equipment sector is occupying about 2 per cent of the total manufacturing industry presently. The target for 1989 is 2,3 per cent. (See the last column in Table 1)

In the fifth five-year development plan, the targeted yearly increase for this industry is determined to be 9,7 percent. This rate is higher than that of the manufacturing industry.

This situation, as it is pointed out in the fifth five-year development plan, is a result of the targets determined in the composition of manufacturing industry changing in favour of capital goods. While the percentage of capital goods is 13,4 in 1984, it is targeted to be 15 per cent in 1989 (Resmi Gazete, November 7, 1984).

2.2. The Developments in the Export of Turkish Electrical Machinery and Equipment

The Turkish economy has applied the policy of import substitution for a long period of time to help the domestic industry develop. But in the last years it has been observed that the small domestic market for electrical machinery and equipment did not allow the industry to come up to the international standards. The exports up to 1980 which were of negligible value did not follow a certain trend and fluctuated. Only after 1980 we have seen a vitality as a result of export oriented policies.

Table 2 shows the export figures since 1972. By examining the figures one can observe that the export of electrical machinery and equipment showed better performances in 1972 and 1973 than the later years. The increase ceased in 1973 and began to fall down until the end of 1976 when it reached the minimum export value. But after this year a gradual increase was observed until 1980 when an abrupt increase was seen and this new trend kept in the following years too. The 1983 figure indicates that after this year only gradual increases will be possible. The estimated figure for 1984 which is 48.766 millions dollars is 42 per cent more than the previous year. This amount has a percentage of about 1.15 per cent in the total manufactured exports. This figure is lower than the percentage occupied in the production of total manufactured goods. This indicates that the sector has not reached the mature level yet (See sixth column in Table 2).

Unlike the export figure of electrical machinery and equipment sector, total manufactured export showed a relatively smooth trend between 1972 and 1983.

An important development observed in the manufacturing industry in recent years is the rapid growth in the investment goods subsector. This situation is also reflected in the case of exports, with increasing percentages of electrical machinery and equipment sector in the total exports of

Analysis of the Electrical Machinery and Equipment Export Realized in the Past Years

Years	Volume (kg)	Value (000 TL)	Value (000 US $)	Total manufactured Exports (000 US $)	% of the sector in man. exp.	Volume Index	Volume Index ($)
1972	664,328	9,563	683	156,000	0.43	100.00	100.00
1973	913,543	11,787	861	294,000	0.29	137.51	125.99
1974	252,410	7,257	516	470,000	0.11	37.99	75.54
1975	139,340	5,056	355	375,000	0.09	20.97	52.01
1976	41,324	2,325	149	498,000	0.03	6.22	21.85
1977	54,543	3,011	166	449,000	0.04	8.21	24.32
1978	115,307	8,652	355	512,000	0.07	17.36	51.92
1979	140,067	16,959	449	634,000	0.07	21.08	65.77
1980	248,167	103,437	1,253	838,000	0.15	37.36	183.38
1981	3,223,979	1,114,202	9,232	1,878,000	0.49	485.30	1,351.49
1982	11,615,078	5,788,881	35,298	2,861,000	1.23	1,748.40	5,167.36
1983	13,690,434	8,128,755	34,342	2,988,000	1.15	2,060.79	5,027.40

Source: Collected and calculated from S.I.S. Foreign Trade Statistics of Turkey, 1972-1983; Economic Report, Union of the Chamber of Commerce, Industry, Maritime Trade and Commodity Exchange of Turkey, 1978-1984

manufactured goods.

Exports of manufactured goods showed high rates of increase during 1981 and 1982. But the rate of increase declined in 1983 down to 4.4 %. (Calculated from Table 2) The decrease in oil revenues of the Middle East countries and the increasing trend of protectionist measures as a result of the unemployment in European countries have adversely affected Turkey's exports.

Another striking point in Table 2 is seen when one examines the volume and value indexes of the exports. The value index has been increasing at a rate of more than twice the volume index. This situation is because of the nature of manufactured goods, which works in favour of exporters of manufactured goods.

Although most of the electrical machinery and equipment exports have been directed to Middle East countries, various European countries also have imported these goods from Turkey. Exports to European countries generally have been realized by the foreign companies which have joint-ventures and licensing agreements in Turkey.

Another point worth considering is the relationship between the amount of production and exports. This relationship is exhibited in Table 3. As seen from Table 3, up to the year 1980 the percentage of export in the production was very small. But after 1980 a sharp increase was observed and reached the level of 15 per cent. In the fifth five-year development plan the production target is 9.7 per cent increase annually while the target for the export is 15.8 per cent increase annually. That means that the percentage of the export in the production is expected to increase continuously (T.C. Resmi Gazete, November 7, 1984).

TABLE 3

The Structure of the Relationship Between Production and Export in Electrical Machinery and Equipment

Years	Electrical machinery production	Export	% of Export in Production
	(000 US $)	(000 US $)	
1972	21,190	683	3.22
1973	32,910	861	2.62
1974	41,450	561	1.24
1975	65,390	355	0.54
1976	85,240	149	0.17
1977	106,390	166	0.15
1978	159,880	355	0.22
1989	225,950	449	0.19
1980	316,030	1,253	0.40
1981	372,460	9,232	2.47
1982	227,750	35,298	15.50
1983	235,670	34,342	14.57
1984 Esti.	253,560	48,766	19.23
1989 Tar.	9.7% increase p.a	15.80%increase p.a	

Source: S.I.S, Foreign Trade Statistics of Turkey, 1972-1983; S.I.S., Industrial Production Statistics of Turkey, 1972-1983; T.C. Resmi Gazete , November 7, 1984

III. COMPETITIVENESS MEASURES IN WORLD MARKETS

3.1. General Competitiveness Measures in Machinery Manufacturing Industry

3.1.1. General Cost Structure of the Sector

The consolidated cost structure of German, Japanese and Turkish machinery manufacturers are shown in the following table 4.

TABLE 4

General Cost Structure in Machinery Manufacturing

	(%) Germany	Japon	Turkey
Cost elements	1978	1978	1982
Material	40.0	59.0	47.0
Personnel	42.0	17.0	27.0
Financing	2.5	-	13.0
Other	15.5	24.0[x]	13.0
Total	100.0	100.0	100.0

[x] Financing included

Source: TSKB, Yatırım Malları Araştırması, 1984, pp.122

In machinery manufacturing industry, the share of labor in cost structure is generally higher than any other sectors.

As is seen in the above Table 4, the differences in cost elements are not seen only between Turkey and the developed countries of which here W.Germany and Japon are illustrated, but also between W.Germany and Japan. The wide uses of affiliated industry (side industry), the extent of automation, the high productivity and relatively low wages are making this difference between W.Germany and Japan. On

the other hand, in W.Germany labor is taking the highest place in the cost elements. She has the lowest material cost among countries considered. As to the situation in Turkey, besides low wages, material prices being very high make the part of labor be even smaller.

The machinery manufacturing industry is labor intensive relative to many other sectors. Since this labor is comparatively skilled and knowledgeable, the sector in general is showing a character of intensity in knowledge and technology.

Financial expenses are showing discrepancies in different countries. While it is making up 2-3 per cent of the total cost in developed countries, financial expenses in Turkey where inflation and rates of interest are high, are keeping an important place (13 per cent, see above Table 4)

3.1.2. Cost Structure in View of Competiteveness

A low cost is an important factor for competitiveness. Behind the low cost lie some critical cost structures determining the competitiveness. These cost structures can not be directly reflected in figures. There is an indirect influence on quantified cost elements. The elements of these cost structures that are suggested in TSKB, Yatırım Malları Araştırması (Capital Goods Survey)[8] are as follows:

i) Labor
ii) Material procurement
iii) Scale of production
iv) Special production
v) Marketing and service
vi) R and D (Research and Development)

In general, while most of these cost structures are present in all capital goods, the intensity of one or a few

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8 TSKB, Yatırım Malları Araştırması, 1984, pp.122

of them are more considerable relative to others. And among these elements the order of importance changes in time. Technological advances are the main reasons for such changes.

The following discussions about the elements of these cost structures are heavily based on the TSKB study.[8]

i) Labor: It was stated earlier that capital goods require in general skilled labor. But the intensity and level of this skilled labor do not remain the same in all capital goods. If a rough classification is made, electrical machinery are more labor-intensive and consequently require less skilled labor. However the other machinery which are the subject of mainly mechanical engineering requires considerable skilled labor. Turkey lacks the sufficient amount of highly skilled labor. Our comparative advantage does not lie in producing machinery which require high skilled labor. Electrical machinery complies more with our present situation of labor structure.

The cost of labor is determined by wages and productivity. When comparing Turkey with developed countries, wages are lower and weekly working hours are higher, same as in other developing countries. The comparison of Turkey to the three developed countries with respect to hourly wages is shown in the following Table 5.

TABLE 5

Hourly Wages in Some Developed Countries and Turkey

(U.S.$/man-hr)

	Non-electrical machinery			Electrical machinery		
	1970	1977	1979	1970	1977	1979
U.S.A.	3.8	6.3	7.3	3.3	5.4	6.3
Japan	1.4	5.6	6.4	1.1	5.0	5.5
Germany	1.8	5.1	7.1	1.5	4.5	6.3
Turkey	0.3	0.8	-	0.3	1.1	-

Source: TSKB, Yatırım Malları Araştırması, 1984, pp.126

[8] TSKB, Yatırım Malları Araştırması, 1984, pp.122

While the hourly wages in machinery manufacturing in Turkey were 10-12 times less than that in U.S.A. in 1970, this difference decreased to the order of 6-7 times in 1977. Although the difference between Turkey and Germany is not as high as the difference between Turkey and U.S.A, Turkish hourly wages were 4-5 times less in 1977 than that of Germany. Statistical values are not available for more recent years, but there is no doubt that the difference has increased in recent years. Taking granted that the main goal is to increase the living standards of individuals, the decrease of labor cost which has a positive effect on the increase of competitiveness is a short-term solution and against the above goal. A permanent solution lies in the enhancement of productivity. When developing countries having relatively low wages improve their productivities sufficiently, they can become competitive against developed countries in labor-intensive sectors.

ii) Material procurement: Material has a critical role in view of competition as the highest cost element in most capital goods. The problem is two-fold. One is to be able to obtain the necessary material at international prices. And the other is the change in prices according to the quantity purchased. The procurement of materials at international prices and additional discounts as a result of large order sizes are giving a competitive edge to the firms which can take advantage of them. The colloboration of companies in importing materials is a remedial solution as larger orders will help obtain bigger discounts.

