Republic of Turkey

The Project on Establishment of Industrial Automation Technology Departments in Anatolian Technical High Schools

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CONTENTS

OF

THE PROJECT DOCUMENT OF SHORT STUDY ON THE PROJECT ON ESTABLISHMENT OF INDUSTRIAL AUTOMATION TECHNOLOGIES DEPARTMENTS IN ANATOLIAN TECHNICAL HIGH SCHOOLS (DRAFT)

1. Introduction

The Republic of Turkey aims at the industrialization from the 1960s, and in 1997 it has achieved to be a semi-developed country where a GNP frame exceeds US$3,000per person. Although the Customs Union between EU-Turkey was concluded in January, 1996, the promotion of the high-technology and capital-intensive industry which enable to strengthen the international competitiveness of domestic manufacture and production of value added goods and service, is required by reason of a common tariff under the regulation of restrictions of EU unification, and the competition in the domestic market with imports which increase rapidly.The necessity for such industrializationis regarded as a prior subject also in the 7th 5-Year Development Plan, which aims to push the Turkey from a semi-developed country up to an advanced nation. For this subject achievement, since it is indispensable to fulfill the demandof the talented personnel who mastered the advanced technology which meets the needs of the high-tech industry accompanied by a world-wide high-tech-industrialization, the Turkey put the priority of national development on the educational field, and aims at the enrichment of the technical high school which produces a large number of excellent engineer and technicians.

As the measure by the government so far, "Apprenticeship and Vocational Training Act No. 3308" was enforced in June 1986, and a new personnel-training system has been building up by enhancing the cooperation and collaboration between a public vocational training system and the industries.Furthermore, some projects related to the vocational education fields were carried out by cooperation with Japan, Germany, and the World Bank, and obtained certain results in the personnel training. This time, the cooperation related to the industrial automation technology is requested to Japan, in order to meet the needs of the industries to keep up with the IT-ization, in addition to the industrialization, based on the technology established so far in the field of vocational education and training.

In the process of project study, the implementation in Anatolian technical high school, which performs the personnel training of the highest technical level as a vocational education organization was recommended by the Turkey government. In particular, two schools located in Izmir and Konya, where the needs of the industries are quite strong, were judged to be suitable as the project site.

The project term will be for five years from April 16, 2001. Two courses of the Information Electronics and the Information Machinery will be prepared as the department related to the industrial automation technology. Two courses in Izmir school,

the base school, and one course of the Information Electronics in Konya school, the cooperation school, will be provided. The establishment of the new in the Industrial Automation Technologies Department in these two schools is the project objective. As for the educational subject, it is expected that the project out puts will be; a preparation of new curriculum and a syllabus, a preparation of teaching materials and studying materials, an introduction and use of equipment, a teacher's training on the instruction method which includes all of these. As for the industrial subject, teaching materials etc. will be prepared and digitized to open, always obtaining a feedback from the industries A publicity work and spreading activities by a seminar will also be performed As the results, the system will be established

It will reach to the overall goal of spreading the new education system to the other schools, if the Turkey government takes a measure to spread the industrial automation technologies department continuously after the project objective is achieved. Therefore, making a system for the spreading is positioned as one of the most important out puts of the project.

This project aims to meet the demand for mid-level technicians, and engineers, who are required in the Republic of Turkey, by the personnel training at such project level as well as the Turkish government policy level.

2. Background

2.1 Socio-economic Context

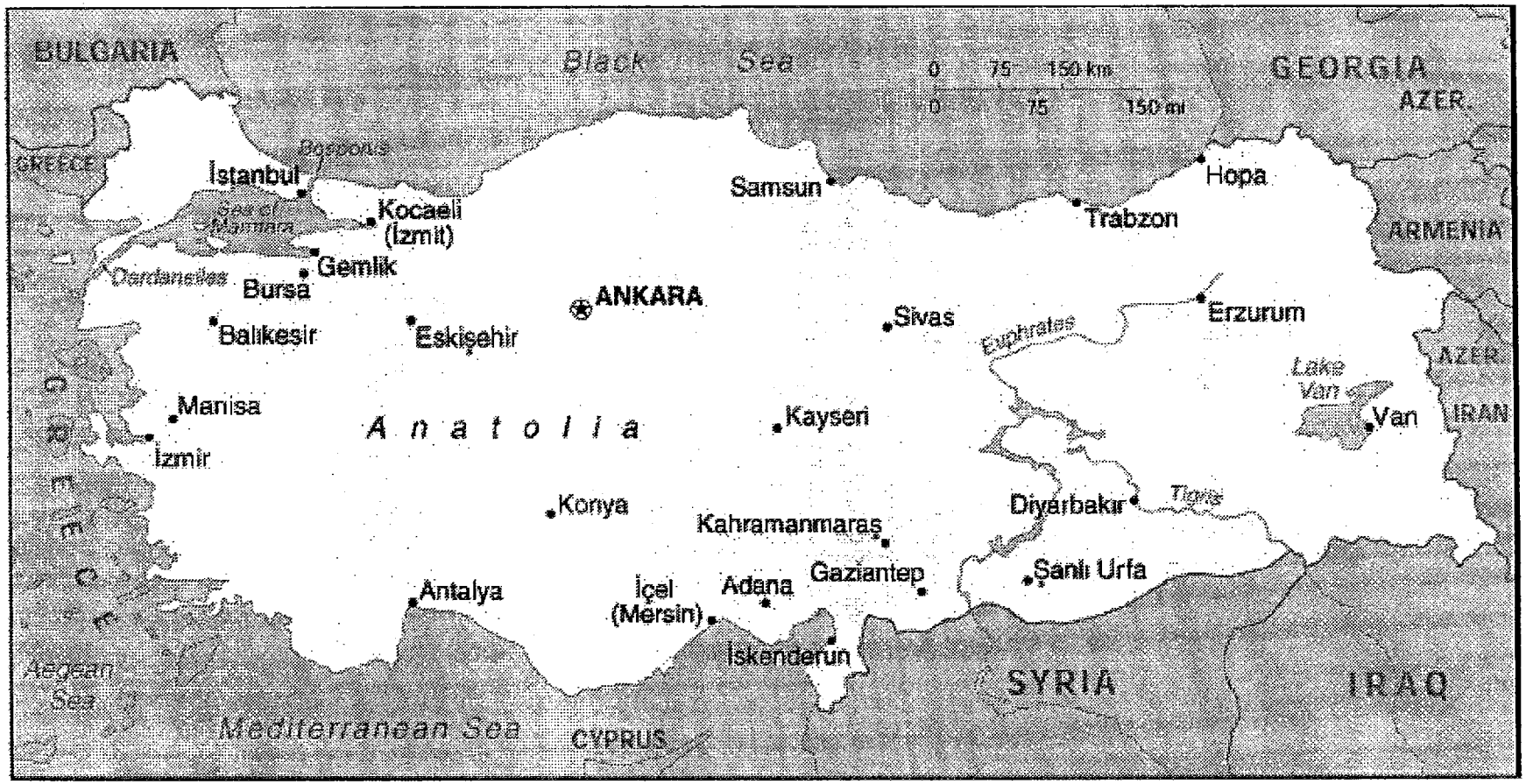
(1) General Social Situation of Turkey

The basic information in general on Turkey is as in Table 2.1. A map of the whole country is as shown in figure 2.1on the following page.

Table 2.1 Basic Information in General on Turkey

Item	Summary
1. Country	Republic of Turkey
2. Independent	October 29, 1923 (republic declaration)
3. Area	779,452 km^2 (about 2.06 times of Japan)
4. Population	62,870,030 persons (1997 census)
5. Language	Turkish (official language)
6. Religion	The Muslim occupies 99% of the whole.
7. Race	80% or more Turkish. As an ethnic minority, about 17%of Kurds.
8. Political Structure	Republican /Uni-cameral Parliament with550 seats.
9. President	President Ahmet Necdet Sezer (assumed in May, 2000: term of seven years)
10. Prime Minister	Bulent Ecevit / affiliation party:DSP

(Source: WEIS"ARC report 1999-The trend and prospect of Turkey economy and trade " and others)



Figuar 2.1 Map of Turkey

1) Characteristic of Turkish Society

The characteristic of recent society of Turkey can be seen as follows

- While industry is concentrated in the western region (Marmara Region), the economic gap between the east and the west has arisen due to the delay in development of eastern area and southeast area.
- A concentration of population is remarkable in big cities and income difference is accruing between city and the province, also within the city.
- Besides Turkey is basically an agricultural country, it has been industrialized and it has a great potential for the growth.

2) Movement of the Population

Turkey has a total population, according to 1997 national-census, about 62,870,000. 5.4% (about 3,390,000 persons) of the population is 65 years old or over, which shows the more population of younger aged group than elderly. Figure 2.2 shows the population distribution by in 1990.

According to statistics of the United Nations, the annual population growth rate of Turkey during 1975 – 97 is 2.1% on average; as for the presumed annual growth rate during 1997 – 2015 is 1.3% on average. It is predicted that the total population in Turkey will be about 80 millionby 2015.

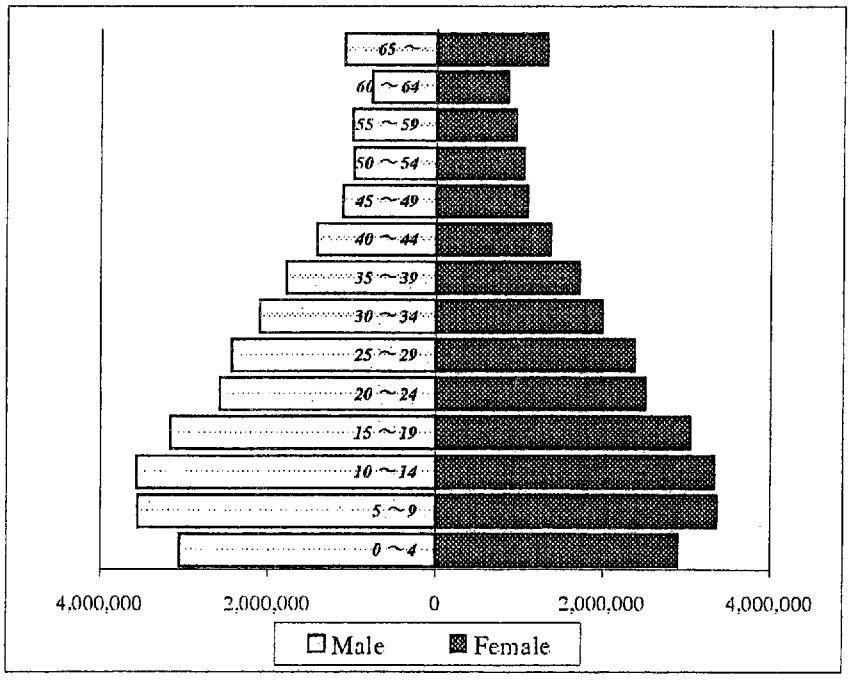


Figure 2.2 Population Distribution by Age

(Source: S.I.S "Statistical Yearbook of Turkey 1998")

3) Major Urban Population

The rate of the urban population occupied to the total population in 1995 is 69% (about 42,590,000). Urbanization is preceded as the present global tendency, so is in Turkey. The annual growth rate of the urban population is 4.4% on average during 1990 - 95. It is estimated by 2025 from now on, about 79,100,000 people will live inurban cities that holds 87% of the total population.

The urban population in major cities as of 1997 is shown in Table 2.2. The sum of these ten cities dominates approximately 42% of 62,870,000 of the whole nation.

Table 2.2 Major Urban Populations

City	Population	City	Population
1. Istanbul	9,050,000	6. Adana	1,680,000
2. Ankara (Capital)	3,630,000	7. Icel	1,510,000
3. Izmir	3,060,000	8. Manisa	1,220,000
4. Bursa	1,946,000	9. Samsun	1,160,000
5. Konya	1,943,000	10. Gaziantep	1,120,000

(Source: WEIS " ARC report 1999-The trend and prospect of economy and trade of Turkey" 1997 census)

4) Labor Pool and Unemployment Rate

A large social problem of unemployment arises from excessive labor supply now in Turkey. Looking at by the area, the unemployment rate stays high in the eastern and the southeast parts of the Anatolian highlands. Table 2.3 shows the transition of the labor pool and the work force in Turkey.

The unemployment rate in farm areas was 7.6% and in the urban area was 11.4% at 1993 outstanding among younger generation who graduated from high schools or universities as of 30% and beyond. Moreover, in OECD's data unemployment rate gap between man and woman indicates 7.7% and 6.2% from the age of 15 to 64, while the rate narrowed to the age from 12 to 24 indicates 14% of man and 15% of woman which considerably higher percentage.