In Turkey, metal and non-metal materials are more expensive relative to foreign prices because of the policy of protecting the domestic industry. Customs taxes and import expenses are raising material costs above those of the developed countries. For examples, in copper, which is the main input of electrical machinery and equipment, the domestic prices are 114 per cent higher than foreign prices (See TSKB, Makina İmalat Sanayiinde Kullanılan Malzemeler ve Sorunlar).

In recent years, the privilege of importing materials without customs fees has been recognized for exporters; in practice, however, this privilege has been used only by large firms. The basic problems remain unsolved for the majority of firms.

iii) Scale of Production: in capital goods in which the scale of production is important, the sizes of establishments have a determining role in competitiveness-the larger the establishment, the higher the competitiveness.

In capital goods in which the scale of production is a critical element, the domestic market market may not supply economies of scale even in some industrialized countries. Hence, most industrialized countries have been looking for the solution in specializing in certain types of machinery, and in increasing their scale and their shares in world markets.

In Turkey, the scales of production are below the level which is accepted abroad as economical. The reason for this is that the companies have served in general the domestic market which is very small. The solution to this problem should be sought in choosing the specialization areas and targeting, in standardization, and in reaching foreign world markets.

iv) Special production: Lots of capital goods are produced according to the needs of customers and require important changes in designs. The additional expenses required by special production are included in general in research and development and marketing expenses. In this type of production, the existing market share for every type of machinery plays an important role in regard to competiteveness.

Because of insufficiency of design capacity in Turkey it does not seem probable that Turkey will gain competitiveness in the short run in this type of capital goods in foreign markets.

v) Marketing and service: In capital goods which require intensive marketing and service, regional market share determines competitiveness. Some of these expenses decrease as the sales increase.

Industrialized countries which have small dömestic markets can be competing in foreign markets in goods in which they are specialized.

For Turkey the competitiveness in capital goods which are marketing-intensive and service-intensive is only possible in the middle-run and long-run. Organizations to be established in some markets that are close to Turkey, would enable Turkey to have manufacturing capacities that would permit economies of scale. The advantage of using well-known brands can be put into practice by using licensing agreements and technical cooperation.

vi) Research and Development: R and D activities and expenses have an important place in machinery manufacturing industry which is in general a knowledge-intensive branch of the industry . At the first stages of production, product and production designs are necessary. In some branches, R and D activities maintain their importance throughout the entire production process.

The chance of Turkish competitiveness in R and D intensive branches does not seem probable in the short-and middle-run.

As to the electrical products R and D expenses are middle or low level especially after licensing agreements.

3.2. Specific Competitiveness Measures in Electrical Machinery and Equipment Sector

In addition to the mentioned measures, there are some specific criteria which determine the competitive position of the products in foreign markets. Some of these

criteria-which may be called product marketability criteria- are related to the product and some are related to the market in consideration.

Substantial intensification of export sales on a longer term basis would make it necessary for the firms to evaluate what role the various marketability criteria play in potential target market regions. The following criteria seem to be the main ones to be evaluated when planning long term export marketing activities.

a) Price flexibility: This criterion refers to price competitiveness and flexibility of the companies to fix the price according to actual export market situations. Adequate and accurate information on price developments and on the companies' cost level is a prerequisite for such flexibility.

b) Operation quality: as to operating quality requirements some tests required by related international institutions should be executed.

c) After-sales service: the after-sales service comprises in general the repair and reconditioning activites, and the treatment of customers' claims as to guarantees, agreements, etc.

d) Manufacturing quality: There is a difference between the operating and manufacturing quality. The latter comprises the process quality referring to machinery and workmanship.

e) Styling: the styling is more or less individual and unpredictable influencing factor specific to buyer groups.

f) Product consultancy to customers: the product consultancy implies the total application and design assistance which can be given by the producer.

g) Response to buyers habits: the success of foreign sales bases greatly on the producer's ability to consider the special mentality of buyer groups in different target markets and to comply with their expectations.

h) Political, socio-economic implications: There are also political, socio-economical and other implications to be taken into account. There are more or less free markets and markets dominated centrally by the government. There is lobbyism, there are many country and government-specific regulations to be considered.

i) Trend conformity : There are also the important market and technological trends to be borne in mind when an export decision for groups of products is to be made.

j) Market proximity/representation : by this term not only the geographical nearness is meant, but also possibility of presence. This implies an efficient and rapid flow of information between the market and the factory headquarters.

This is not a complete set of criteria to be considered when planning export marketing activities. Other criteria can be added. The importance of an indivual criterion varies between the different market regions and also between the product groups.

The mentioned general competitiveness measures are indirectly reflected in the cost structure. Proper satisfaction of these criteria will give a competitive edge from the viewpoint of production cost structure. But cost is not the only determining factor that influencesthe purchasing decisions. There are many other factors-which we have mentioned them in specific competitiveness measures-which customers consider when they make their purchasing decisions.

We can state the factors which have influence on purchasing decisions in two broad category; price and non-price factors. As long as the non-price factors can not be quantified they will not be of much help in understanding

their effects on purchasing decisions.

In this study, non-price factors were examined, but qualitatively. In the sixth chapter, only relative prices were put into analysis. But in an ideal model, non-price factors too should be included in the analysis. We already accept the shortcomings of the import and export model which will be presented in sixth chapter.

IV. STRUCTURE OF THE TURKISH ELECTRICAL MACHINERY AND EQUIPMENT

The electrotechnical industry plays an important role in the Turkish economy. During the past years, quite substantial investments have been made in introducing modern technology into this sector and thus increasing the international product competitiveness of Turkish electro-technical goods. Therefore, the electrotechnical sector was focused upon as far as its international competitiveness and export potential is concerned.

Out of the wide range of electrotechnical products, electrical machinery and equipment which are mainly cables, electrical motors and transformers will be included in the study. Findings heavily depend on the research performed by TSKB[9] about these goods.

4.1. Production and Technology

In this section, the above-mentioned products in regard to general sectoral information, input materials, technology and capacities will be examined.

4.1.1 Cables

(a) General sectoral information: almost all kinds of PVC insulated cables and XLPE cables can now be produced except for high voltage ones. The existing feasable capacity for 1983 is estimated to be as:

PVC cables : about 34 000 Cu tons

XLPE cables : about 6 000 Cu tons

The average capacity utilization for cable subsector is indicated to range between 30 per cent in 1977 and 44

[9] TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983

per cent in 1981. During the last years an increase in the production of cables was experienced due to the repressed demand in previous years and governmental incentives to encourage exports. The production of these cables in 1982 is realised to be around 22 000 copper tons[9].

(b) Input materials: the input materials used in the cable sector are mainly copper, pvc granulate, pvc filling, steel belt, steel wire, colorants, plastic tape and diamond dies. Most of these materials can be locally produced and can be imported too. But the quality of imported materials is generally superior to that of locally produced materials. When the prices of these materials are compared it can be stated that the price range of world market materials fluctuates (copper about 30%). These price fluctuations are observed in Turkish raw material prices in approximately the same manner. The price of the basic raw material, locally purchased, is more than double the price of that purchased obroad. The other materials are mostly more than 20 per cent more expensive than in European prices. The availability of raw material so far does not pose great problems.[10]

(c) Technology: technical equipment in firms that were established in last years reflects mostly high level cable processing technology and at large extent assures good manufacturing quality. Licence agreements which formerly existed, are no more necessary in some branches of cable producing sector. The installed equipment is relatively highly modern and between 2-8 years old.[11]

(d) Capacity: when some capacity characteristics of this sector is examined and compared with foreign ones the following results are obtained. The copperweight numbers per employee per year reflect mainly more or less the automation degree. The Turkish figure is 12-15 ton copper weight per employee per year while this figure is 50, 42, 54 for average

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[9] Ibid pp.6
[10] Ibid pp.10
[11] Ibid pp.12

German, USA and Japanese producers, respectively. The capacity utilization degrees of 1982 were about 30 per cent for Turkey and 55-80 per cent for foreign producers. Turkey's figure is even below the break-even capacity in Turkish producers. The optimal plant capacities in Turkey have been laid out for too high outputs which do not correspond to local conditions. This is one of the reasons which push the firms into export activities.[12]

4.1.2 Transformers

(a) General sectoral information: transformer production in Turkey started in 1954. Almost all kinds of power and distribution transformers can now be produced locally except for high voltage power transformers and very specialized transformers. The existing feasable capacity for 1983 (one shift operation) in this sector is estimated to be as:

Distribution transformers : about 3600 MVA/14,400 units
Power transformers : about 2300 MVA

The production in this sector in 1982 is realized to be around 2,000 MVA or 9,300 units which corresponds to a capacity utilization rate of about 55 per cent or 67 per cent respectively. The production of power transformers reached about 1500 MVA in 1982 equivalent to an average capacity utilization of about 65 per cent. The production heavily depends on the demand of TEK (Turkish Electricity Board) which counts for about 70 per cent of the orders.

The capacity of the sector will be increasing since new or expansion investments are being undertaken or planned.[13]

(b) Input materials: the input materials used in the transformer sector are mainly silicone steel, copper conductor,

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[12] Ibid pp.13

[13] Ibid pp.30

enamelled copper wire, pressboard, cable paper, steel, transformer oil, radiators, bushings, Some of these materials are locally produced and imported. Some are only imported. Price comparisons of locally produced materials with European conditions reveal the same facts as in cable sector. Prices fluctuate considerably. Reductions of 40 per cent and more can be encountered, thus making costing highly uncertain. Similar considerations are valid for the transformer sector as were mentioned for cables.[14]

(c) Technology: The technology and equipment in last years show a comparable level to their European competitors. The workmanship is much higher than in the cable sector.

The production technology with its internationally comparable level allows a fair and continuous product quality for the most frequently used transformer types.[15]

(d) Capacities: unlike the cable sector, the average capacity utilization degree in the transformer sector is more than 60 per cent. Comparison of some rough capacity characteristics with foreign ones reveals the following facts. The annual feasible capacity of a Turkish firm is 600 MVA/year while this figure for foreign ones of similar production structure is 1800, 2200, 3000 MVA/year for W.Germany,USA and Japan respectively. A throughput potential (in MVA per employee) is 2,3, 12,8,11,1 and 39 for a Turkish firm, an average W.German, USA, and Japanese producer respectively. The capacity utilization degrees of 1982 were 80 per cent for a Turkish firm and between 58-82 per cent for average foreign producers. Unlike the cable sector, the capacity utilization in Turkey is above the break-even capacity.

The relatively low Turkish capacities become obvious when great lot sizes are to be produced. This low capacity sometimes causes Turkey to loose tenders.

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[14] Ibid pp.33

[15] Ibid pp.35

The MVA/employee figures indicate that the number of staffing concerned surpasses that in other countries, so that in the corresponding Turkish factory the personnel seems to be overstaffed in comparison to that of W.Germany, USA, Japan and that a lower productivity exists in comparison with foreign competitors[16]

4.1.3. Electrical Motors

(a) General sectoral information: Electrical motors began to be produced in Turkey in the mid 50's. The power of these motors were around 10 HP. After the 60's the number of producers increased tremendously. Today there are approximately 35 motor producing firms. 15-20 of them have large or medium-sized capacities. Two types of motors, commutator type and industrial type motors are being produced. The production capacities for 1983 are as follows:

Commutator type motors : 500,000 HP/3,000,000 Units
Industrial type motors :4,000,000 HP/500,000 Units

The average capacity utilization was around 50 per cent for 1982.[17]

(b) Input materials : the input materials used in the motor sector are mainly copper, copper enamelled, aluminium, lamination steel, silicone steel, steel rods, pressboard pvc, plastics, insulating tape, pig iron, varnish, ball bearings. Like in cables and transformers, some materials are both locally produced and imported. Some are only imported like varnish and ball bearings.

Because of customs duty on the different raw materials, goods produced for the domestic market will in consequence have a high local price.

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[16] Ibid. pp. 37

[17] Ibid. pp.57

The price range of world market materials is considerable and is leading to similar fluctuations in the local market. Thus also in the motor sector great uncertainties enter the calculation of cost-breakdowns.[18]

(c) Technology: the production structure of the Turkish firms varies greatly, not only because of the product range, but also of the equipment.

As the industrial type and universal motors are fully developed technical products, licences are no more needed for their production. Therefore the firms do no more work with licences. The production technology corresponds more or less to international level and enables IEC (International Electric Commission) standard quality.

To summarize, the motors produced in developed Turkish firms are suitable for most of the application fields for possible foreign target markets.[19]

(d) Capacity: When the comparison of capacity oriented characteristics are done the following results appear. Throughput rate per man (productivity) is 0.36, 0.52, 0.46, 1.28 for Turkish, German, USA and Japanese producer respectively. Utilization of Capacity for 1982 is 40, 74, 62 and 82 per cent for Turkey and above countries respectively. The break even capacity is considerably high in the world, Most factories in the whole world are presently working below break-even capacity.

A striking difference exists in the working costs per hour. In Turkey wage costs are lower.

Capacities in the sector are too large for the actual conditions of the present market. Exporting would therefore be recommended for filling this capacity gap.[20]

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[18] Ibid. pp.57

[19] Ibid. pp.61

[20] Ibid. pp.66

4.2. Costing and Pricing

4.2.1. Cables

The cost and market price levels fluctuate considerably in the sector, particularly because of dumping prices and fluctuations of raw material prices. Comparisons of Turkish export prices with prices of a German producer show that the export prices of Turkish companies can be normally considered as a little price competitive against European competitiors.[21] But generally Far East countries deliver cables at a price which is about 10-40 per cent lower than comparable German products. In these countries copper is bought at very big amounts and therefore at a lower price.[22]

In order to analyse the competitiveness of the Turkish cable producer mainly from the view of the cost structure a comparison is made between the unit cost structure of a Turkish and a German cable manufacturer. The costs are compared with the estimated FOB price for the products. The calculations are shown in the following Table 6.

TABLE 6

Turkish-German Price Comparison for a Cable
(in TL, 1 DM = 74 TL)

Items	Turkish Company Exporting without incentives	Turkish Company Exporting with incentives	German Co.
Estimated FOB-price	6,660	6,660	6,660
Tax rebate (17.5%)	-	1,165	-
Revenues	6,660	7,825	6,660
Total costs	8,101	5,243	5,507
Profit	-1,441	2,582	1,153

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.22

[21] Ibid. pp.19
[22] Ibid. pp.19

The calculations for the case of exporting without making use of export incentives show the considereable competitive disadvantages of high raw material prices in Turkey. The calculations reflect the benefits of the export incentives which allow for duty free importation of materials needed for export production up to a maximum value of 50 per cent of the FOB-export revenue.

For the example it can be concluded that the Turkish producer is not at all competitive against a German producer if export incentives are not taken into consideration.

Financial costs are not included in the calculations. These costs are normally low in Germany and reach quite a substantial portion of the unit costs in Turkey due to the financing conditions in Turkey.

As a result it can generally be said that Turkish producers can only be competitive against European firms from the production cost point of view if;

- raw material costs can be kept at nearly the same level as in Europe,
- financial costs can be kept at a bearable level depending on the companies individual situation.

"The present unfavourable situation may change if the actual economic recession period in many countries comes to an end, and dumping prices and high price rebates are becoming an exception rather than a rule"[23]

4.2.2 Transformers

One main determinant for pricing is the market price level. To get an idea of price levels in the sector, price comparisons should be made. Comparisons made between Turkish and German producers show that for low-power Turkish

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[23] Ibid. pp.24

transformers, producer can be competitive in the European market.

The wage costs in Turkey being lower than European ones compensate for the raw material items. Besides, by the government incentives, the Turkish entrepreneur is in the position of reducing considerably his total costs. The following table shows the influence.

TABLE 7

Cost/Price Comparison for a Transformer
(250 KVA, 30 KV) (in TL)

Items	Turkish example Exporting without incentives	Exporting with incentives	German example
Estimated FOB-price	560,000	560,000	560,000
Tax rebate (20%)	-	95,000	
Total revenues	560,000	655,200	560,000
Total costs	650,140	544,331	598,452
Profit	-90,140	110,869	-38,452

Source : TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.47

A general discussion of these results leads to the following consequences:

(a) competitive prices against German companies' prices can be achieved;

(b) since the financial costs were not considered, generally it can be said that high financial costs jeopardize the advantage by government incentives.

4.2.3. Electrical motors

In the same manner as in the cables and transformers, in order to judge Turkish producers as to price competitiveness compared with foreign competitors, a comparison of foreign market prices with Turkish prices is to be made. A comparison of Turkish prices with West European market prices show that Turkish producers are somewhat competitive in Germany, at least for the lower power range.[24]

To analyse the price competitiveness of a Turkish producer, his cost competitiveness has to be known. The following Table 8 gives a survey about different cost price structures.

As can be generally concluded from Table 8, a Turkish producer supplying motors of the standard industrial type for the European market and having raw material cost as his European competitor can principally be competitive,

TABLE 8

Price/Cost Competitiveness Comparison for a Motor (in TL, 74 TL = 1DM)

Items	Turkish example Exporting without incentives	Exporting with incentives	German example
Estimated FOB-price	16,990	16,990	16,990
Tax rebate (20%)	-	3,034	-
Total revenues	16,990	20,024	16,990
Total costs	16,867	14,210	18,939
Profit	123	5,814	-1,949

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.77

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24 Ibid. pp. 77

provided that his financial costs are low and export prices do not face dumping prices which hardly cover raw material costs. The effect of the government incentives is clearly seen, driving company out of loss zone. The German producer can not cover his costs at the above indicated price.

4.3. Export Marketing Aspects

4.3.1. Cables

(a) Recent export developments: the rapid increase of cable exports in last few years in due mostly to the interruption of trade between Iran and Western countries and secondly to increasing activities of Turkish contractors in Middle East and Libya. The export value of cables reached a level of $ 27,540,000 in 1982 which is realized by using 1/8 of the existing installed capacity. Total exports for 1980 to 1982 are shown below.

TABLE 9

Turkish Cable Exports

(Cu tons, US 000 $)

Years	Quantity	Value	Q.Increase(%)	V.Increase(%)
1980	88	200	-	-
1981	1,374	4,975	1,461	2,387
1982	6,750	27,510	391	453

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.6

When we examine the figures, the rates of increase through years are strikingly high. And the rates of value increases are exceeding the rate of quantity increases.

Looking at the distribution of Turkish cable exports with respect to countries for 1980 to 1982. Iran turns out

to be the most important buyer. The share of Iran in total cable exports is 33 per cent, 56 per cent and 74 per cent for these years. Iran is followed by Libya, whose share is 18, 26, and 8 percent for the same years. Smaller volume of exports have also been realized to Switzerland, Belgium, Luxemburg, Germany, and some other countries in the Middle East and Europe. As well as the volume of exports, the number of export countries has also increased during this period. The following Table 10 shows the share of each country as percentage in the total cable exports of Turkey.

TABLE 10

Breakdown of Cable Exports by Countries (%)

1980		1981		1982	
Pakistan	38	Iran	56	Iran	74
Iran	33	Libya	26	Libya	8
Libya	18	Iraq	3.7	Switzerland	11
Dubai	6	Germany	2.3	Germany	1
Holland	4	S.Arabia	1.5	S.Arabia	1
		The rest: Switzerland, Dubai, Lebanon, Britain, Abu Dhabi	10.5	The rest: Iraq, France, Dubai, Jordon	5

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.7

(b) Present export sales activities: exports are generally initiated by general managers or export managers. No foreign representative office has been set up for exports. Production program and product policy are based on the orders received and product qualities are according to Turkish standards. There may be difficulties in meeting special requirements. The products can be offered at competitive prices. With regard to export promotion activities, public relation, advertising and exhibition activities are low. Personal selling is so far the predominant promotional activity.

Export intensification, particularly to countries other than Iran, would require intensified and systematic marketing activities. Adequate information on foreign markets and on the marketability of own products would form the basis for these activities.[25]

4.3.2. Transformers

(a) Recent export developments: export business began only in the last few years. The figures for 1981 and 1982 are as follows:

TABLE 11

Turkish Transformer Exports (US 000$)

Years	MVA	Value	MVA Increase(%)	V.Increase(%)
1981	125	118	-	-
1982	55	455	-56	286

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.31

The figures show that a substantial export value has not yet been reached. Although the value of transformers exported increased, the total power sold decreased. This is because of changes in the composition of transformers in favour of small size transformer.

Table 12 shows the breakdown of transformers exports by countries.

Contrary to cable exports, Europe has a considerable share in the total transformer exports.

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25 Ibid. pp.25

TABLE 12

Breakdown of Transformer exports by Countries (%)

1981		1982	
Dubai	51	Dubai	35
Germany	27	Netherland	28
Libya	21	Libya	15,5
Pakistan	1	Germany	10,5
		Pakistan	6
		Jordon	1,3
		The rest: S.Arabia, Lebanon, Switzerland	3,7

Source: TSKB, Producer Survey, Electrical Industry in Turkey, April 1983, pp.31

(b) Present export sales activities: The present export marketing activities mainly comprise

a. response to tenders;

b. using channels of licencers as a basis to foreign markets, by means of joint marketing, tendering.