However, currently as far as those are concerned who are talented university or high school graduates, as well as technical experts and skilled persons, the situation seems to have a labor shortage around foreign-affiliated firms.

Table 2.3 Transition of the Labor Pool in Turkey (unit: 10 thousand)

	1993	1994	1995	1996	1997
Total Population	5,893.7	5,982.9	6,090.1	6,193.3	6,286.5
Age at 12 or over	4,298.8	4,395.1	4,508.5	4,613.5	4,719.5
Labor pool	2,162.8	2,213.6	2,290.0	2,303.0	2,235.9
Work force	1,990.6	2,039.7	2,137.8	2,169.8	2,081.5
Unemployment rate (%)	8.0	7.9	6.6	5.8	6.9

(Source: WEIS " ARC report 1999-The trend and prospect of Turkey economy and trade" The original data is Monthly Bulletin of Statistics, 1998 March. The unemployment rate by sex has been omitted because of the inappropriate value in 1997.)

Table 2.4 shows the employment tendency classified by industries. Workers in the industrial fields of 1994 occupied 22% of all workers, in 1997. It increased then to 25% (the increase marked 666,000 since 1994). Thus the rate of industrial work force keeps up gradually. It has been marked also in service industries as showing 1.2% more since 1994, which makes 35% at the year of 1997(482,000 increase since 1994). Agricultural industry on the other hand showed 4.2% of decrease as a result of increases in industrial and service industries.

Table 2.4 Work Force by Industries in 1997 (unit: 10 thousand)

	Total		Agriculture		Industry		Service industry	
Year	1994	1997	1994	1997	1994	1997	1994	1997
Workers	2,039.6	2,081.5	902.3	821.9	447.3	521.3	690.0	738.2
Worker ratio	*100%*	*100%*	*44.2%*	*40%*	*22%*	*25%*	*33.8%*	*35%*
Worker (man)	1,451.5	1,536.4	482.6	465.7	382.4	449.0	586.6	621.7
Worker (woman)	588.1	545.0	419.7	356.2	64.9	72.4	103.4	116.4

(Source: S.I.S "Statistical Yearbook of Turkey 1998" / notes: The data is subjected the age of 12 or upper as of in October.)

5) Work Force Outflow to Overseas

A large number of mid-level technicians and young workersin Turkey immigrate to overseas for surplus work force within the country as mentioned above, and they often become political and economical issuesin the country abode. According to the Ministry of Finance, the number of emigrants of Turkish workers were amounted approximately 1,550,000 at the end of July, 1993. The major countries of stay are 660,000 in Germany, 400,000 in Saudi Arabia, 220,000 in Libya, etc. As for in Germany it is estimated that the actual number exceeds 3 times including family.

(2) General Economy Situation of Turkey

1) Changes in Economy

The Turkey government has been promoting the industrialization to replace the import under the control of the government since 1963. Thereby, industrialization from the 50s up to the first half of the 70s especially in the 60s made the progress and the GDP share of the industrial field also increased gradually. But after the second half of the 1970s, the political disorder at home and abroad, the oil shock, or other factors originated the increase of domestic inflation, shortage of materials, decline of productivity due to frequent labor dispute and financial aggravation Consequently, the economic growth rate showed negative. Then in January, 1980 complying with the recommendation of IMF and the World Bank, the Turkish government launched " Economical stabilization program "which emphasizes the international trade balance, including a domestic demand control by curtailed budget, as well as the introduction of competition principal by a free market. The strategy of the industrialization to replace the import was switched to the open economic system that aims at emphasizing the industry inclined to export under the competition principle for it.

Although the Turkey economy had accomplished comparatively favorable growthin the first half of the 1980s, in the mid to the second half of the 80s followed by expansion of the budget deficit and high constant inflation, the brittleness of the economic structure of the country actualized because the balance of international trade became unstable and the debt expanded. In 1994 since the U.S. rating agency marked down the eligible for investment evaluation,a foreign currency speculated, and it gave a serious influence to the Turkey economy. In April of the same year, the government announced " Economical stabilization program " that included the installation of a provisional special tax, strengthens the power of the Central Bank, conversion of the national enterprises to the privates. This announcement worked to earn a support of IMF

and the World Bank. Despite of the confusion of the economy temporarily, the program was well evaluated that the government could receive a fund from IMF. At the same time, the improvement of the trade balance and other factors by devaluation of Turkish Lira and a large decline of the domestic demand enabled surplus current balance. The government also made an improvement in a financial balance as well as an increase in foreign currency reserves. Still the economy structure of Turkey does not change, a budget deficit and high constant inflation stays even after1995. Besides, in 1998 a great scale of earthquake attacked the industrial district for twice, it certainly causedserious damage to the society and the economy of the country.

During the Customs Union between EU-Turkey was concluded in January, 1996 under the regulations of restrictions of EU unification such as competitionin a domestic market against the rapidly increasingimported goods and a common tariff and so on, it is urged that strengthening in competitiveness of domestic manufacturing industry, establishing the high-technology which enables production of value added goods and services and upbringing of capital-intensive industry. In the 7th 5-Year Development Plan (1996 - 2000), above-mentioned points are addressed as the subjects to be conquered for Turkey to survive in the world economy.Table 2.5 shows the economic index of Turkey in recent years.

Table 2.5 Staple Economic Index of Turkey

		Unit	1995	1996	1997	1998	1999
1	Nominal GNP	B TL	7,854,882	14,978,067	29,393,262	53,518,332	78,242,496
2	Real GNP growth	(%)	8.0	7.1	8.3	3.9	-6.4
3	Real GDP growth	(%)	7.2	7.0	7.5	3.1	-5.0
4	Nominal GNP per capita	US$	2,759	2,900	3,080	3,255	2,878
5	CPI	(%)	78.9	79.8	99.1	69.7	68.8
6	Unemployment (April)	(%)	7.2	6.3	5.1	6.0	-
7	Fiscal balance	T TL	-317	-1,218	-2,181	-3,698	-9,045
8	Current balance	MUS$	-2,339	-2,437	-2,636	-2,692	-
9	Trade balance	MUS$	-14,072	-20,402	-22,298	-18,947	-14,103
10	(Export: fob)	MUS$	21,637	23,224	26,261	26,974	26,588
11	(Import: cif)	MUS$	35,709	43,627	48,559	45,921	40,962
12	Foreign currency reserves	MUS$	23,942	27,776	27,168	31,645	-
13	Foreign debt balance	MUS$	73,278	84,123	91,586	106,0521	111,215
14	Exchange rate (For US$)	TL/ US$	45,678.3	81,047.4	151,237.5	259,859.7	416,806.0

Source: State Institute of Statistics Prime Ministry Republic of Turkey=S.I.S "Turkey Statistics 1999", "Statistical Yearbook of Turkey1998", "Selected Indicators 2000", "Monthly Bulletin of Statistics 2000", and WEIS"ARCreport 1999 Turkey", JETRO data, etc. / Note: TL stands for Turkey Rira. The unit T stands for Trillion, M for Million. The exchange rate used as of June 2000 is US$1=approx. TL 613,000. Converted in Japanese yen calculating US$1=¥105 becomes ¥1= TL 5,838.

2) Situation of Import/Export and Foreign Investment

The rate of the manufacturing products (oil products and agricultural processed products are excluded) account for the export increased from 62.5% to 81.8% during 1985 through 1998, which represents enhanced importance of manufacturing in Turkish industry. As for the import, with a large scaled liberalization of trade enforced in 1984; the capital goods import of machines has been activated coupled with the development of domestic industrialization. On the other hand, after the affiliation with EU Customs Union in January 1996, the tariff on the industrial products between EU-Turkey and quantity control has been abolished. Consequently no further growth in exports can be seen as counted on but the excess of imports continues, while imports rapidly increase

The foreign investment in recent years accounts 1224 approvals in 1998, sums up

with 1,645,770,000 dollars, which decreased by 28,570,000 dollars and 116 approvals from the previous year. As for the composition by industries, the manufacturing occupies 62.0% with subsequent service industries of 36.8%. In the share of the investment by industries, the manufacturing occupies 62.0%, and the servicing marks 36.8% subsequently. From the aspect of the foreign investment tendency to Turkish manufacturing industry, besides the conspicuous investment to an automobile field after 1995 onwards, there are other fields as commonly invested, such as chemistry and electronics, steel, food, tobacco and so on.

(3) Industrial Trend of Turkey

1) Transition of Industrial Composition of Whole Turkey

GNP shares by agriculture, industrial, service in the nominal GNP for 30 years from 1969 to 1999 are shown in Figures. 2.3a and 2.3b respectively.

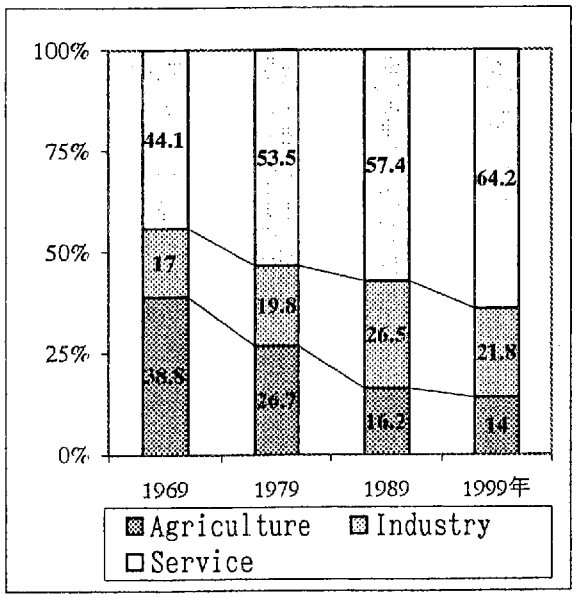


Figure 2.3a Industrial Composition (nominal GNP)

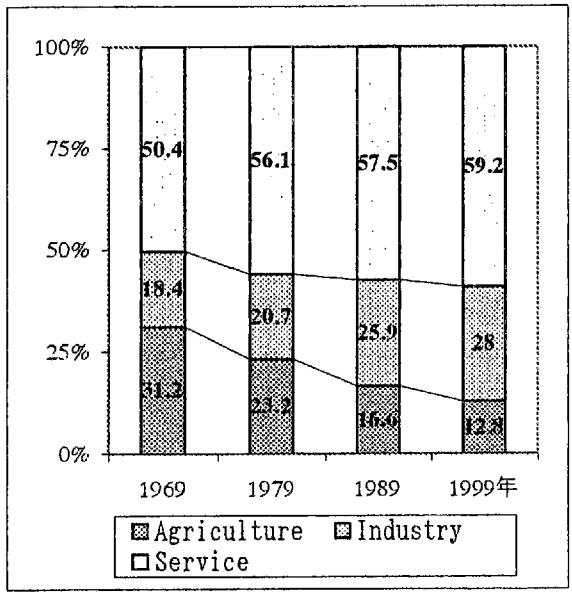


Figure 2.3b Industrial composition (real GNP)

(Source: Values in 1969 – 1989 from S.I.S "Statistical Year book of Turkey 1998", and in 1999 from "Monthly Bulletin of Statistics 2000". / note: As for value in 1999, the sum of agricultural products and livestock products is made into the agriculture, but fishing industry and forestry are excluded. The sum of manufacturing, energy related operation, etc. is made into the industry, but mining is excluded. The real GNP is based on a market price in 1987.)

As in the Figures, the weight of the agriculture occupied to GNP in 1969 is large; it gradually decreased 30 years after then in 1999, down to 12.8%. As for the industry on contrary, the GNP growth of 4.8% and 9.6%, in nominal and real respectively, are recorded in 1999, compared to as of 1969. The share of the service industry in GNP in the same comparison shows 20% in nominal and 8.8% in real growth.

2) Total Number and the Size of Manufacturer

The total number and the composition by the size of manufacturers in Turkey are listed in Table 2.6. As for the total number of manufacturers in 1989 were 9,445; it increased to 11,373 in 1997. Also in the composition by companies, compared with 1989, the rate of small companies with fewer than 49 employees in the total number of companies decreased in 1997, whereas medium sized companies (50-199 employees) showed increase of 4.5 point in the eight years. The share of large companies (200 employees or more) shows nearly plateau, still the increase is continued constantly as far as in number.

Table 2.6 Transition of Composition by Total of Number and Size of Manufacturers

(unit:%)

Number of employees	*1989*	1994	1995	1996	1997
49 or less	*67.4*	68.3	66.2	64.8	63.0
50 - 199	*21.7*	22.2	23.5	24.8	26.2
200 or more	*10.9*	9.5	10.3	10.4	10.8
Total number of companies	*9,445*	10,127	10,230	10,583	11,373
Growth in total number of companies (Year of 1989 =100)	*100*	107.2	108.3	112.0	120.4

(Source: S.I.S "Statistical Yearbook of Turkey 1998" and "Turkey in Statistics 1999")

(4) Industrial Structure of the Principal Regions

The industry that yields the maximum added value within the manufacturing field of whole Turkey is in the chemical/plastics by occupying one third of the share. Machinery/metal-working business occupies about 20% subsequently, and the textile related, food, beverage, tobacco, etc. are following after.

Among the total of 10,583 companies (real figure as of 1996) in Turkey, the textile related occupies one third of the share by the number of the companies, and the machinery/metal-working business comes next with a little over 20%. The chemical/plastic industrythat yields the maximum added value in Turkey occupies not

even 10%.On the other hand, the textile related field occupies about one third again in the share by the number of employees just as same as in the share by the number of companies. Then machinery/metal-working business occupies a little over 20% in the same manner. These two fields are the most remarkable in high employment absorbency among the manufacturing industry in Turkey.

The area where the most of the industrial fields gather is concentrated in the big urban cities along the Mediterranean coast. Particularly Istanbul has the majority of 36% with a one-fourth production of the added value in Turkey. The table 2.7 shows the industrial composition (manufacturers) in major 5 districts (5 top population cities)

Table 2.7 Industrial Structures by Area

District	Industry		TOTAL	FOOD, BEVERAGES, TOBACCO	TEXTILE, APPAREL, LEATHER	WOOD, FURNISH	PAPER, PRINTING, PUBLISHING	CHEMICALS, PLASTIC	NON-METALIC MINERAL	BASIC METAL	FABRICATED METAL, MACHINERY	OTHERS
	Industry Code		–	31	32	33	34	35	36	37	38	39
Turkey	Number of Companies		10,583	1821	3329	419	370	932	842	374	2390	106
		Share (%)	–	17.2	31.5	4.0	3.5	8.8	8.0	3.5	22.6	1.0
	Number of Employees		1,015,755	172,135	355,295	23,336	36,131	98,483	68,141	58,162	218,367	6,780
		Share (%)	–	16.6	34.3	2.3	3.5	9.5	6.6	5.6	21.1	0.7
	Value Added Output		2880.4M	436.2M	497.3M	34.9M	102.6M	821.5M	201.2M	177.9M	599.2M	9.7M
		Share (%)	–	14.1	17.3	1.3	3.6	28.5	7.0	6.2	20.8	0.3
Istanbul	Number of Companies		3,766	236	1613	68	199	405	100	107	952	86
		Share (%)	–	6.3	*42.8*	1.8	5.3	10.8	2.7	2.8	25.3	2.3
	Number of Employees		302,116	19,772	132,251	2,984	15,513	29,962	10,182	6,751	78,802	5,899
		Share (%)	–	6.5	*43.8*	1.0	5.1	9.9	3.4	2.2	26.1	2.0
	Value Added Output		739.5M	79.4M	187.0M	3.9M	57.7M	132.4M	43.4M	18.0M	208.6M	9.1M
		Share (%)	–	10.7	**25.3**	0.5	**7.8**	17.9	5.9	2.4	***28.2***	**1.2**
Ankara	Number of Companies		620	109	83	44	33	35	51	16	244	5
		Share (%)	–	17.6	13.4	7.1	5.3	5.6	8.2	2.6	*39.4*	0.8
	Number of Employees		45,775	7,224	5,189	2,551	2,232	1,529	3,207	1,260	22,222	361
		Share (%)	–	15.8	11.3	5.6	4.9	3.3	7.0	2.8	*48.5*	0.8
	Value Added Output		107.3M	19.5M	5.6M	4.4M	3.4M	3.7M	7.7M	3.2M	59.5M	0.3M
		Share (%)	–	**18.2**	5.2	**4.1**	3.2	3.4	**7.2**	3.0	***55.4***	0.2
Izmir	Number of Companies		1,103	173	382	37	40	90	51	34	285	11
		Share (%)	–	15.7	*34.6*	3.4	3.6	8.2	4.6	3.1	25.8	1.0
	Number of Employees		104,980	27,785	30,517	1,219	3,931	13,365	4,912	3,118	19,720	413
		Share (%)	–	*26.5*	29.1	1.2	3.7	12.7	4.7	3.0	18.8	0.4
	Value Added Output		399.5M	105.4M	31.3M	1.1M	10.6M	170.8M	19.6M	13.1M	47.2M	0.3M
		Share (%)	–	**26.4**	7.8	0.3	2.7	***42.8***	4.9	3.3	11.8	0.1
Bursa	Number of Companies		544	75	212	28	10	51	12	14	141	1
		Share (%)	–	13.8	*39.0*	5.1	1.8	9.4	2.2	2.6	25.9	0.2
	Number of Employees		82,217	9,153	41,303	1,620	---	4,832	843	2,778	20,942	---
		Share (%)	–	11.1	*50.2*	2.0	---	5.9	1.0	3.4	25.5	---
	Value Added Output		186.7M	25.4M	62.3M	2.2M	---	11.2M	3.9M	14.8M	63.5M	---
		Share (%)	–	13.6	***35.0***	1.2	0.0	6.0	2.1	**7.9**	**34.0**	0.0
Konya	Number of Companies		217	65	12	4	7	16	13	16	84	0
		Share (%)	–	30.0	5.5	1.8	3.2	7.4	6.0	7.4	*38.7*	0.0
	Number of Employees		16,440	5,563	1,175	42	587	592	1,149	3,611	3,721	0
		Share (%)	–	*33.8*	7.1	0.3	3.6	3.6	7.0	22.0	22.6	0.0
	Value Added Output		35.0M	18.2M	1.0M	0.3M	0.8M	1.6M	4.0M	5.2M	4.1M	0.0
		Share (%)	–	***52.0***	2.9	0.1	2.4	4.5	**11.4**	**15.0**	11.8	0.0

(Source: S.I.S Annual Manufacturing Industry Statistics 1996)

2.2 Description of the Sector/Sub-sector

In connection with a change of the society and the economic situation in Turkey, required personnel also shifts from the agriculture to the industry and a service industry, as well as advanced technology has been required as shown in 2.1. Thus, the needs of personnel training from private enterprises are very high, but they cannot actually fulfill their needs with vocational training operated by the public agency. Every company is carrying out various training such as on-the-job training, as well as dispatching their employees to take a training course by an external training agency, such as university etc. Some Turkish companies, which need a mid-level technician, builds (Some maintenance) a vocational training high school, contributes the school for the Ministry of National Education, and leaves the management to the government. It is likely the case for the past ten years. The following descriptions provide the general condition of the personnel training system in Turkey including education and vocational training.

(1) Education System of Turkey

1) National Education System

Education and vocational training in Turkey is generalized by the Ministry of National Education under " Apprentice and Vocational Training Act No. 3308 " (effected in June, 1986). The Ministry directly manage the Primary and the secondary education, including all the planning of educational service, adjustment, implementation, creation of the criteria for curriculums, development of teaching materials, installation of all educational facilities other than the higher education, and giving support to the foreign living Turkish people etc. The educational council is organized as a deliberations / advice agency for making a proposal of a curriculum, an examination, approval of a textbook, etc. Concerning of the educational matters in general, national education congress is called every year to deliberate and submit a report.

On the other hand, high education (university or higher) is controlled by the high-education council, who consists of committees, such as the President, the Ministry of National Education and university related, to determine the policy refer to the high education. Figure 2.4 in the following page shows the organization of Ministry of National Education of Turkey.

2) Local Education System

The 国民教育長官 whom the Minister of National Education appointed is assigned in a district to supervise over all the local education. And the provincial education office supervises the preschool education agency and the primary school education. Here, the

Ministry of National Education direcly takes in charge of instructing the secondary education related schools.

3) Educational Revolution and Others

After the consistent compulsory education system for eight yearswas set in 1973; the educational revolution has launched in 1997, by establishing " Primary Education School " which unified a primary school and a junior high school to be compulsory education for eight years.

- Curriculum

  The Ministry of National Education and the educational ethics association have defined government guidelines for teaching It is not reviewed in certain fixed period but it revised whenever required, based on the opinion from the educational site.

- Textbook

  The educational ethics association takes in charge of the official approval of a textbook. It sets to compulsory education that a textbook to be distributed free, but in fact at present the selection of the textbook is onerously left up to an individual This purpose is to ease the burden on a family as much as possible.It resulted that different textbooks are used for the same lesson under the situation though, it seems that a rather good result for a student is brought with increase of interest to the textbook.

- Facility

  The scales of school and class are finely specified in the form of the notification according to the plan without any regulation. The regulation is set only for the private school, specified in detail.

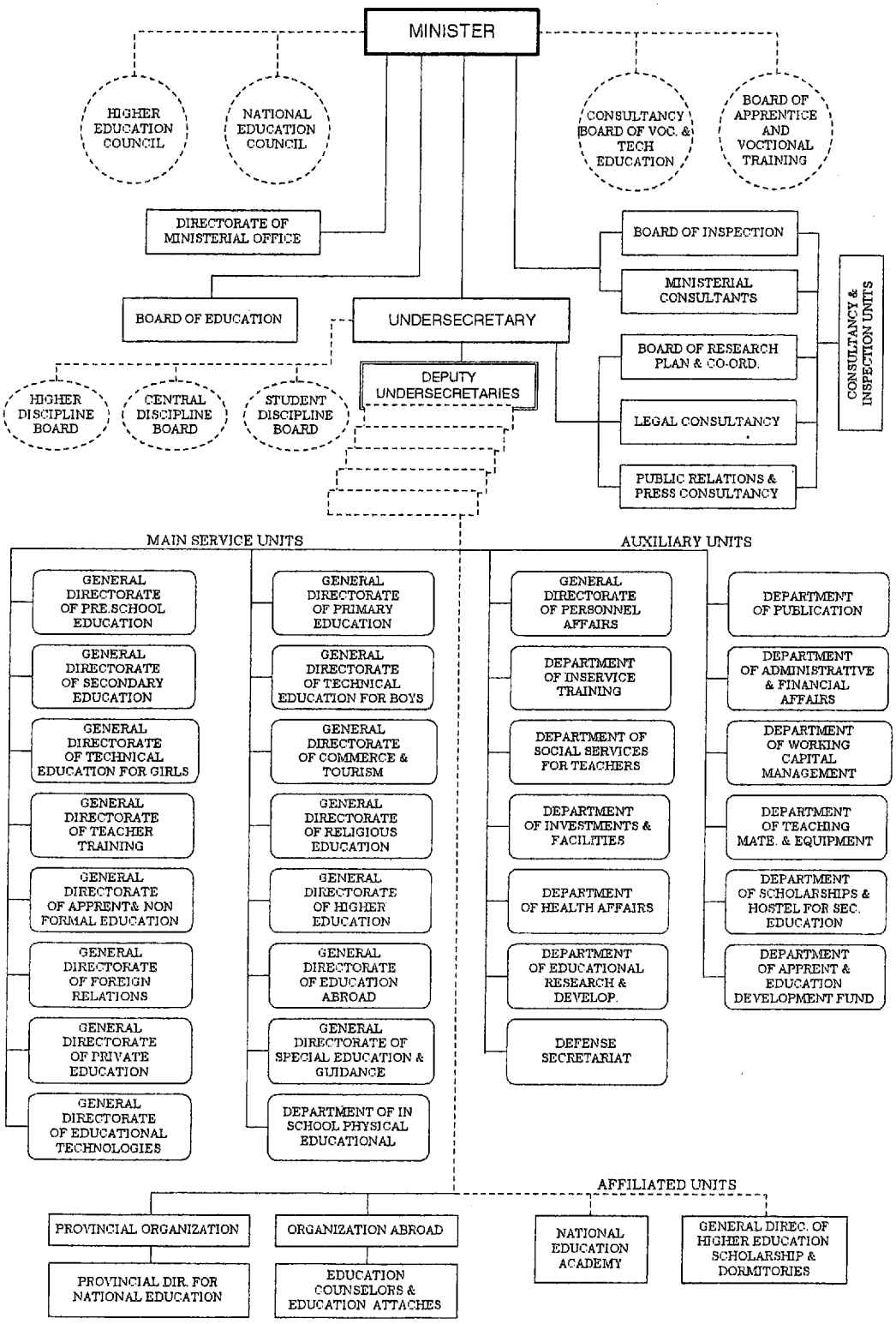


Figure 2.4 Organization of Ministry of National Education

(Source: "VOCATIONAL AND TECHNICAL EDUCATION IN THE TURKISH EDUCATION SYSTEMS") REPUBLIC OF TURKY MINISTRY OF NATIONAL EDUCATION, ANKARA, 1999)