The potential customers are mostly public or semi-public institutions (industrial enterprises are of second order). The marketing channels are more or less given by the caller for tenders. Personal selling is tried.[26]

4.3.3. Electrical Motors

(a) Recent export developments: the export volume of Turkey for the last four years is shown in the following Table 13.

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[26] Ibid. pp.51

TABLE 13

Electrical Motor Exports (US 000$)

Years	Value	V.Increase (%)
1979	18.2	-
1980	0.5	-97
1981	360	71,900
1982	2,638	632

Source: TSKB, Producer Survey, Electrical Industry in Turkey April 1983, pp.55

Increases in 1981 and 1982 are striking with respect to previous years.

If the countries where these motors are exported are examined it can be said that Iran is the most important market for Turkish motors for the time being. If we exclude 1980, when the value of exports was at a negligible level, the distribution of motor exports with respect to countries is as follows in Table 14

TABLE 14

Breakdown of Motor Exports by Countries (%)

1979		1981		1982	
England	70	Iran	78	Iran	72
Spain	27	Syria	13	Germany	23
Germany	3	Greece	3	Rest:	5
		Libya	2.8	Various	
		Rest:	3.2	countries	
		Germany, Iraq			

Source: TSKB, Producer Survey, Electrical Industry in Turkey, April 1983, pp.55

(b) Present export sales activities: exports to Germany are realized by means of know-how partners. A new strategy (market research by travelling to foreign countries, making contacts, offering advantage in price, services etc.) tries

to be put into practice. Some firms are marketing their products to know-how partners in Europe and USA using the marketing channels of those firms.[27]

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[27] Ibid. pp.80

again in real terms by over 10 per cent, despite a decline in clothing and textiles, although world trade increased only 4 per cent."[29]

While these countries performed well in expanding exports of those manufactured goods in which they have traditionally had a comparative advantage, such as textiles and apparel, leather goods and shoes, "they achieved their largest relative gains in branches to which they were newcomers."[30] Especially marked export growth rates were achieved in the metal manufacturing industries-metal fabrication, mechanical engineering, electrical engineering (electrotechnical) and road motor vehicles. This sector, in turn, was led by the electrical engineering industry in which "the LDC's managed to attain average annual export growth rates in excess of thirty per cent already by the second half of the nineteen sixties".[31] This amounted to more than twice the respective growth rate for total manufacturing. The LDC's were to make even more substantial progress, both in accelerating and diversifying their supply of exports, during the early nineteen seventies; indeed they appear to have emerged as serious competitors to some of the industrialized countries, or more developed countries in electrical engineering products already.

This is shown quite distinctly by overall trade patterns between the LDC's and the advanced OECD countries. "Over the period 1964 to 1973 these countries' imports of electrical engineering products originating in LDC's grew at an average annual rate of 20.2 per cent, slightly less than the 21.3 per cent average annual growth of imports of total manufactured products."[32] But this relationship between

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[29] Chenery, Hollis B. The changing Composition of Developing Country Exports, World Bank Staff Working Paper No: 314, January 1979, pp.12

[30] Weiss, Frank Dietmar, Electrical Engineering in West Germany, Kiel, Institut für Weltwirtschaft an der Universität Kiel, 1978, pp.1

[31] Ibid. pp.1

[32] Ibid. pp.2

the two sectors changed sharply by the beginning of the nineteen seventies. "Thus, growth of imports of manufactured items averaged 29.7 per cent annually between 1970 and 1973, and imports of electrical engineering products increased at an average annual rate of 54.9 per cent over that period. By way of reference, in 1964 these OECD countries' imports of electrical engineering products from the LDC's amounted to 0.7 per cent of their exports to the LDC's; by 1973 they amounted to 20.2 per cent"[33]

Thus it appears that in electrical engineering an intensification of the international division of labor between less developed and more developed countries is taking place, prompted by a rapidly expanding supply potential in the less developed countries. "Amongs the possible consequences of this apparent change in the international structure of competitiveness two extreme outcomes are worth pointing out:

a) The first is a deepening international division of labor, with accompanying real income goins for both groups of countries;

b) The second is an increase in protection on the part of the MDC's directed against the LDC's. The consequences are losses in efficiency and hence in real income for both sets of countries."[34]

5.2. Decreasing Competitiveness of Germany as A More Developed Country

The case of Germany is in several respects an instructive one in this regard. First, import competition

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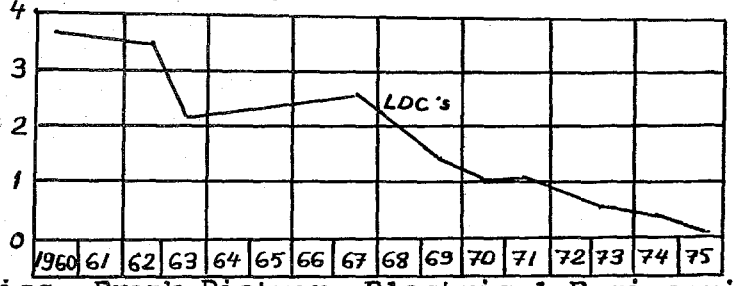
[33] Ibid. pp.2

[34] Ibid. pp.3

from the LDC's in electrical engineering did not become a problem until 1970. Second, that country's experience has been variable; an initial phase of declining competitiveness was followed by a rising one which in turn was superseded by a longer period of continuously falling competitiveness. (See Chart I)

CHART I

Electrical Engineering Competitiveness of Germany vis-a-vis the LDC's



Source : Weiss, Frank Dietmar, Electrical Engineering in West Germany, Kiel, Institut für Weltwirtshaft an der Universität Kiel, 1978, pp. 13

Although the presented facts correspond to the years before eighties it would not be of much error to extend the findings to the present and future especialy on the basis of prevailing success of Far East countries.

It was found in Weiss' research that human capital intensity, unskilled labor intensity and degree of standardization most consistently explained the structure of competitiveness vis-a-vis the LDC's:

"The higher the skill class, the more aboundatly it should be found in countries at progressively higher levels of development. Consequently, the higher the level of development the cheaper are high skilled employees relative to low skilled employees, hence countries well endowed with less skilled labor will tend to enjoy a comparative endowment employing this factor relatively intensively."[35] For the high income countries investigated

[35] Ibid. pp.27

in Weiss' research (Germany), unskilled labor can be expected to become relatively expensive in the future. "Branches utilizing unskilled labor in Germany will be subject to increasing competitive pressure from the LDC's."[36]

"German electrical engineering will find it increasingly difficult to attract unskilled labor at wages enabling it to compete with developing countries. The low skilled lines of activity will therefore be threatened."[37]

The findings indeed suggest that the subindustries less intensive in human capital, and not continuously bringing forth innovations will tend to come under strong competitive pressure from LDC's.

Turkey in this scenery, being considered in the set of countries that are called LDC's, can not afford to be outside these trade patterns and structural characterics changing in favour of LDC's. Turkey has already begun to take the initiatives in integrating her industry to the world trade with ever increasing percentages of industrial goods in total exports, which accounted for 64 per cent of total exports in 1983 and is estimated to be 75 per cent in 1984.

5.3. Germany as a Target Market

Although most of the Turkish exports of electrical machinery and equipment were directed to Middle East and North African countries hitherto, due to the decreasing competitiveness of MDC's in these products, we will focus on W.Germany in this section. In the sixth chapter too, the efforts for the export forecasting will be directed at Germany only. In future studies these models can be used for other target countries too.

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[36] Ibid. pp.27

[37] Ibid. pp.40

Our main reason for applying the model first to W.Germany is that W.Germany has a liberal trade policy which does not restrict the imports specially in machinery. Therefore, we thought its trade would be explained better by equations which intrinsically contain shortcomings as far as the ability to quantify the trade determinants are concerned.

"With an economic potential second only to the United States of America, the Federal Republic of Germany represents a market with a proven capacity for absorbing imports, including products from developing countries"[38]

Owing to its liberal trade policy, government promotion of imports from developing countries and ample foreign exchange reserves to pay for its imports, the Federal Republic of Germany offer favourable conditions for exporters from developing countries.

In the European Community (EC), the Federal Republic of Germany has the greatest market potential. The German market is a large market with buyers having considerable purchasing power, but it is also a difficult market because there are many international competitors.

"Exporting to an industrial country, such as the Federal Republic of Germany, is a permanent job for the businessman and not just for a limited period of time."[39]

In Germany over the last 10 years the production of electrical machinery and equipment increased at about 5 per cent annually in dollar terms. In the same period of time the exports rose at about 14 per cent annually on the average and the imports showed the highest average annual increase, about 16 per cent. Exports nowadays represent already more than half of the production and keeping the position on the local markets against imports is getting more and more difficult (see Appendix B for statistics)

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[38] Wilhelms, Christian, the Federal Republic of Germany, Market and Marketing, Federal Ministry for Economic Cooperation, October 1979, pp.11

[39] Ibid. pp.12

VI. THE EXPORT PERFORMANCE OF TURKISH ELECTRICAL MACHINERY AND EQUIPMENT TO W. GERMANY

6.1. A Model For Import and Export Determination

Exports are closely tied to the movements of foreign markets and to the actions of competitors abroad. This is the reason export forecasting poses special difficulties in the absence of knowledge about the developments outside the home area. To overcome these difficulties we will approach the export determination by assessing the import developments of the target markets. So in this study first an import model for the target market, and secondly an export model for Turkey will be used.

Searching the necessary literature on import and export determinations, the most convenient one for our specific case was found in an OECD study.[40]

The original model was posing some difficulties because of the independent variables contained in it. The availability problem of statistics and our purpose to get a handy tool led us to drop some variables such as, excess inventory measure and excess unfilled order/delivery ratio etc. without which we thought the model would perform as well. Changes were made in definitions of variables to adapt it to our case as well. The following qualitative analysis about the model is mainly based on the OECD study.

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[40] Adams, FG. An Econometric Analysis of International Trade, OECD Economic Studies Series, January 1969

6.1.1. Determinants of Imports

Table 15 presents simple, but useful, classification of the factors which play a role in influencing the volume of imports. What follows is a brief description of variables.

(a) Domestic demand factors: The relationship between movements of domestic demand and imports accounts for the considerable part of the variation of import volume. In our case total imports consists of finished goods going into final demand for current use, and imports for inventory replenishment.

Imports can be related to industrial production. Investment or inventory change may be used as independent variables in the import function.

(b) Domestic supply factors : The movement of imports may be closely related to domestic product availabilities. The notion of "the pressure of demand" effect is that at times when pressure of demand on domestic producing capacity is high, imports of competitive goods from abroad will be stimulated.