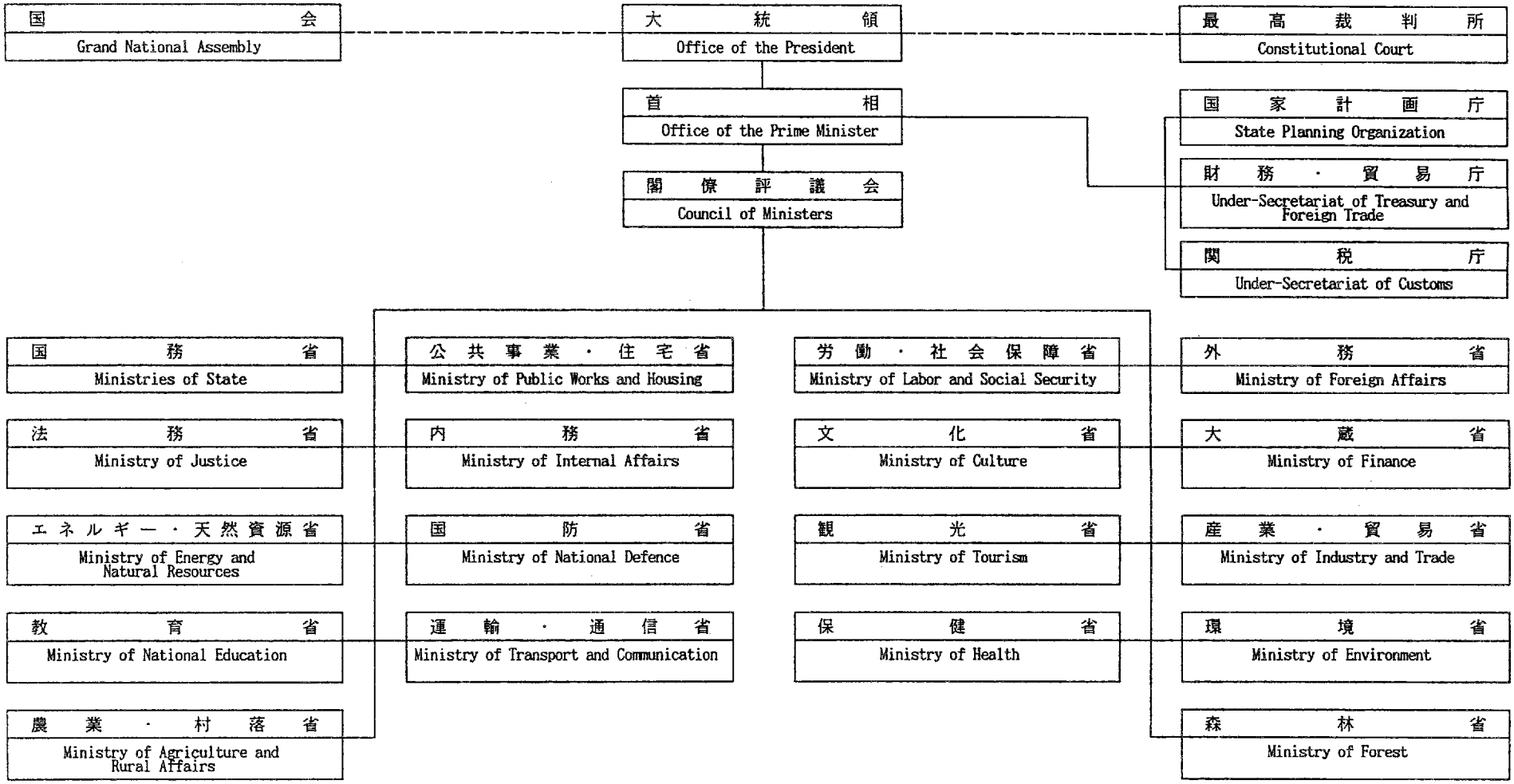


Fig 2.5　トルコ国政府機構図

4) Current situation of Measures to The Subjects on Education

a) Measures to Increase of Juvenile Student.

- The numbers of juvenile students increase abruptly accompanied by the start of compulsory education system for eight years as well as the increase in a birth rate.
- The increase in the number of juvenile students accompanied by a population influx from a district to the urban section.

○ Measures: 2 sessions of a class are adapted in big cities.

b) Measures to Teacher shortage.

- By introduction of eight-year compulsory education system, a problem arose with the serious shortage of the number of teachers.
- In teacher appointment, the graduation qualification by the department of education of a university is required.

○ Measure: Increase in the regular number of the department of education / Relief of conditions is devised by temporarily accepting any university graduate qualification to appoint.

c) Measures to Fund Shortage.

- The source of revenue needed in implementation of the educational revolution is insufficient.

○ Fund shortage is supplemented by raising a tax for time being while the support from international authorities, such as the World Bank, is expected.

5) Situation of School Attendance in Turkey

Situation of school attendance in Turkey is as Table 2.8. The field of the highest priority of national development in the 7th 5-year plan puts on educational field Particularly it makes a vocational and technical education be much more substantial so that the educated personnel can be adapted to the current demand. However, The vocational high school attendance during the period of 1998 - 1999 is 25.1%, which is less than the targeted value by 10%, implies the situation not easy to be achieved.

Table 2.8 School Attendances in Turkey

	Number of schools	Number of students (1000 persons)		School attendance (%)	
	1998	1994	2000 (target)	1994	2000 (target)
Primary Education School (Primary and Junior High Schools)	44,525	9,651	10,562	89.8	100
Secondary Education School	5,708	2,125	3,037	53.0	75
General High School	2,611	1,227	1,640	30.6	40.5
Vocational High School	3,097	898	1,397	22.4	34.5
Higher Education	863*	1,339	1,677	26.7	31.0

(Source: Pilot survey team data. The original data referred are Turkish government "Seventh Five Year Development Plan (1996-2000) ", "Strategy of the Seventh Five-Year (1996-2000) Development Plan", and Ministry of National Education vocational training head office data/Note:* indicates the number of schools in 1996-1997 school year)

6) Education System in Turkey

a) Primary School Education

Compulsory education was changed from 5 years duration to 8 years duration in 1997 as mentioned above, the conventional primary school and Junior high school was unified as " Primary-education-school ". Although 2-session system is adapted one in the morning and another in the afternoon 100% quantitatively because of the educational facility shortage, qualitative fullness isstill a future assignment. The ratio of students going on to the junior high school in 1995 before included in the compulsory education was about 60%. The school year is separated in 2-term system that starts in September and ends in June. The minimum schooldays are 180 days.

b) Outline of Secondary Education and Various Schools

① General High School

The school in this category is a 3-year system where the student who aims at going to a university enters. It is divided into a literature course and a science course in the second year, and further in the third year of science course divided into a mathematics course and a natural science course. The religion high school peculiar to Turkey is also classified intothis category.

② Anatolian TechnicalHigh School (the school subjected to this study / Details are described later)

Anatolian Technical high School is of a five-year system for the mid-level technician education. The difference from the technical high school mentioned below is that the first year is set for a preparation course; a foreign language is mainly studied Afterwards the lessons are performed by in the foreign language in some courses. The student, who graduated from a primary education school and passes a national common examination is permitted to enter this high school. The subjects of study currently programmedare the following 28subjects. The industrial automation technologies department subjected to support is one of this shoot.

(There are 20,045 students and 157 schools as of 1998 –99)

Airplane electricity maintenance, airplane engine, automobile technology, **industrial automation technology**, construction, construction drafting, CNC control, computer science (hardware), computer science (software), measurement and control, chemistry, electricity, electronics, hydraulic technology, industrial electronics, basic facility, journalism, mechanical engineering, medical electronics, micro technology, radio and television, communication, textiles (dyeing), textiles (spinning), textiles (ready-made article), textiles (handmade), knitting technology, mold manufacturing

③ Technical High School

This is of the four-year system for the mid-level technician education of which curriculum of the first year is same as the vocational high school.

(There are 29,131 students, 268 schools, and 27 study subjects are programmed as of 1998-99.)

④ Anatolian Vocational High School

This is the high school of the four-year system for training a skilled engineer, where the education is much more practical than in the technical high school. The difference from the above-mentioned vocational high schoolis that the first year set for a preparation course; a foreign language is mainly studiedin the first year. Afterward the lesson is performed in the foreign language in some subjects. The student, who graduated from a primary education school and passes a national common examination is permitted to enter this high school.

(There are 61,571 students, 134 schools, and 38 study subjects are programmed as of 1998-99.)

⑤ Vocational High School

This school has the three year of system for performing education much more practical than an technical high school, and trains skillful personnel. Entrance into the school is permitted by the individual performance and intention during the

primary school. The curriculums in the first year are the same as that of the technical high school. The students who studied remarkable results with the subject of science course, such as mathematics and physics, are possible to transfer to the second year of the technical high school at the time of ending the 1-year of a vocational high school.

(There are 426 schools and 63 study subjects are programmed as of 1998 -99. / There are also 1129 schools and 500,000 students in other data. Both data are from the Ministry of National Education.)

⑥ Multi-Programmed High School

This was started in the regions where the population is small and diverse, for the purpose of the effective use of the natural resources. The general subjects and vocational training subjects are covered in three years. (There have 150 schools and 33 study subjects are programmed as of 1998 -99)

c) Higher Education

There are about 60 domestic universities of which educational level is high Some universities conduct the class in English. The student aged 17 or older, who obtains eligibility requirements for an university examination and passes the national common entrance examination which is given by the student selection and distribution center, is determined by the center which university to enter. The entrance exam race is so hard that only 1/3 of the candidate can enter; the rest most likely results to give up even though they stand by and study to take another examination in the next year. The ratio of students going on to higher education is about 15%.

The education system in Turkey is illustrated in Figure 2.6. Figure 2.7 shows the details of the educational system concerned with the technical high school and the vocational high school.

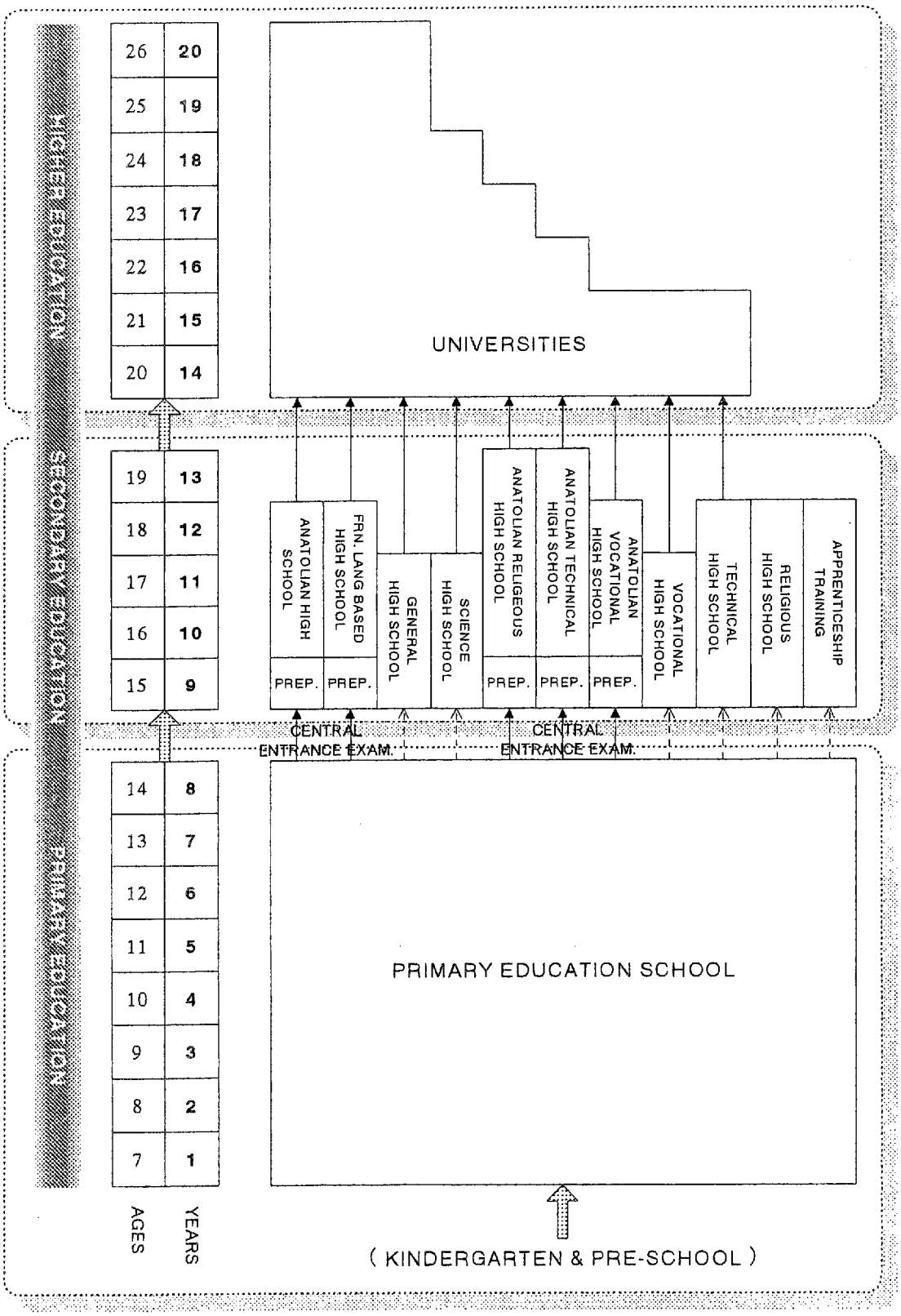


Fig. 2.6 Education system inTurkey

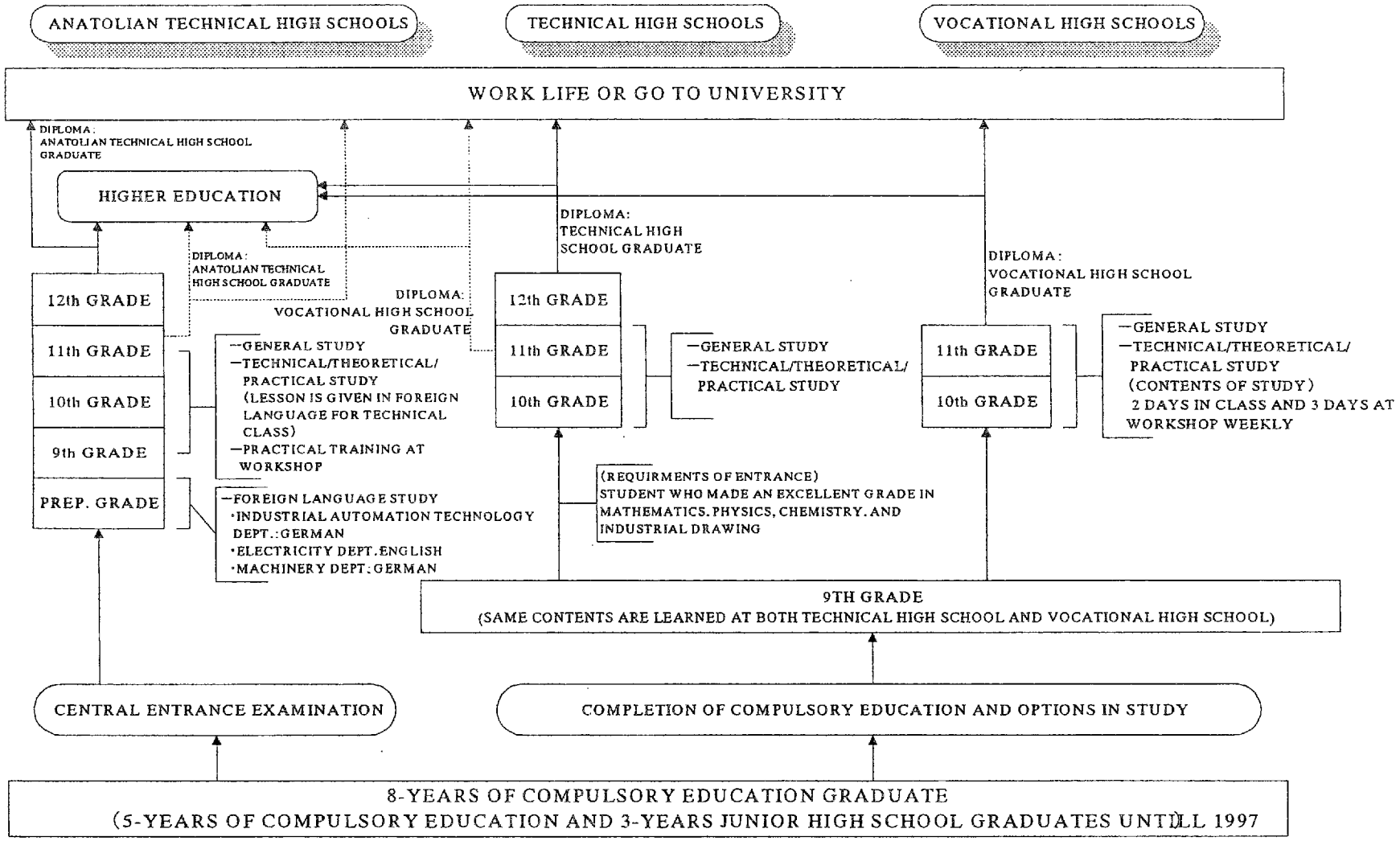


Fig. 2.7 DETAILED EDUCATION SYSTEM ON TECHNICAL HIGH SCHOOL AND VOCATIONAL HIGH SCHOOL

(2) Ministry of National Education's Budget

As for the change of the budget for ten years during 1991 to 2000, the Ministry of National Education of 14.2% occupancy in the total national budget as of 1991 shows a downward tendency every year until the year of 2000 of 7.17%. Also the budget for the vocational and technical education is also decreased in the occupancy within the Ministry such as 6.12% in 1991, and 4.97% in 2000, situating severe in budget.

(3) Vocational Education and Training Related Administrative Organization

1) Vocational Education and Training Related Organization in Turkey

The Ministry of National Education also manages the vocational education and training. In Turkey, Education / training course is programmed after completing the primary school education (compulsory education).

In accordance to the nature of vocational education and training, the school and the facility for are under jurisdiction of the following 5 directorates.

① General Directorate of Technical Education for Boys
② General Directorate of Technical Education for Girls
③ General Directorate of Training in Trade and Tourism
④ General Directorate of Training Apprenticeship and Extensive Training
⑤ General Directorate of Technical and Vocational Education

The above ① and ② seem to be distinguished by sex ideality but true isa sort by the industry. The vocational education (the above-mentioned various industrial and vocational school secondary education level), vocational training (apprentice training center *1, various public training center *2, correspondence course in technical education *3) are carried out under the above-mentioned five directorates.

*1 Apprentice training system

The apprenticeship training center takes charge of lesson-instruction to train a craftsman. The student is qualified as a craftsman after the training term of 3 to 4 years if passes the craftsman examination. Then, They will be called master if passes the examination after gaining practical business experiences for a minimum of three years and subsequent mastership training. There are 325 centers in the whole country, which offer 89 occupational descriptions to the scale of 260,074 apprentices.

*2 Public Training Center

This is an institution of which bears the principal areas of informal education. The available courses are literate, vocational, social, and cultural. Approximately 1 million of adults (who have finished the formal education and aged over the apprentice's) attended the courses among 55,272 courses opened at 917 places all over the country. As far as vocational training by itself, a total of 693,021 attended among 40,123 courses offered.

*3 Correspondence Technical Education

Theoretical study is made through the correspondence and practical study is by participating in a workshop in the vocational high school at night or a weekend. The graduate can be qualified equivalent to the graduation from the vocational high school. The numbers of students are 14,868.

2) Assignment of Teachers.

All the teachers are allocated by the Ministry of National Education, based on the request from the prefecture branch of the ministry. In order to get rid of a domestic regional gap and to keep an educational opportunity and the educational quality equal, the nationwide rotation system of teachers is adopted.

(4) Current Situation of Vocational Education and Training of thosebesides the MONE

The education sponsored by private sectors is provided under supervision of Turkish government.

- The Turkey chamber of commerce (UCCET) provid es the vocational training course under instruction of the Ministry of National Education. The 県の chamber of commerce provides a training center and scholarship, and establishes some courses, while UCCET supports it. An in-service training for one to two weeks provided out 12 courses a year (achievements as of 1999 -2000) as a training course for teachers.
- Some of large and middle-sized companies provide their own training center or section for training skilled personnel in house.

2.3 Host Country Strategy

(1) Positioning of this Sector on Present National Development Policy

The present 7th 5-Year Development Plan is scheduled to set 5 years from 1996 to 2000. The object is to promote Turkey to an advanced country from a semi developed country making the maximum use of the merit of globalization that enable the country to catch up with the current of international society. The priority of the national development within the period is put on the educational field as one of the elements to achieve the objective. It means that the more effective occupational and technical education improves the personnel training which is adapted to the social demand to bear the industrialization under the current globalization.

There is a necessity to increase in the foreign relations in the financial side and to raise international competitiveness of the domestic businessin Turkey. There is also a necessity to strengthen the international competitiveness for the Turkish industry to develop in international economy from now on In order to achieve the object, while taking full advantage of the human resources, which now potentially exist, and participating them to the production process with better quality, it is indispensable to develop the country toward the high value added industry, which applied the advanced technology. Small and middle-sized companies especially increase the demand for the mid-level technician in this field of technology. Regardless to formal or non-formal, development of human resources is considered to be important in this field

According to the Ministry of National Education, the school attendance to an occupation and a technical high school aim to pull up to 34.5% (1,397 persons) by the year of 2000 to 2001, which is the final year of the plan, while it was 22.4% (898 persons) in 1994 to 1995. But the school attendance in the 1998 to 1999 was 25.1% which was less than and the target by 10%, consequently the situation shows the achievement is not easy to achieve.

Also in industrialization and the relation with an information society, the importance of this sector is stated as follows.

Industrialization is one of the basic factors of development; its fundamental purposes are the improvement in productivity, quality and standardization, spread of the flexible production systems, use of the modern technology, integration of the small and large-scaled industry, and adoption of the high value added production structure. The positive strategy which is not domestic-industries protectionism but which enable to form influential company group in the international market accordingly.

In order to convert to the information society, it is important to support a scientific

and technological activities and it is required to enrich the quality and quantity of the mid-level technicians. Also the education, training, and research-and-development budget increase and so on are needed towards the information-oriented society as well. Each industry will beable to keep up with the technical evolution by means of the flexible production system and the industrial automation technology. The international cooperation in this field especially from EU, Japanand the United States is in need.

(2) Positioning of this Sector in the 8th 5-Year Development Plan

(3) The Ministry of National Education's policy

" Apprentice and the Vocational Training Act No. 3308 " (enforcement of June, 1986) is often called " Reformation provision " as to aim at the construction of a new personnel training system for strengthening the joint forces with the Turkish vocational training system and the industries more than ever.

There are the following features in this system.

1) Apprentice Training System

Mentioned as above.

2) In-house Job Training by Company

The practical training system in cooperation with private company and factory is established, alternating the conventional school-oriented system. At the final year of the vocational and technical high school, lessons are taken every two days in school, another three days in company to have on-the-job training in a week.

3) Cost Sharing

To keep the system, " Apprentice training and vocational and technical training development foundation " is established, at the same time" a vocational and technical training research and development center (METARGEM) " is founded for developing and researching the occupational and technical education curriculum

4) Wages and Social Security

The wages (It should not be less than 30% of the minimum wage with tax-exempt.), workmen's compensation, an occupational disease compensation for the student under an apprentice training term or under the participation to the on-the-job training in company are specified.

As far as the industrial automation technology is concerned, no concrete policy or a program is referred in the 7th and the 8th 5-Year Development Plan. Further according

to the Ministry of National Education, the government presently to support this sector does not carry out any specific measure and the program.

2.4 Prior or On-going Assistance

(1) Project of Turkish government

(2) Japan Cooperation in Turkey (Tuzula vocational training high school project)

The Turkish government set up the target of well-balanced society and economical development in the 5th 5-year plan (1985 -89 years), catching up with the change of the society and industrial structure of the country accompanied by the rapid industrial development in recent years. For achieving this target, the promotion of the personnel-training plan had been directed.