Prices of domestic products have a place in the import function. Prices tend to be inflexible in the short run, particularly for manufactured goods, tend to adjust supply and demand and direct the purchaser towards imported goods at the peak of demand. In place of price changes, changing of delivery terms is very influencial. From the point of view of the purchaser, the worsening of delivery terms is analogous to a price rise.

TABLE 15

Import Determinants

Variables	Definitions	Explanations
Dependent Variable, X_j	$X_j/\bar{X}_j \times 100$	Import value index of commodity imports of country j; $\bar{X}_j$, in the base year.
Independent variables		
IP_j	$IP_j/\bar{IP}_j \times 100$	Industrial production of commodity; $\bar{IP}_j$, in the base year.
PM_j	$\frac{P_j^M/P_j^D}{(P_j^M/P_j^D)} \times 100$	Relative import price measure; Import price of manufactured good (P_j^M) relative to domestic manufactured goods price (P_j^D). $(\overline{P_j^M/P_j^D})$, in the base year.
PD_j	$PD_j/\bar{PD}_j \times 100$	Pressure of demand index; PD_j is defined to be composed of production minus export plus import of commodity $\bar{PD}_j$, in the base year.
IN_j	$IN_j/\bar{IN}_j \times 100$	Total fixed investment index; $\bar{IN}_j$, in the base year.

Source: Adam, FG. An Econometric Analysis of International Trade, OECD Economic Studies Series, January 1969, pp.18. Adopted to our case.

(c) Foreign Supply Factors: In demand analysis for imports, domestic prices, import prices as well as duties and other applicable barrier to import may belong in the import function.

Variables considered convenient for our import model are summarized in Table 15.

Now the import function can be written as:

$$X_j = F_{IM}(IP_j, PM_j, PD_j, IN_j) \quad (1)$$

The linear form of the function can be constructed as:

$$X_j = a_0 + a_1 IP_j + a_2 PM_j + a_3 PD_j + a_4 IN_j \quad (2)$$

And also the logarithmic one would be as follows:

$$\ln(X_j) = a_0 + a_1 \ln(IP) + a_2 \ln(PM_j) + a_3 \ln(PD_j) + a_4 \ln(IN_j) \quad (3)$$

6.1.2. Determinants of Exports

The discussion of export determination is broken down into consideration of the influence of the "market" and of the factors affecting the shares of various exporters.

(a) Market Effect: The basic factor influencing the short-term movements of the exports of a particular country is the development of import demand in its principal market area.

A simple approach to defining the "market" is market share. Supposing

$$S_i = \sum_j \gamma_{ij} X_j \quad (4)$$

Where the γ_{ij}'s are the share in the base year of country i in the j markets and where the X_j are the current imports of the j countries. S represent the total exports which country i whould make assuming its share in various markets had remained at base year levels, in other words, assuming exports moved proportionately with the imports of

countries in the market area.

(b) Market shares: Given the total size of the market, trade patterns may also be influenced by changes in competitiveness of one country relative to others.

Competitiveness involves some of the same factors which influence imports. Thus market shares and export volumes are affected by prices. But pressure of demand through its impact on delivery period, credit terms, sales effort made etc. may also play a role in determining market shares. The relevant definition of the factors which describe international competitiveness with regard to exports is, of course different from that applying to imports. What is relevant here is the price (or other terms) at which the product is offered by the exporter relative to the prices (or other terms) offered by competitors for the market.

Variables considered converient for export are summarized in Table 16.

Now the export function can be written as

$$X_i = F_{EX}(S_i, PX_i, PDX_i) \qquad (5)$$

The linear form of the function can be constructed as:

$$X_i = b_0 + b_i S_i + b_2 PX_i + b_3 PDX_i \qquad (6)$$

And the logarithmic one would be as follows:

$$\ln(X_i) = b_0 + b_i \ln(S_i) + b_2 \ln(PX_i) + b_3 \ln(PDX_i) \qquad (7)$$

These two trade models will be connected to each other in the following way:

After validating the variables' explanatory powers and getting a causal relationship explaining the imports of a country, the future estimated values of each variable are put into the equation and we get an idea about the future values of imports. According to the trend of our market share in this importing country we estimate our export value to this country. On the other hand, we get a second export value by use of our export equation. This approach to the analysis provides the two ways by which one can have an idea about the developments of export and also helps us in

validating the results by checking with each other.

TABLE 16

Export Determinants

Variables	Definitions	Explanations
Dependent variable, X_i	$X_i/\bar{X}_i \times 100$	Value index of commodity exports of country. $\bar{X}_i$, in the base year
Independent variables		
Market variable		
S_i	$\frac{(X_i/X_j)}{(\overline{X_i/X_j})} \times 100$	Market share index
	where (X_i/X_j)	Country i's share in country j's imports
	where $(\overline{X_i/X_j})$	share in the base year
Relative competitiveness variable		
PX_i	$\left(\frac{P_i^X}{\sum \gamma_k P_k^X} \Big/ \frac{\bar{P}_i^X}{\sum \bar{\gamma}_k \bar{P}_k^X}\right) \times 100$	Relative export price measure. Export price of manufactured goods of country i relative to weighted export prices of competing countries k in the market area. Market share of country k; Pressure of demand measure; Production minus export plus import of commodity. $\overline{PDX}_i$, in the base year
where $k = \frac{X_k}{X_j}$		
Pressure of Demand variable		
PDX_i	$\frac{PDX_i}{\overline{PDX}_i} \times 100$	

Source: Adapted from Adam, FG. An Econometric Analysis of International Trade. OECD, Economic Studies Series, January 1969, pp.31

6.2. Data Utilized For The Model

In the adapted import and export model, the statistical data for the variables chosen were gathered from secondary sources. Amongs these sources are State Institute of Statistics (SIS), Industrial Production Statics of Turkey; State Institute of Statistics (SIS), Foreign Trade Statistics of Turkey; Statisches Jahrbuch für die Bundesrepublic Deutchland; U.N. Statistical Yearbooks of Trade; U.N. Statistical Yearbooks of Production, and OECD economic surveys.

Statistics were manipulated to obtain a sets of indexes throughout the years. In the analysis, the statistics of the year 1972 through 1982 were used and the year 1972 was taken to be the base year in preparing the indexes. Besides, for the variables of relative competitiveness and relative import price measure because we could not find a single price representing the prices of all different kinds of products in question in this study, we decided to generate a fictitous price which is thought to represent the real prices.

Per-kg-value of the amount traded was taken to be as a fictitous price. In the preparation of the variable of relative competitiveness used in the export model, the export price of Turkish products was represented by the per-kg-value of the Turkish export to Germany. And the export prices of competing countries to Germany were represented by the per-kg-value of the German imports. In the same manner, in the preparation of the variable of relative import price measure, per-kg-value of the German imports was taken to be the import price of these goods and per-kg-value of the German export was taken to be price of domestic manufactured goods.

The variable of"pressure of demand" is composed of the production minus the export plus the import of these goods.

6.2.1 The Import Model Applied for W. Germany

The variables in the import model were explained in Table 15. But in this table definitions were given in such a way as to have indexes of these variables. Here, first we will give the absolute figures of corresponding variables and then indexes of them. They are German import value of electrical machinery and equipment as the dependent variable and the industrial production value, the relative import price, the pressure of demand, and the total fixed investment as the independent variables. In the following Table 17 these variables and their absolute figures are given.

When the trends of the figures are examined, the first striking point is that the business activities in these products lived their peak points in 1980. All variables, except for the variable of relative import price, had steadily increased up to 1981. After 1980 a decreasing trend is being observed. The way that we think the causal relationship between independent variables and dependent variable is that increasing investments and increasing pressure of demand will increase the imports,while increasing relative import price will decrease imports.Our concept about the effect of changing production is somewhat vague. We will evaluate it basing on the regression analysis.

Table 18 presents the index values of the variables studied.

TABLE 17

Import Variables of Electrical Machinery and Equipment of Germany

Year	Dependent variable Import value (US 000$) X (1)	Basic variables Industrial production (US 000$) IP (2)	relative import price PM (3)	pressure of demand (US 000$) PD (4)	Fixed investments (US 000$) IN (5)
1972	536,753	4,382,000	0.6077	3,597,521	65,570,000
1973	777,889	5,852,000	0.5815	4,690,343	78,670,000
1974	912,361	6,010,000	0.6000	4,275,570	82,130,000
1975	998,079	5,859,000	0.5741	4,107,688	85,130,000
1976	1,195,574	6,291,000	0.7043	3,624,673	89,700,000
1977	1,454,283	7,268,000	0.7591	5,012,437	104,740,000
1978	1,787,198	8,389,000	0.6408	5,777,525	132,730,000
1979	2,295,727	9,348,000	0.7316	6,617,056	164,760,000
1980	2,733,234	10,013,000	0.7514	7,044,174	184,690,000
1981	2,345,456	8,266,000	0.8431	5,601,532	150,120,000
1982	2,263,952	7,902,000	0.8215	5,055,651	135,200,000

Source: (1) U.N. Statistical yearbooks of Trade 1972-1982, (2): Statistisches Jahrbuch 1983 für die Bundesrepublik Deutchland (1972-79 figures calculated from the index given), (3): Calculated from U.N. Statistical Yearbooks of Trade 1972-82, (4): Calculated from U.N. Statistical Yearbooks of Trade and Statistisches Jahrbuch 1983 für die Bundesrepublik Deutchland, (5): OECD Economic Surveys 1982-1983, Germany, June 1983.

TABLE 18

Indexes for the Regression Analysis of Import Variables

Year	Dependent variable value index X	Basic variables Industrial production index IP	Relative import price measure PM	Pressure of demand index PD	Fixed investments index IN
1972	100.00	100.00	100.00	100.00	100.00
1973	145.92	133.55	95.69	130.38	119.98
1974	169.98	137.15	98.73	118.85	125.26
1975	185.95	133.71	94.47	114.18	129.83
1976	222.74	143.56	115.89	100.75	136.80
1977	270.94	165.86	124.91	139.33	159.73
1978	332.96	191.44	105.44	160.60	202.42
1979	427.71	213.33	120.22	183.93	251.27
1980	509.22	228.50	123.64	195.81	281.67
1981	436.97	188.64	138.73	155.71	228.94
1982	421.79	180.38	135.19	140.53	206.19

Source: Calculated from tables 15 and 17.

6.2.2 The Export Model Applied For Turkey

The variables in the export model were explained in Table 16. As in the case of import model, first absolute figures of each variable will be presented and then their indexes will be formulated. The sets of figures of each variable are shown in Table 19. The variables are Turkish export value of electrical machinery and equipment as the dependent variable and the market share in the German market, the relative competitiveness and the pressure of demand as the independent variables.