Engineers and technicians in the fieldof electric, electronics and computer science, as well as the teachers were especially short, and the technical cooperation to Tuzula vocational training high school was requested for the purpose of the expansion of the vocational technical education for training such a talented personnel. (The object was the same vocational and technical high schoolas the category mentioned above).

Our country performed a technical cooperation as a project for five years from 1987 on the vocational education courses (electric and electronics) and technical education courses (electric, electronics, and computer) in the vocational technical high school, achieved the original goal and completed (The trainees of these courses were the graduates from junior high school. The training term was three years and four years respectively. 240 trainees in a school year).

Then, a short-term specialist was dispatched for the aftercare from January to March of 1997, and another short-term specialist was dispatched upon request of a technology-transfer on applied technology and new technology from February to March 1999.

In the present, Tuzula School stands as-a-leader position in the educational fieldin Turkey because of the many textbooks prepared by the Japanese specialist and Turkish side C/P in this project. Also, the level of the student who enters the school is very high, naturally the school serves as which gathers a high reputation in Turkey. The following are the results of the study about the situation spreading the out puts and cooperation in concrete.

1) March, 1991, Data of Governmental Establishments Abroad

- The technical power of Japan for high-tech, such as electrics, electronics, and computer, is highly evaluated at Turkish side. Many students wish the school since it was the cooperation school with Japan.
- The Ministry of National Education has distributed the textbooks to the same kind of high schools for their reference

2) March, 1994, Data of Governmental Establishments Abroad

- 23 foreign students from some of the Turkish republic countries in Central Asia have been accepted since 1992.

3) October 18 to 31, 1994, Well-informed Person's Evaluation (Data of the Institute of Asian Economy).

- Out of 61 textbooks prepared in the five years of this project, 27 books were reprinted and they have been utilized in the vocational technical high school
- It was pointed out as a specific remark that five students from Turkmenistan in central Asia and 21 students from Uzbekistan have had been studying with the Turkish government scholarship.

4) March, 1995, Post-project Monitor on Current Situation by JICA Office (Local Consultant)

- 34 Turkish teachers received the direct technology transfer, and they have taught students in this school. In addition, while a summer course isopened for teachers in Turkey, trainings for a civilian sector were provided to spread the technology.
- The Ministry of National Education authorizes the curriculum prepared by the project, and teachers of other domestic schools are given training in it.

5) February, 1999, Comprehensive Report by Short-term Specialist

- The entire counterparts transferred to other schools are applied to a position rather important such as a chief of section, a vice-principal, and a principal in the institution.

(3) Outline of Third Power Cooperation Including International Authority

According to the data from the Directorate of Technical and Vocational Education, the Ministry of National Education, the 7 projects were carried out until now with foreign support in the field of the office in its duty. There are two projects by the World Bank and three by Germany, one by France and one by Japan (JICA-Tuzula vocational technical high school) The donor and the outline of the projects etc. are listed in table 2.9 on the following page.

Especially the impact of support by Germany in the field of industrial automation

technology is remarkable, which support period was divided into the 1st term and the 2nd term, and has continued till present. The outline of Germany's support is shown below.

1) German: The 1st term (1987-)

Haydarpasa Anatolian Technical High School in Istanbul, It was conducted with a scheme equivalent to professional works of Japan, and has already been completed (provision of equipment, specialist dispatch, and training program in Germany are included). At present, a German specialist seems to be inthe school on an independent personnel dispatch base.

2) German: the 2nd term (1992 – present)

It was conducted for six schools of the Anatolian technical high school as in Izmir (Ataturk school), Kocaeli, Bursa, Istanbul, Eskisehir, and Adana In order to have a training using the equipment and descriptions, which wereprovided from Germany, German is taught in the first year. For three schools, which are Istanbul, Eskisehir and Adana, once requested Japan to give the support. However, Germany has proposed a continuous support proposal later and it lasts till present.

The support of Germany has been conducted focusing on the very fundamental technical field in industrial education so that it is highly evaluated by the Turkish side. Haydarpasa school has also performed the training of teachers of industrial automation technology which makes the school to be the core of the technical high school in Turkey from the viewpoint of teacher education. It seems that, however, in order to meet to the talented personnel demand by the contemporary industry from which electronic control becomes in use in the present Turkey where industrialization is progressing quickly, there seem to be a portion just insufficient state of German support.

Table 2.9 Donors other than our country, outline of project

Donor	Project	Amount	Summary
World Bank	Technical school project (1985-92)	Loan amount of US$57,700,000, Turkish side In put US$1,500,000	It aims at improvement of the existing curriculum and training teaching materials, and the program development for a new occupational description etc. to the 64 technical high schools
World Bank	Non formal vocational training project (1987-)	Loan amount US$58,500,000, Turkish side In put US$1,320,000	It aims at an improvement of the quality and quantity of the workers for the manufacture, through the training in the adult technical training centers for adult, entrepreneur training, etc.
Germany	Turkey-German vocational training center project	DM 12,300,000 (Onerous)	It is for 13 vocational training centers.
Germany	Anatolian technical high school, automatic control Department project	DM 4,700,000 (Onerous)	It is for 7 Anatolian industrial automatic control department high schools.
Germany	The Ankara, ポラトリ vocational high school project	DM 270,000 (Onerous)	It is for about the Ankara ポラトリ vocational high school.
France	The Istanbul カギタン・プロフィロ Anatolian technical high school project	43 million F.FR offered (23 million, loan, 20 million by onerous)	It aims at provision of equipment, teacher training, textbook creation, and training program development for the Istanbul カギタン・プロフィロ Anatolian technical high school.

(Source: state the Ministry of National Education data / Japan Project is excluded. /Note: DM shows German Mark and F.FR shows French Franc.)

3. Problem to be addressed, the Current Situation

3.1 Problem to be Addressed, the Current Situation

(1) Analysis of problem to be addressed, and the current situation

The necessity for the personnel training for promoting industrialization of the Republic of Turkey became clear after the implementation of PCM (Project Cycle Management) based on the spot described in Chapter 2 (Refer to Supplement 8.6). It is indispensable to develop the automatic-control in order to enhance the modernization to support the industrial base of the country and to compete in the international market It was confirmed in a workshop of Japan and Turkey that a mid-level technician in the field of automatic control is insufficient and that an adequate measure should be placed on the problem. It was discussed broadly as to not only the school education but also the industry of many fields in relation, and then, the following nine problems were extracted and analyzed.

<The problems extracted and analyzed>

① The communication among teachers is insufficient (Stinginess of technology, unsuitable counseling in guidance.)

② Some students go to the field different from having learned in school.

③ Suitable personnel education/training are insufficient in the field of industrial automation technology.

④ There is no program by which students can study the industrial automation technology in university.

⑤ There is no new curriculum. (The curriculum does not meet for the current needs)

⑥ There is no learning material.

⑦ Students think that the practical exercise is not so important.

⑧ Suitable instruments for education are not prepared in school, workroom, and laboratory.

⑨ There is no government support to enhance the cooperation between engineers and the industries.

Furthermore, as a result caused directly by the main problem, the following items were raised; ① rise of production cost, ② reduction of labor efficiency, ③ increase in workers accidents. ④ skilled worker shortage, ⑤ less transportation of the technology from foreign country. As the result of ④, the increase in unemployment was mentioned, however, there was another viewpoint that the industries wanted to employ the skilled worker, but there was no talented worker with suitable technology, and employment did not increase.

It is necessary to divide these problems into two groups. One of which is related to school

education, and another is concerning with the situation of the industries in thefield of automation technology.The problems will be analyzed below for those of the school education and for those of needs from the industries separately in (2) and (3) below

(2) The Current Situation of the Vocational Education and Training of Turkey and the Anatolian Technical High School

As described in the preceding chapter 2.2, as to the vocational education and training of Turkey, the following four kinds of school are provided, i.eAnatolian Technical High School ② Technical High School, ③ Anatolian Vocational High School, and④ Vocational High School. These schools,harnessing each feature, raise the talented personnel who can adapt him to broad industry of a certain technical level The program which goes up to 63 from heavy industry such as airplane engine, to light industries such as textiles and shoemaking, is provided in these schools. Each school performs different level ofeducation and training and each from low technical level to even the mid-level technician accordingo the training years. The Anatolian Technical High school, among these high schools,has foreign language class in the first year, and has the term of a technical course as the longest for four years A large number of the talented persomel of the highest technical level have graduated from this school.

The implementation of the project in Anatolian Technical High School was requested from the Turkey government, since the school has brought up many mid-levelechnicians in the field of industrial automation technology and the school was judged as suitable in technical level. The description in below is focused on the problem of Anatolian Technical High School. The institutional framework of Anatolian Technical High School etc. is described in the following clause 3.2.

1) The Problem on theEducation in Anatolian Technical High School

The problem raised here in the first place is that the curriculum has not well prepared

And in second, the maintenance of teaching materials is insufficient and the equipment for training is not enough

The shortage of teachers and its imbalanced allocation are raised in third By these problems, the evil is caused in which educational quality falls down and the opportunity to get education is unequal. At the interview, the opinion in which low wage rate was mentionedas a cause of insufficiency in number of teachers, and the overwhelming quality of the education in companies were pointed out.

As the fourth problem, the gap between thetrainees and the needs of a company is raised. This is notably seen especially in a high-tech field.

The building of institution has not been aserious problem, since the system is adopted in which the buildings, after a private enterprise etc. has constructed, are contributed for the Ministry of National Education.

2) Problems in the Industrial Automation Technologies Department of Anatolian Technical High School.

① Problems In the Educational Curriculum

The vocational training related to the air and hydraulic technology is emphasized. The development of the curriculum covering broadly the industrial automation technology is required, because many students of the Anatolian Technical High School aim to enter university.

The industrial automation technology can be divided into two as follows; (i) the automatic control technology that is applied to the manufactured goods in them, such as automobile parts controlled by microcomputer, and other broad application in electric goods having a sensor. (ii) Automatic controlled manufacturing process, such as automation of factories. The industrial automation technologies department, by cooperation of Germany, emphasizes on the automation of the manufacturing process of (ii), and further puts effort on the air and hydraulic control rather than electronic control. In order to meet the needs of time, the curriculum has to put emphasis on the automatic control technology by the computer (electronic control).

② Insufficient Textbooks and Teaching Materials

Financial shortage is a big factor for it. But there is another factor that teachers lack their effort to make the required facilities by themselves, as well as their morale to carry out an originality work because of the facts that a teacher's charging field is fixed.

③ Shortage of teachers

Lots of excellent teachers who mastered new technology move to companies, and the situation of the teacher shortage of on industry is chronic.

3) Future Plan and Prediction Concerning the Industrial Automation Technologies Department.

The industrial automation technologies department has so far been provided in seven schools, starting with the Istanbul Haydarpasa school as explained in 3.2. Since the industrial automation technologies department graduate of Haydarpasa school

(established from 1987 to 1988) fulfilled the demand to the mid-level technician of the local industries and brought a good performance. Then, the same educational institutions were opened by a strong request from the industries of other areas, such as Adana, Bursa, and Eskisehir.

As mentioned above, a majority of Anatolian Technical High School student is from the neighboring area, and it is common to stay at that area after graduation and to be employed there. Although the conventional type of industrial automation technologies department has spread all over the country, on the other hand, the industrial area where the industrial automation technologies department of Anatolian Technical High School does not exist is the point of disadvantageous for reserving the mid-level technician of the automatic control field As it became clear in Chapter 2, one of the cities where the department of automatic control is not fixed is Konya. And although Izmir has the department, it became necessary to open newly the industrial automationtechnologies department in Mazhar Zorlu school because of its space area. As a fact to support the circumstances about both of Izmir Mazhar Zorlu school and Konya Adil Karaagac school, those are candidate school of this project, for which the local industries built the school building spontaneously to be contributed for the Ministry of National Education. The local industries earnestly require the introduction of the automatic-control technology and the personnel training for it. From this fact, it is clear that the private enterprise staff recognizes the needs at considerably a high level Furthermore, it is shown the prospect of increasing needs from Izmir, which request for engineers understanding the science technology and being able to apply it on practice and being able to use fluently foreign languages. ThenAnatolian Technical High School graduates gather a high expectation in this meaning.

For these reasons, the Turkey government has come to request the Japanese government to established the industrial automation technologies department in Izmir Mazhar Zorlu school and Konya Adil Karaagac school amongAnatolian Technical High School over the country.

(3) Results of Study about the Needs from the Industries

1) The Current Situation of the Automatic Control Field in Turkey (General situation)

Automatic control is a comparatively new field for Turkey. Then It is recognized strongly by industry and education related people that engineers and leaders in this field are running short and the industrial development is impeded by this situation. A small size enterprise and that of medium size are the main body in current Turkey industry. Most of the production system still has the form of labor concentration type

employing comparatively cheap labor force

On the other hand, in the current data analysis of the interview in a preliminary study, PCM workshop, and the 7th 5-Year Development Plan etc., "laborer's low quality" is counted as one of the main factor of the obstacle for the development of industry and attraction of a foreign-affiliated firm, and recognition of the related people is very high as to the necessity for the automatic-control technology in a manufacturing industry. Therefore, it is expected that the needs of the industries for the technician training of the automatic control field will becomerise in future.

At the interview to the Ministry of National Education and the Mitsubishi Ankara branch, the importance of the automatic-control field in Turkeys domestic business development in future is pointed out. According to the Ministry, the State Planning Organization (SPO) also recognizes this problem intensely and manifests the full support for this project. Moreover, according to UCCET (chamber of commerce), the training course graduates of the automatic control field get place favorably starting work, and it confirmed that the needs of the industries to this field is pointed to this subject.

Furthermore, it is asked to fully achieve the numerical target value for the improvement of domestic economic conditions at the time of the affiliation to EU Customs Union, and further strengthening the competitive power is indispensable.

According to the results of a short-term study between July and August in 2000, the textile industry is the most leading type of industry to introduce automatic control system in near future (reply from a chamber of commerce and ministry of commerce and industry). Although the textile industry of Turkey established as a brand in Europe, it aims at exporting a cheaper product by mechanizing, sincethe majority is a manual operation. In addition, as a manufacturing industry that has already introduced automatic control technology, a paper manufacture, tobacco, plastics window frame, resin pipe, automobile, beer, paint and film were counted. (Visiting report to companies in Konya and Izmir)

2) Needs of Private Enterprise at a Short Term Study (April 2000)

As described in above 1) and preceding chapter, the personnel training needs in automatic control field of the private enterprise are very high, and future possibilities are expected. In Turkey where the labor force transfer among each industrial area is seldom, but comparatively labor supply within an area is secured, it is necessary to satisfy the needs of the industries to that of local one. That is, in order to be evaluated from the industries in Izmir and Konya which are the candidate object site of this

project, it becomes an important point in order that the balance of the industrial structure and the development level of automatic control may raise the efficiency and the effect of a project. Because when a mid-level technician istrained in the school fixed by the project, whether the local industries can absorb these engineers depends on the structure of local industry, and the degree of development.

Then, the needs of industries of each area are analyzed below.

a) Needs for the automatic control technology in Izmir area

Two large-scale industrial complexes arealready situated in Izmir, and the scale is under expansion including five new housing complexes. Major industry fields are metal, machine, textiles, food, chemistry, and electronic industry, and morethan 600 types of industry and about 6000 companies are located.

Moreover, the government political support also has new development of a free trade zone etc., and the investment and employment have an expansion tendency. Within the reply from several companies of Izmir, for question, about the establishment of the industrial automation technologies department, a high expectation to the Anatolian Technical High School graduate, who understands technology and can adapt to the practical business, and also speaks a foreign language is remarkable. It implies the needs to the technician will increase. This background is the high-tech introduction accompanied by the joint management with a foreign company, or the increase in foreign investment. Moreover, according to the chamber of commerce, since the number of the factories and companies increases in recent years, it counts also upon a rise of the labor force demand.

The following means arecoped with the shortage of engineer of automatic control field in the present situation; supplementing with engineers of related fields such as electrics and an electronics; sending employees to a private computer school; receiving trainees at a company from companies where the equipment was purchased (inside and/or outside of turkey); studying in institute and university. However, if the mid-level technicians, who have fundamental capability, are trained in Anatolian Technical High School, companies wish to employ them.

Although the factories related to plastic production which is the major industries of Izmir area produce by imported machine, the product line for each factory is poor because of the lack of its own automatic control technology. Izmir area locates facing to the Mediterranean, and the 3rd big city in Turkey (about 2 million population), and lots of company has contact with oversea countries. The visitor receives the impression that the companies there have developed comparatively.

< Visited place >

a plastics furniture factory (chair related), a tool factory, a plastics construction material factory, plastic film factory

b) Needs for the automatic control technology in Konya area

There are three large-scale industrial complexes and, in addition, five new industrial complexes are developed in Konya area. The major industries of Konya are machine (agricultural machinery), chemistry, food, and stockrising. 99% of companies there are small and medium-sized enterprises. Theparts for automobiles, one of main products, are dealt with inside and outside the country. The products such as a car-body, bulb, piston, piston rod, and various gears are famous. It is said that the products such as a machining stand, a machine manufacturing steel-sheet, and various instruments for inspection and repair have excellent quality comparing with those of Europe. As for the agricultural machinery, it occupies 60% of the demand in the whole Turkey. On the other hand, food industries are extremely successful such as a milling, biscuit, pasta, edible oil, and sugar refiningThere are also many factories that meet the industrial basis of ISO 9000. Thoughit is a local city, the manufacture field spreads widely in variety, and almost all the products are exported, then Konya is called "Taiwan in Turkey. " There is also a company which has introduced the facility of CNC (computer) NC. Moreover, there are some so-called high-tech companies, such as special companies of automation machine-design manufacturing using PLC, a software house, and an Internet provider (two companies), but they are comparatively small-scale.

There are also many companies relating to machine manufacture, on the other hand, which do not need so advanced technology. In the course of the vocational training center, the welding course is doubles with automobile maintenance and an NC machine. The center was established commonly by the chamber of commerce Konya area and Germany. As is common to any company, manufacturing machines and technology are introduced from a foreign country, and they are used as it is, therefore diversification of management does not progress.

<Visited place>

a chuck factory, a construction machine shop, PLC factory, a pasta factory, tractor factory, a software house, vocational training center

3) Needs in Private Enterprise at short-term study (July through August, 2000)

For the purpose of confirming the current situation of the related object area concerning and the needs of industries for the automatic control engineers, the visiting study was carried out over the companies around Izumir and Konya area (Refer to Table 3.1). A total of 26 companies were visited. Without inclining toward specific, it regarded so that the visit study might cover uniformly all the type of industry.

Table 3.1 Visiting Study Company

Local / Type of industry	Ankara	Istanbul	Konya	Izmir	Total
Motor vehicles	1			1	2
Motor vehicle parts/accessories			3	1	4
Agricultural machinery			1		1
Metal working machinery			2		2
Hydraulic equipment			1		1
Chemical machinery				3	3
Electrical machinery		2			2
Food, Beverages, Tobacco, n.e.c.			3	3	6
Apparel, Textile, Garments, n.e.c.			1	1	2
Chemicals				2	2
Paper and Paper products			1		1
Companies visited total	1	2	12	11	26

☐ Profile of the company visited

a) Number of employees

-100 or less : 8 companies

-101 - 200 : 7 companies

-201 - 300 : 4 companies

-301 or more :5 companies

b) The employment situation and items of engineer

①Employment situation of university graduates

Generally, about 10 college graduates were employed per company.

As companies employed exceptionally lots of college graduate are / EGEPEN (Metalworking, window frame) : 80 university graduates, PHILSA (tobacco) : 28, Opel (motor vehicle) : 25

② Employment Situation of Technical/Vocational High School Gaduates

The companies employing about 20 or so graduates from technical / vocational high school are general. However, companies employing exceptionally large number of such special high school graduates are polibak(film) :70 high school graduate, PHILSA (tobacco) : 483, and Opel (motor vehicle) : 100.

c) Average Operating Ratio of a Manufactory

The line operation ratio of the visited companies was 60 to 70%or so for most of the companies visited, KOMBASSAN (paper) and Polibak (film) however, suite the high level operation ratio 95%, and the opposite is Filkar (motor vehicle parts) of the ratio 45%, which is below the average.

d) Problem of the Current Situation for Automatic Control Technology / Facility

- The technical dependence, including training of an engineer, on the company from which the technology and its know-how are introduced (mostly EU) is high. The time and cost for training are also significant.
- Dissatisfaction is in the technical service system (at the time of maintenance and failure) of company from which the technology is introduced. Many companies carry out maintenance by themselves.

e) Problem on the ability (skill) of engineers

- More than half of companies answered that the engineers are missing" the practical processing ability".
- Some companies, though the number is small, answered that the engineer is missing "the fundamental technical ability" and " the applicable technical ability".

f) Problem in Connection with the Education System of Technical / Vocational High School

- Many companies answered that the technical contents (curriculum) are "technically low level and outdated."

g) Engineer Adoption Plan

- Clear plans were obtained from five companies. The result is as follows:

Table 3.2 Adoption Plan in 2000 Fiscal Year of Five Interview Companies

Company	Indusry	Location	Adoption plan
TETIK	Motor vehicle parts	Konya	T/V: 15
inan	Machinery	Konya	U: 2, T: 3, V: 5
KAYAHAN	Hydraulic equipment	Konya	U: 19, T/V: 50
iMAS	Machinery	Konya	U: 5, T/V: 35-40
polibak	Film	Izmir	U:5, T/V: 20

T/V: Technical/Vocational High School Graduate

T: Technical High School Graduate

V: Vocational High School Graduate

U: University Graduate

- Several companies have adoption plan at the time July to August 2000, but it is not settled numerically. The satisfactory answer was not gotten from last companies where the personnel of reception did not know the plan.

h) The assigning section of newly adopted engineer

- University graduate: production (management), quality control
- Technical / Vocational High School graduate: operator, maintenance

i) Situation Corresponding to Information

Introduction of a personal computer has been achieved in most companies. In addition to word processing, accept and order business, the IT technology has become available as in Japan to broad fields such as CAD software (AutoCAD), ERP (Enterprise Resource Planning: Integrated Information System) and electronic commerce (EC) using the Internet.

j) Situation Corresponding to Automation

The companies, conducted visit investigation, have introduced automation system to the various manufacturing processes, and few factories achieved the automation thoroughly.

The companies of full automation or to some extent achieved are listed in Table 3.3.

Table 3.3 Example of Correspondence to Production-line Automation

	Company	Manufacture field	Location	Situation of automation
1	BAYARAKU	Coating material	Izmir	▲
2	EGEPEN	Window frame	Izmir	▲
3	EGEPLAST	Resin pipe	Izmir	▲
4	KOMBASSAN	Paper	Konya	▲
5	Opel	Automobile	Izmir	●
6	PHILSA	Tobacco	Izmir	●
7	polibak	Film	Izmir	▲
8	TUBORGU	Beer	Izmir	●

(Notes: ● : Full automation, ▲ : Automation except for packing and a shipment process)

k) Generalization of Study on Company Needs

① Lack of Employees' Technical Ability

Many managers pointed out the insufficient practical processing ability of engineers employed in Turkey. Most of manufacturing technology/facility is introduced from EU countries including Germany, Italy, and France. The company which introduced the facility has spent much expense and time on training and mastering the maintenance for engineer. Moreover, there was also an example as follows: In the local child companies, whose parent companies are in EU countries, a facility, an educational system, etc. are altogether made into the same specification as the parent company.

② Reason of Delay on Introduction of Automatic Control

As one of the main reasons why introducing robot and automatic system does not progress, the following situation can be pointed; worker's wages are extremely cheep compared with the introducing cost of automation instrument. For an example, the monthly wage of a welder in MAN company is DM350, namely about ¥17,000 (in case of DM1=¥50).

③ Situation of Introduction/Application of IT

As to the situation of introducing and using IT, the method of application and the number of PC to be introduced will be changed as progressing circumstances and quality of manufactured goods. The current situation of correspondence against IT in each company is tolerable as for software of business, applicability of CAD software and correspondence to the Internet.