A quick examination of the figures throughout the years up to 1981 reveals the fact that there were fluctuating changes except for the Turkish pressure of demand. An abrupt increase in the export value to Germany in 1981 is observed. There is also an abrupt increase in the market share in the German market.

Our expectation about the export value when the independent variables change is that the increasing market share will increase the export value whereas the increasing relative competitiveness and the pressure of demand will decrease the export value.

Prepared indexes for the same figures of variables are shown in Table 20.

TABLE 19

Export Variables of Electrical Machinery and Equipment of Turkey to W.Germany

Years	Dependent variable Export value (US $) X(1)	Basic variables Market share (%) S (2)	Relative competitiveness PX(3)	Pressure of demand (US 000 $) PDX (4)
1972	-	-	-	37,731
1973	43,306	0.0057	0.6016	62,806
1974	103,467	0.0113	0.4355	84,254
1975	33,699	0.0034	0.6327	163,441
1976	39,731	0.0033	0.6039	195,027
1977	23,279	0.0016	0.7855	189,679
1978	35,825	0.0020	0.3923	217,712
1979	212,308	0.0092	0.9403	284,915
1980	40,861	0.0015	0.8854	428,765
1981	488,049	0.0208	0.2709	467,793
1982	2,532,000	0.1118	0.7650	304,356

Source : SIS, Foreign Trade Statistics of Turkey 1972-1982, (2), (3) : Calculated from U.N. Statistical yearbook of Trade 1972-1982 and SIS, Foreign Trade Statistics 1972-1982 , (4): Calculated from SIS, Foreign Trade Statistics 1972-1982 and SIS, Industrial Production Statistics of Turkey 1972-1982

TABLE 20

Indexes for the Regression Analysis of Export Variables

Year	Dependent variable	Basic variables		
	Value index X	Market variable index S	Relative competitiveness variable index PX	Pressure of Demand index PDX
1972	-	-	-	100.00
1973	100.00	100.00	100.00	166.46
1974	238.92	198.24	72.39	223.30
1975	77.81	59.65	105.17	433.17
1976	91.74	57.89	100.38	516.39
1977	53.75	28.07	130.57	502.72
1978	82.73	43.86	65.21	577.01
1979	490.25	161.46	156.30	755.13
1980	94.35	26.32	147.17	1136.38
1981	1126.98	364.91	45.03	1239.82
1982	5846.76	1961.40	127.16	806.65

Source: Calculated from table 16 and 19

6.3. Results on the Regression Analysis of W.German Imports of Electrical Machinery and Equipment

To validate the explaining power of each variable they are put into the analysis one by one.

First, industrial production variable was put into the analysis

$$X = -269.54 + 3.41 \text{ IP} \qquad (1)$$

St. err. (0.35)

t (5.74) critical t=2.82 (α=0.01)

Adj.R^2=0.90 $F_{1,9} = 5.12$

$F_{calc.} = 93.35$

The regression coefficient is highly significant at 1 per cent level and calculated F value is higher than F table value. Industrial production and imports are positively correlated and adjusted R squared is as high as 0.90. Although we have a high correlation it can not be expected that this variable should explain all the features of W.German imports.

Putting relative import price into the regression one gets

$$X = -509.76 + 7.05 \text{ PM} \qquad (2)$$

St.err. (1.74)

t (4.05)

Adj. R^2=0.61 $F_{calc.}$=16.47

The regression is significant at 1 per cent level. But it is not as significant as the coefficient of industrial production. Coefficient of correlation does not explain well the changes in imports. The coefficient sign of price index is not as expected. As import prices increase quantity imported is supposed to decrease. The sign happened to be so because price is not the single variable explaining imports. A relatively low coefficient of correlation indicates that there must be other variables too.

Continuing the analysis, now "pressure of demand" variable is tried.

$$X = -241.28 + 3.81\ PD \qquad (3)$$

St. err. (0.73)

t (5.22)

Adj. R^2=0.73 $F_{calc.}$=27.44

It is significant at 1 per cent level and has a right sign as expected. It can explain 73 per cent of the variations in imports by its own. When the pressure of demand in these goods increases, imports also will increase.

The last variable is the investment index

$$X = -350.56 + 5.13\ IN \qquad (4)$$

St. err. (0.43)

t (11.90)

Adj.R^2=0.93 $F_{calc.}$=142.53

It is significant at 1 per cent level and has a right sign as expected. It highly explain the variations in imports. This is a very natural result because as investments increase electrical machinery and equipment which are capital goods will be demanded more and used in the establishments.

Now, we can put all the variables into the regression analysis. The following function in linear form was found.

$$X = -333.42+2.41\ IP-0.16\ PM-0.95\ PD+3.01\ IN \qquad (5)$$

St. err.	(0.35)	(0.52)	(0.40)	(0.42)
t	(6.88)	(0.31)	(2.38)	(7.17)
Beta values	(0.68)	(-0.02)	(-0.22)	(0.57)

Adj. R^2=0.99 $F_{4,6}$=4.53 Critical t=1.94 (α=0.05)

$F_{calc.}$= 440.50

The coefficients of the variable of industrial production, pressure of demand and investment pass the t-test. The coefficients, except PD, have right signs. As the industrial production increases import also increases. At first sight this seems illogical because then the domestic demand will be met more by domestic production. But the demand is defined to be composed of production minus export plus import. Higher the production is, higher the export will be and higher the

the imports also will be to cover the gap in the demand. Although the coefficients of relative import price measure is not significant it has a right sign. It is natural that increasing import prices is expected to decrease imports.

Looking at beta values we can see that in the equation industrial production has the highest effect on the import. Secondly investment exerts an influence on imports.

The variable of pressure of demand did not behave as the hypothesis claimed. It has a negative sign. This turned out to be so because of a high correlation coefficient of 0.94 between the variable of industrial production and that of pressure of demand.

The regression equation as a whole explain very well the variations in imports.

The foregoing analysis was also performed for the logarithmic form.

The logainthmic form for the analysis is as follows:

$$\ln(X)=-5.78+2.09\ln(IP)+0.07\ln(PM)-0.84\ln(PD)+0.94\ln(IN) \quad (6)$$

St. err.	(0.23)	(0.32)	(0.25)	(0.29)
t	(8.91)	(0.21)	(3.32)	(3.24)

$\text{Adj.}R^2=0.98$ $F_{4,6}=4.53$ Critical t=1.94 ($\alpha=0.05$)

$F_{calc.}=224$

The explanatory power of the logarithmic equation is little less than the linear one. In this equation also the coefficient of relative import price measure failed to be significant and in contrast to our expectation, has a positive coefficient which is very close to zero. We may accept that the price has almost no influence in this equation. The coefficient of "pressure of demand", as in the linear equation has a opposite sign.

In this equation also, the most influential variable is industrial production and secondly investment. The influence of pressure of demand on import has developed negatively so as to have the same influence as that of investments.

In the logarithmic equation, two coeeficient failed to conform to our expectations where as in the linear one,

one coefficient had the opposite sign. And also the calculated F value is higher in the linear equation than in the logarithmic one. Since the linear model complies more with our expectations and performed better, it will be used in making inferences for future.

As a result, the most successful variable in explaining the changes in imports was industrial production which proved to be both significant and had the right coefficient sign in the equation. The other successful variable was investment which also proved to be both significant and had the right coefficient sign. Although the variable of relative import price measure gave the right coefficient sign it failed to be significant. The effect of this variable in explaining the changes of the import equation was found to be of relatively negligible value. Also the variable of pressure of demand showed oddnesses against our expectations. Our conclusion about these two variable is that the fictitous prices generated failed to explain fully the effect of price on the amount of imports and also the relative measure of quality could not be quantified and put into the equation.

The variable of pressure of demand gave a coefficient of the right sign which was also significant when it was put into the equation alone. In the equation in which all these variables are analysed, the interaction of this variable with the import price measure which could not be quantified well, caused this variable to behave against our expectation.

6.4. Results on the Regression Analysis of Turkish Exports of Electrical Machinery and Equipment to the W.German Market

In this section, a regression analysis for determination of the export of the Turkish electrical machinery and equipment industry to W.Germany over the period 1972 to 1982 was done. This section of the study had additional difficulties in

analysis, compared to the analysis of German imports which reached a relatively mature trend. Unfortunately, the export values up to 1980 are at levels which can not even be considered as exports in international scene. After 1980 an increasing trend is observed. The values increased acceleratingly until 1983 and 1983 value realized almost the same as 1982.

As explained in Table 19 the variables chosen are variables of market share, relative competitiveness, and pressure of demand. The variable of market share in the German imports of these goods was used instead of just the total German imports of these goods.

The variable of relative competitiveness was put in the analysis by the fact that increasing export prices relative to the market prices in the German market, which here is taken to be the import prices of electrical machinery in the German market, would decrease the export.

The variable of pressure of demand is based on the hypothesis that in periods of increasing domestic demand, goods and resources which would otherwise be used to supply export markets will be diverted to domestic sales. The validity of this hypothesis in the electrical machinery will be tested.

A regression analysis was conducted yielding the following equations.

First, relative competitiveness was put into the analysis

$$X = 354.21 + 3.41 \quad PX \qquad (1)$$

St. err. (15.71)

t (0.22)

Adj. $R^2 = -0.12$

The relative competitiveness variable both can not explain the variations and is not significant in our case. This variable will be used together with other variables in another analysis.

Another equation containing the market variable and the variable of pressure of demand is as follows:

$$X = -386.98 + 2.63\ S + 0.48\ PDX \qquad (2)$$

St.err. (0.10) (0.17)

t (25.66) (2.82)

Adj. R^2=0.98 $F_{2,7}$ =39.4 Critical t=2.36(α=0.025)

$F_{calc.}$=369

Both coefficients are significant at 2.5 per cent level. Since calculated F value exceeds F table value, the equation as a whole explainsthe variations very well. Market variable index is explaining the variations in exports very well and is highly significant. The coefficient sign of the pressure of demand is opposite of the expectations. But the influence on the export is one nineth of the market variable. From the analysis one can conclude that in Turkey the higher demand for electrical machinery and equipment results in a higher export of these goods. One tentative explanation of this can be done in the following way. In the years when the domestic demand is high manufacturers are producing higher amounts of goods using their capacities more. This in turn provides a more efficient production which results in less production cost. So excess amounts of machinery and equipment produced, now more price competitive can find ways of being exported.

Another equation contains market variable and relative competitiveness

$$X = 90.59 + 2.71\ S - 1.83\ PX \qquad (3)$$

St. err. (0.14) (2.30)

t (19.26) (0.80)

Adj. R^2 = 0.97 $F_{calc.}$ = 186

The market variable is again very good. This time the coefficient of relative competitiveness gave a negative sign which is in accordance with the expectation, but , it is not significant.

Finally, all the suggested variables were put into the analysis.

$$X = -176.07 + 2.64\ S - 2.13\ PX + 0.49\ PDX \qquad (4)$$

St. err. (0.097) (1.55) (0.16)

t (27.24) (1.37) (3.08)

Adj. R^2=0.98 $F_{3,6}$ = 4.76 Critical t=1.94(α=0.05)

$F_{calc.}$ = 278.23

The variables of market share, relative competitiveness, and pressure of demand can explain 98 per cent of the variations in exports.

The market variable and pressure of demand pass the t-test. Although the coefficient of relative competitiveness has a right sign it is not significant. The variable of pressure of demand showed the same behaviour and the previous explanations about this adverse behaviour applies here too.

The reason why the market variable performed so well should be searched in the structure of data for this variable. This variable was obtained by dividing the Turkish export figures by the German import figures. A trend similar to the Turkish export figures has been obtained since the German import figures are not changing abruptly as the Turkish figures.

All the variables in equation (4) were also tried in the logarithmic equation. The performance was less than the linear form. The adjusted R squared was 0.67 and only the variable of market share gave a significant coefficient.

So the linear one will be used in making inferences for future.

This time too we think the variable of relative competitiveness which is composed of fictitous prices interacted with the pressure of demand variables and influenced its expected behaviour.

We may accept that the failure of the variable of relative competitiveness is because of its data which have not shown a mature trend and that during the years in which the data were taken, the amount of exports and the pressure of demand were correlated positively.

6.5. Future Estimations of German Imports and Turkish Exports to Germany Based on the Regression Analysis

While one purpose of regression analysis is to determine the variables explaining an event, the other purpose is to make inferences for the future. The latter use of regression analysis is more dufficult than the former because one can not be fully sure that the regression function which fits the past data will also be appropriate over the wider range of the independent variables.[41] We encounter another difficulty when we try to estimate the dependent variable because we need the estimatedvalues of independent variable. So two kinds of errors, one coming from the function and the other coming from the estimatedvalues of independent variables, will enter the analysis.

6.5.1. Future Estimations of German Imports of Electrical Machinery and Equipment

Now we have to consider the future prospects of variables we took as explaining variables in the import model.

In German economy, between 1980 and 1982 a recession period was observed. The recovery in economic activity started at the beginning of 1983. Like every economy, German economy also is undergoing cyclical changes. The year 1983 is the year when economic activities began to climb up. In

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41 Neter, John and Wasserman, William, Applied Linear Statistical Model, Homewood, Illinois, Richard D. Irwin, Inc, 1974 pp. 350

our forecasting of 5 year long we will assume a continuous upward trend.

Now we will consider the changes in independent variables one by one.

Industrial production; during the last 11 years, increased at a rate of 6.07 per cent yearly on the average. In 1983 an increase close to this was observed in manufacturing industry. So we extended our estimations for the years 1983-1987 using the average rate of increase. Relative import price; the observed trend is that the import prices continuously increased faster than the export prices of Germany although import prices are under the export prices. This trend which shows an increase of 3 per cent annually on the average is extended for the next five years after 1982. The pressure of demand; again in this variable too, the last years' increasing trend of 3.46 per cent annually on the average is extended for the future. Fixed investments; the investment values were stated to be 2.9, 5.6, and 3.8 per cent increases for 1983, 1984 and 1985 respectively. The values for both 1986 and 1987 are assumed to realize as 4 per cent. [42]

Using the estimated figures and the equation(5, on pp. 60) in which all mentioned-independent variables exist, the import values of electrical machinery and equipment of Germany are forecasted as shown in Table 21.

TABLE 21

Estimated Figures for German Imports

Years	Index	Value (US 000 $)
1983	453,64	2,434,926
1984	502.60	2,697,720
1985	546.98	2,935.931
1986	593.95	3,188.044
1987	643.48	3,453,898

Source : calculated

42 OECD Economic Survey, Germany, 1984

Between the years 1972 and 1982, German imports of electrical machinery and equipment increased at about 16 per cent on the average. In 1981 and 1982 decreases in the import figures were observed. But from 1983 on the estimated figures show that there will be about 9 per cent annual increases on the average in the period of forecasting.

The Turkish market share in recent years are as shown in Table 22

TABLE 22

Turkish Market Share

Years	Turkish Exports (000 $)	German Imports (000 $)	Turkish Market share (%)
1981	488	2,345,456	0.021
1982	2,532	2,263,952	0.112
1983	1,690	2,434,926	0.069
1984	2,600	2,697,720	0.096

Explanations: Turkish export figures represents realized ones. For W.Germany 1981 and 1982 figures are realized ones. The figures for 1983 and 1984 were obtained by the import model.

An abrupt increase in the market share was observed in 1982. But this did not maintain in the following years. It is very difficult to make future estimations for Turkish market share. Yet 1983 and 1984 figures show that there will be some increases in the market share. A market share of 0.1 per cent seems to be a critical value. In near future too, Turkish market share seems to fluctuate around this percentage. Even if this percentage remains the same, increasing German imports will give higher values for the Turkish exports.

According the import values shown in Table 21, Turkish exports of electrical machinery and equipment will reach the figures shown in Table 23 when we use 0.1 per cent as the market share in the following years.

TABLE 23

Estimated Figures for the Turkish Exports to Germany

Years	Values (US 000 $)
1983	2,435
1984	2,698
1985	2,936
1986	3,188
1987	3,454

Source: Calculated

6.5.2. Future Estimations of Turkish Exports of Electrical Machinery and Equipment to W.Germany

As in the case of the import model, we will consider the future prospects of variables we took as explanatory variables in the export model.

The increasing export values since 1980 lost its momentum in 1983 and almost the same performance was achieved in the total exports of electrical machinery and equipment. In 1984 we observed again an attack reaching 42 per cent of increase with respect to 1983. While the exports of electrical machinery and equipment to Germany was $ 2,532,000 in 1982, this value realized as $ 1,690,000 in 1983. And it was estimated to be $ 2,600,000 in 1984.

Now we will consider the changes in independent variables one by one.

Market share: as explained previously, the best estimated value for the Turkish share seems to be 0.1 per cent for near future. This value will be used between 1983 and 1987. Since the market shares in 1983 and 1984 were calculated by using the estimated German imports, we will not use them in the estimation of exports. Relative competitiveness; did not show a smooth trend between 1972 and 1982. The best way to handle this situation would be to extend the average value which is 104.9 as index between 1972 and 1982 to the future.

Pressure of Demand; is composed of production minus exports plus imports. Considering the target values for these three variable in fifth 5-year development plan we estimated the pressure of demand for the period of forecasting. This corresponds to about a 7.1 per cent increase in 1982 to 1984, and about a 11.4 percent increase in 1985 to 1987.

Using the estimated figures and the equation (4, on pp 64) the export values of electrical machinery and equipment to Germany are forecasted as shown in Table 24.

TABLE 24

Estimated Figures for the Turkish Exports to Germany

Year	Index	Value (US 000$)
1983	4655.83	2,016
1984	4685.98	2,029
1985	4737.62	2,051
1986	4795.48	2,076
1987	4860.33	2,105

Source : calculated

The export figures obtained by the export model are very different from those obtained by the import model utilizing the Turkish market share.

In the export model, most of the variations in Turkish exports was explained by the variable of market share. Since we took the market share and the relative competitiveness as constant in the period of forecasting, this resulted in very small annual increases in estimated export figures.

The same market share gave higher values for the Turkish exports in the import model.

When the market shares remained the same the export value should have increased as a result of increases in the German import values.

Therefore, we conclude that the export model in our case is not successful and we think that the problem originated from the data and not from the model because no smooth trend was observed for the variables in the export model.

We understand that in such cases, determining the exports by ways of import figures of the target markets would give better results.

VII. CONCLUSIONS AND IMPLICATIONS

Production capacity of Turkish electrical machinery and equipment is sufficient to meet the domestic requirements and export demand presently. In fact, increasing sales either in domestic or export markets in vital for the efficient operations of the firms in the sector, since firms will benefit from the economies of scale with the increase in their capacity utilization and will be able to decrease their costs.

Turkish industry is used to the comforts of operating in a domestic sellers' market in the past and it has been protected by means of high custom duties, quotas etc. So, export business is a real opportunity for any firm operating in the industry for "to see and face a dynamic competitive market, which will enable the firm to reach a more competitive and productive level and to develop more suitable products to meet the needs of customers" [43]. Operating in export markets, firms will gain experience and more easily gather information about the competitors and their products.

Today, export business is supported by various incentives. Major use of export incentives is that they make Turkish products more competitive. But the ultimate use of incentives will be seen in future if electrical machinery and equipment producers succeed in becoming self-competitive by reaching an effective and productive production operation compared to the developed countries and leading developing countries.

Nonetheless,exporting is a challenging business. There are risks associated with the export business. Risks and benefits should be balanced.

There are for the time being market opportunities especially in Middle East countries. The rapid increase in the last few years is due mostly to the interruption of trade between Iran and Western countries and secondly, to increasing activities of Turkish contractors in Middle East

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[43] Kozlu, Cem M, Uluslararası Pazarlama, T.İ.Ş.B. Kültür yayınları, No:234, Ankara 1982, pp.5

and Libya. But this situation can not be expected to last forever. The development activities and the corresponding demand for electrical goods in Middle East and North African countries may be reduced as long as oil revenues are decreasing. The opportunities in European countries can not be neglected.

In fact, Middle East and North Africa are different from the markets of Europe. They have some common factors, which distinguish them from industrialized markets like the EEC; namely, procurement and purchase control, protecting the domestic producers, restricted market entry channels, price subsidies.

The imports of capital goods in developing countries should decrease gradually. Since a country forced to obtain the means of of production by imports can not free itself from dependency on the other countries. Furthermore the export of capital goods should increase because value increase always exceeds the volume increase.

Generally it can be said that in Turkish firms the Research and Development activities are not comparable to most European firms. Continuing the production by the help of licencers and their know-how will bring in future some disadvantages because the production technology will soon fall behind the international level of the competitors. Hence, more attention must be given to R and D activities.

Researches show that the competitiveness of developed countries in electrical machinery and equipment has decreased. LDC's have begun to be more competitive in world markets. So opportunities are lasting and the export business is not the result of a transient situation.

In this study, a comparison with the prices of German producer as a representative of MDC's was made.The question is no more, how do the Turkish export prices compare with a German producer's price, but how do the Turkish export prices compare with an (apparently non-German) market price in Europe. From the cost comparison tables we may conclude that the firms' total costs allow competitive prices against German producers. We may also state that Turkish cost structure allows price competitiveness on the actual European market (but only when government incentives are applied). But we may

not state that Turkey even with ideal conditions (raw material prices as world market prices, no financial costs) can compete with East Asian cost level.

So our most important competitors in future will be the other developing countries, especially Far East countries.

As to the trends prevailing nowadays from the point of view of customer, technology, and applications conditions, generally it can be outlined that the following general trends are making themselves felt more and more.

There is more and more a tendency in the target markets which suggests a preference for integrated systems instead of single products. The customer tends toward complete application assistance, which exceeds the convential after-sales-services. The demand is such that any products meeting international quality standards at the cheapest possible price are preferred. There is a trend called" beauty trend" influencing sales activities to a certain extent. The product should have an agreeable pleasing styling and should be very well shaped.

Thus for a producer without a wide application assistance, and a considerable stock holding there is only little chance for penetrating export markets. Great efforts have to be made on the part of Turkish producers to comply with these requirements.

The following bottlenecks and advantages for export activities can be deduced.

Strong points : the export prices per unit can be kept lower than West-European mormal market prices, but dumping prices have also to be faced in competition.

The labor costs per unit are lower than comparable European ones.

Raw material costs are generally higher even with incentives. Lower unit prices could be reached when raw material prices were at world market prices.

Some of the neighbouring countries face construction requirements which some Turkish producers could profit of.

Market nearness to Middle East countries turns out to be an advantage.

The technological level of most companies corresponds to the normal European technology within their product range.

Weak points: sufficient importance is not given for beauty and style. Another point is the operating quality. The production permits a "fair to good"operating quality mostly to IEC recommendations. The deficit of technical but particularly of marketing information is one of the reasons for insufficient marketing.

Most of the firms work with underutilized capacities. Raw material costs are too highespecially in the cable sector.

A worsening factor in the competitiveness is the high financing cost.

Participating in the international fairs to present the Turkish goods is highly recommended.

After evaluating the relative position of Turkish electrical machinery and equipment in foreign markets as far as the competitiveness is concerned, we have to know the amounts of exportspossible to foreign markets. So we did the regression analysis. We applied the analysis first to Germany. The analysis done should be applied to other target markets too. We leave the analysis for other target markets to another study. The sum of each export figure belonging a target market would give an idea about the total exports of electrical machinery and equipment.

The evaluation of general competitiveness measures in manufacturing industry showed our advantages and disadvantages as far as the cost structure is concerned. From the view-point of cost structure, we identified that Turkish electrical machinery and equipment to be somewhat competitive against European producers by the given incentives.

But cost is not the only determining factor that influences purchasing decisions. There are many other factors-which we have mentioned in the specific competitiveness measures-customers consider when they make their purchasing decisions.

Factors influencing purchasing decisions can be classified in two broad category; price and non-price factors. In this study a qualitative analysis was performed for non-

price factors. The price factor was put into the export and import models as a relative price measure.

In the import and export models, relative price measure was the only factor that will influence imports and exports as far as competitiveness is concerned. In the regression analysis we obtained insignificant coefficients for relative price measure. This shows that the price factor is not sufficient in explaining the variations in exports and imports. This result highly suggests that non-price factors should be included in the models.

The additional problem in the relative price measure originated because of not having an adequate price representing those of all these different types of products. The fictitous price generated did not perform well. But there is no easy solution. The best approach seems to be this one when different products are conglomerated in a group. The real price of a product can only be put into the analysis if this product is singled out out of wide ranges of products. Only statistics belonging to this product then should be used. But most of the time necessary statistics may not be found. And this would be a vain effort.

In the import model, the variable of industrial production and investment performed very well. The variable of pressure of demand behaved adversely against our expectation. We conclude that since relative price measure was not quantified well it disturbed the effect of pressure of demand and caused it to behave against our expectation.

In the export model, the market variable performed very well. The relative price measure did not give a significant result because of its data which have not shown a smooth trend. Probably, our approach of generating fictitous prices was the main reason not to have a smooth trend.

We obtained different figures for Turkish exports of electrical machinery and equipment to W.Germany both from the stand-point of their magnitude and trend they show in two different models.

We had difficulty in extending the market share for the period of forecasting. We concluded that a market share

of 0.1 per cent would be the best approach. The same market share were used in two models. The export model gave almost constant figures for next years. Even the same market share had to give increasing export values since the German imports increased.

We concluded that the export model was unreliable in our case. And we think the data, which have not shown smooth trends, were the main reason for failure.

We understand that in such cases, determining exports by ways of import figures of target markets will give better results.

From the export figures obtained by the import model we see that gradual increases in the exports of our products to W. Germany are expected in the following years.

This study also gives some ideas to the firms that will export these products to become succesful in the export business. Therefore, we presented the possible target markets and the general trends prevailing nowadays from the view-point of customer, technology and application conditions, Some marketability criteria were presented to use in planning long-term marketing activities. And looking at world trends we observed that the export business in these goods was not a transient buta continuous business. The fact that the value increase exceedsthe volume increase each year also suggests that the necessary importance should be given.

In conclusion, we state that this study will reach its purpose if it has identified electrical machinery and equipment sector to have sufficient export potential and has given some guidelines to rank the profitable target markets and to design appropriate entry strategies for these markets.

APPENDIX A

Manufacturing Specifications of the products

Most of the producers of electrical items, areworking with licences and know-how agreements of well known European and American producers. Therefore their products are manufactured in accordance with international standards like VDE, DIN, IEC etc.

Electric motors

a) Commutator type motors

Rated power	:	70-700 Watts
Frequency	:	50/60 Hz or D.C.
Rated voltage	:	220 VAC, 12 DC
Speed	:	1425 rpm - 21,000 rpm
Applications	:	Industrial DC machines, automative industries, household appliances, power tools

b) Single-phase motors

Rater power	:	0.08 - 1.1 kW
Frequency	:	50/60 Hz
Rated voltage	:	220 V (other voltages on request)
Speed	:	1400 - 2800 rpm
Standards	:	According to IEC recommendations
Applications	:	Household appliences

c) Three-phase motors

Frame size	:	63-225
Rated power	:	0.18 - 45 kW
Number of poles	:	2-8
Frequency	:	50/60 Hz
Rated voltage	:	380 VAC
Speed	:	750-3000
Standards	:	According to related VDE, DIN and IEC recommendations
Applications	:	General purpose industrial applications

Transformers

a) Distribution transformers

Oil - immersed type natural cooling

Rated power : 50 KVA to 1600 KVA

Max.rated voltage : up to 36 kV

Frequency : 50-60 Hz

Standards : VDE 0532 and IEC 76 recommendations

Applications : Final step-down stage in power distribution systems

b) Power transformers

Oil-immersed type natural on forced-air cooling

Rated power : 2 MVA to 50 MVA

Max. Rated Voltage : up to 154 kV

Frequency : 50-60 Hz

Standards : VDE 0532 and IEC 76

Applications : Network-interconnecting transformers or generator transformers

Switchgear, switchboards and accessories

a) Medium voltage switchboards

Voltage ranges : 12 kV, 24 kV, 36 kV

Current ratings : 400-3150 Amps

Standards : Acc. to VDE regulations

Application : Electrical power distributions and network substations

b) Low voltage switchboards

Voltage ratings: 400 Volts

Current ratings: 400-3150 Amps

Standards : Acc. to VDE regulations

Applications : For fix mounted and draw-out systems lighting and distribution systems and motor control centers

c) Low-oil breakers, SF6 Breakers

Voltage ratings: up to 36 kV

Current ratings: up to 1250 Amps

APPENDIX B

TABLE I

Electric Power Machinery Imports (ml.US$)

Countries	1977	1978	1979	1980	1981
Libya	89	113	142	-	-
Iran	356	-	-	-	-
Egypt	34	71	48	53	84
Tunisia	16	27	29	-	-
Yemen	-	14	45	-	-
Lebanon	10	-	-	-	-
Iraq	102	-	-	-	-
Kuwait	94	177	-	-	-
Jordan	19	16	17	41	27
Pakistan	37	35	48	31	31
S.Arabia	568	708	724	623	801
Morocco	25	32	34	-	-
Syria	69	39	51	-	-
Algeria	145	150	95	-	-
Germany	438	537	668	813	694
U.S.A.	457	558	707	866	1044
Canada	244	296	369	347	401
France	251	328	407	51	26
Holland	238	262	320	351	302
Nigeria	240	287	-	-	-
Italy	207	243	304	408	340
England	194	260	314	378	365
Indonesia	221	161	158	218	232
Sweden	163	179	210	270	226
Bel-lux	164	187	206	232	195

Source: TSKB, Producer Survey, Electrical Industry Sector In Turkey, April 1983, pp. 90

TABLE II

Electrical Transformers Imports (ml. US $)

Countries	1978	1979	1980
Germany	66	82	94
Sweden	36	36	49
France	55	64	79
Denmark	22	23	185
Bel-lux	38	34	35
Netherlands	41	49	54
U.K.	29	35	52
Austria	25	22	27
Italy	21	26	29
Saudi Arabia	135	122	124
Algeria	37	32	-

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp.91

TABLE III

Insulated Wire and Cable Imports (ml. US $)

Countries	1977	1978	1979	1980	1981
Libya	53	56	83	-	-
Iran	122	-	-	-	-
Egypt	47	93	29	26	39
Tunisia	18	16	19	-	-
Yemen	-	11	8	-	-
Lebanon	-	-	-	-	-
Iraq	42	-	-	-	-
Kuwait	69	61	-	-	-
Jordon	8	11	8	15	20
S. Arabia	301	443	522	621	742
Morocco	11	8	9	-	-
Syria	16	22	17	-	-
Algeria	60	59	53	-	-
Pakistan	20	17	18	23	23

Table III'continued

Nigeria	75	117	82	210	-
U.A.E.	140	82	105	-	-
Quatar	18	13	23	42	-
Bahreyn	12	17	20	-	-
U.S.A.	204	284	366	445	549
Germany	143	172	243	300	270
France	115	145	212	258	203
Netherlands	106	141	167	209	147
Belg-lux	79	88	104	124	95
U.K.	52	70	110	155	154
Sweden	45	50	70	101	90
Italy	32	43	52	68	55

Source: TSKB, Producer Survey, Electrical Industry Sector in Turkey, April 1983, pp. 92

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