3.2 Institutional Framework for the Sub-Sector

(1) The industrial automation technologies department of Anatolian Technical High School (existing)

1) Circumstances of the Establishment

The Ministry of National Education established a industrial automation technologies department in Haydarpasa technical high school for the purpose of training the mid-level technician in response to support of Germany in the 1987 school year. The establishment of the department was determined by accepting requests from local industries and the department consists of fields such as machine, hydraulic technology, electricity and electronics

The graduate of the department made remarkable activity in the industries of the Istanbul suburbs, and the result is evaluated. Then, it was determined that the industrial automation technologies department was established in other industrial cities, and it was opened in the 1994 school year in six high school as below;

- ADANA ANATOLIAN TECHNICAL HIGH SCHOOL
- BURSA ANATOLIAN TECHNICAL HIGH SCHOOL
- ESKISEHIR ANATOLIANN TECHNICAL HIGH SCHOOL
- ISTANBUL ZEYTINBURNU ANATOLIAN TECHNICAL HIGH SCHOOL
- IZMIR ATATURK ANATOLIAN TECHNICAL HIGH SCHOOL
- KOCAELI ANATOLIAN TECHNICAL HIGH SCHOOL

As mentioned in chapter 2 and chapter 3, the industrial automation technologies department opened in each high school focused on the fundamental technical field, and the result was evaluated from Turkish side. On the other hand, the establishment of new department concerning electronic control has been requested from the industries. As increasing demand on electronic field, our country, which is in leading position in the world, has become to be asked the support of the automatic control and its related subject.

2) Curriculum

There are 24 admission capacities It is indispensable condition for them to enter the department in these high schools that they have to get remarkable results in the primary school education, and to pass the National Common Entrance Examination.

The curriculum of this subject of study in Anatolian technical high school is

shown in table 3. as practical examples. It is featured that the subject of automatic control is studied using two languages; one is Turkish and another is foreign language studied through the preparation process, and that the practical exercise is weighed as well as lecture.

The freshman studies putting emphasis on the basic education of a foreign language and technology, and it is obvious that the study aims at practical technical education for senior class in 2nd and 3rd year, and the practical training in a company is included in the curriculum.

At the time of graduation, the eligible requirements for an examination of university are given with the qualification as an automatic control engineer.

The curriculum is planned at the Ministry of National Education, and it is not fixed but may change with the cooperation relationship in future. In addition, not a unit system but the grade system is adopted.

The details of the school subject of the existing industrial automation technologies department are as reference 1, and the list of providing equipments demanded by Turkey at the beginning on implementation of this project shown in reference 2. As long as these equipments lists are concerned, it is supposed that the influence of a German teaching-materials maker is strong.In addition, this list is based on a German teaching-materials maker's product not necessarily considered to be the teaching materials based on an educational standpoint.

3) Jurisdiction Department and Support Organization of Anatolian Technical high School

The Anatolian Technical High School is the organization which the Directorate of Technical and Vocational Education, the Ministry of National Education, superintends directly, and on executing this project the bureau is responsible to such a budget measure and arrangement of C/P.

Therefore on managing the project, it is necessary to build up with the bureau a succeeding close relation. In addition, although it is necessary to obtain recognition of Board of Education in recognition of a new curriculum, so long as the bureau commits, the new curriculum must be recognized.

4) Graduate's Trend

As a graduate's course, the following several choices of passage can be considered from the educational system.

・Graduate after 5th year and ① become a mid-level technician in industryor

② go on to university and after that become an engineer.

- When the 4th year (the 3rd year of a special course) is ended, go through university entrance examination and enter there of higher grade. Afterward become an engineer.

As studied about the actual trend of each Anatolian Technical High School since the system by which all conduct investigation about a graduate does not exist the data which have come to hand by now about the trend of the industrial automation technologies department graduate are only the replies of the data in the 1998 -1999 school year from Haydarpasa school, and the Izmir Ataturk school.

For the Haydarpasa school, 40% of the graduates have brought to automatic control field, 20% of them go to the school of higher grade and the remainder are unknown.

For the Izmir Ataturk school, the industrial automation technologies department which is decided to move to the Izmir Mazhar Zorlu school, 20 persons of total 24graduates of the year went to the university and rest 4 were employed by the company of different field. It is hard to say that the school has achieved to educate the mid-level technician of special field.

It was pointed out from the interview of Japanese trading company that there was a tendency for young layer to like the school of technical system, and engineers were employed completely unrelated field because the collage graduate became a big brand, and they were actually excellent.

However, from the interview performed during the preliminary survey as to the point that many of students go on to an upper school, opinions are divided " Since the university entrance itself is difficult, as for most graduates, being immediately employed after graduation is common. " " Even if it calls an upper school, it is the night school or the opening university in fact, and they are employed in daytime to the special field of study as an engineer. "All are the opinions to suppose that most graduates are absorbed by the industries.

It seems that on the other hand, according to the view of the Ministry of National Education, the possibility of coexistence with the night school, an opening university, and an engineering work is not high.The government official of a public office goes usually to the night school or an opening university for promotion.

It is necessary to promote the cooperation with the foundation for school management and the local chamber of commerce so that the graduate can play as a supervisor of production/management line with automatic control technology, even

if the persons educated by proposed curriculum system would employed immediately after graduation or would go to the school of upper grade.

5) Support System by the Private Sector Organization

It is general in Turkey that after a company constructs school building; the management is entrusted to the Ministry of National Education. Two schools now targeted in this project were also built for the personnel training which the local industries needed.

After the school building has been constructed, the company establishes a foundation and offers the required school material under the cooperation with the Ministry of National Education. Although this point can be evaluated, in special case, the possibility of having a character of "the school in company" cannot be denied. Attention should be required

Table 3.4 Curriculum Table

	Subject	Prep.	Special course			
			9th	10th	11th	12th
General Educational Subject	Turkey language	4				
	Turkey language and literature		4	2	2	
	Religion culture and ethics		1	1	1	
	History		3			
	Geography		2			
	Mathematics		4			
	Creature and health		2			
	Physics		2			
	Chemistry		2			
	Foreign language	24	6	4	4	4
	History of the Republic of Turkey and Ataturk				2	
	National defense (military affairs)			1		
	Philosophy				2	
	Gymnastics	2				
(Sub Total)		30	26	8	11	4
Special Subject of Study	(Lecture subject)					
	Creature			2	3	
	Physics			3	3	2
	Chemistry			2	3	2
	Mathematics			3	3	3
	Geometry					3
	Vocation drafting		2	2	2	
	Technical drafting	2				
	(Practical subject)					
	Machine Practice		4			
	Electric technology		5	4		
	Electronic technology		4	8		
	Microcomputer technology				4	8
	Automatic control					10
	Digital electronic technology			2	4	
	Air pressure			4	6	
	Oil pressure					2
	CAD					2
	PLC, MPS					8
(Sub Total)			15	30	32	40
Special selection				4		1
General selection		4		3	2	
(Total)		34	41	45	45	45
Guidance			1	1	1	1

Table 3.5 Timetable of Anatolian technical high school (example)

	Hour	Monday	Tuesday	Wednesday	Thursday	Friday
Fundamental	1	Foreign language	Foreign language	Turkey language	Foreign language	Machine practice
	2	Foreign language	Foreign language	Turkey language	Foreign language	Machine practice
	3	Foreign language	Foreign language	Foreign language	Foreign language	Machine practice
	4	Foreign language	Foreign language	Foreign language	Foreign language	Machine practice
	5	Turkey language	Foreign language	Foreign language	Technical drafting	Machine practice
	6	Turkey language	Foreign language	Foreign language	Technical drafting	Machine practice
	7	Gymnastics	Foreign language	Foreign language		Machine practice
	8	Gymnastics	Foreign language	Foreign language		Machine practice
	9		Morality	Foreign language		Machine practice
	10			Foreign language		Machine practice
	11					
9	Hour	Monday	Tuesday	Wednesday	Thursday	Friday
	1	Mathematics	Electric practice	The Turkey language and literature	History	Chemistry
	2	Mathematics	Electric practice	The Turkey language and literature	History	Chemistry
	3	History	The Turkey language and literature	Mathematics	Electric practice	Foreign language
	4	Religion culture and ethics	The Turkey language and literature	Mathematics	Electric practice	Foreign language
	5	Foreign language	Physics	Geography	Electric practice	Biology and sanitary
	6	Foreign language	Physics	Geography	Foreign language	Biology and sanitary
	7	Electric practice		Machine practice	Foreign language	

	8	Electric practice		Machine practice		
	9	Electric practice		Machine practice		
	10	Vocation drafting		Machine practice		
	11	Vocation drafting		Morality		
	12					
	Hour	Monday	Tuesday	Wednesday	Thursday	Friday
10th year student	1	Electronic practice	Mathematics	Electric practice		
	2	Electronic practice	Mathematics	Electric practice		
	3	Electronic practice	Mathematics	Electric practice	Chemistry	
	4	Electronic practice	Physics	Electric practice	Chemistry	
	5	Physics	The Turkey language and literature	Occupation drafting	Digital electronic technology	Foreign language
	6	Physics	The Turkey language and literature	Occupation drafting	Digital electronic technology	Foreign language
	7	Selection	Electronic practice	Selection	Air pressure practice	Foreign language
	8	Selection	Electronic practice	Selection	Air pressure practice	Foreign language
	9	Biology and sanitary	Electronic practice	National insurance	Air pressure practice	Selection
	10	Biology and sanitary	Electronic practice	Selection	Air pressure practice	Selection
	11		Morality	Religion culture and ethics		
	12					

Table 3.5 Timetable of Anatolian technical high school (example) continued

	Hour	Monday	Tuesday	Wednesday	Thursday	Friday
11th year student	1	The Turkey history and Ataturk	The Turkey history and Ataturk	Digital electronic technology	Air pressure practice	Foreign language
	2	Physics	Mathematics	Digital electronic technology	Air pressure practice	Foreign language
	3	The Turkey language and literature	Microcomputer technical practice	Digital electronic technical practice	Air pressure practice	Chemistry
	4	The Turkey language and literature	Microcomputer technical practice	Digital electronic technical practice	Air pressure practice	Chemistry
	5	Mathematics	Microcomputer technical practice	Physics	Air pressure practice	Philosophy
	6	Mathematics	Microcomputer technical practice	Physics	Air pressure practice	Philosophy
	7	Oil-pressure practice	Occupation drafting	Chemistry	Selection	
	8	Oil-pressure practice	Occupation drafting	Chemistry	Selection	
	9	Oil-pressure practice	Biology and sanitary	Biology and sanitary	Foreign language	
	10	Oil-pressure practice	Biology and sanitary	Religion culture and ethics	Foreign language	
	11	Morality				
	12					
	Hour	Monday	Tuesday	Wednesday	Thursday	Friday
12th year student	1	Oil-pressure practice l	CAD practice	Foreign language	Automatic control practice	
	2	Oil-pressure practice	CAD practice	Foreign language		Automatic control practice
	3	PLC servo technical practice	PLC servo technical practice	Chemistry		Automatic control practice

12th year student	4	PLC, servo technical practice	PLC, servo technical practice	Chemistry		Automatic control practice
	5	PLC, servo technical practice	PLC, servo technical practice	Physics	Foreign language	Automatic control practice
	6	PLC, servo technical practice	PLC, servo technical practice	Physics	Foreign language	Automatic control practice
	7	Microcomputer technical practice	Geometry	Mathematics	Microcomputer technical practice	Automatic control practice
	8	Microcomputer technical practice	Geometry	Mathematics	Microcomputer technical practice	Automatic control practice
	9	Microcomputer technical practice	Mathematics	Geometry	Microcomputer technical practice	Automatic control practice
	10	Microcomputer technical practice	Course guidance		Microcomputer technical practice	Automatic control practice
	11				Morality	
	12					

(2) Outline of Project Implementation School (the Izmir Mazhar Zorlu Anatolian Technical High School)

The outlines of two schools i.e., the Izmir Mazhar Zorlu and the Izmir Konya where the project implementation is planned are as follows.

1) General Condition

The school was established by the contribution of Mazhar Zorlu holding company in 1998, which manages widely the plastics-related enterprise in Izmir area which is the large industrial zone in western part of Turkey. The management is transferred after establishment to the Ministry of National Education, and it is managed under the control of the Ministry. The management of the school foundation is under Mazhar Zorlu holding company, and the establisher considerably affects the school The school scale is as follows.

Table 3.6 Scale of Izmir Mazhar Zorlu Anatolian Technical High School

Item	Scale etc.
1. Area	21,000 m^2
2. Management Building	493 m^2
3. Lecture Building	2,686 m^2
4. Number of Classrooms	25
5. Number of Laboratories	6
6. Number of workshops	2 (2,421 m^2)
7. Present Number of Instructors - General Subject - Technical Subject	 12 19
8. Number of Students (Anatolian Technical High School) Department of Automatic Command	 24 students for every 1st and 2nd year; total 48 students are studying
(Plastics industrial profession high school) Department of Automatic Manipulation	Total 252 students in 1st an 2nd year are studying
9. Number of Maximum Accommodation Students	650

2) Relation between the Existing Department and Industrial Automation Technologies department

There is an industrial automation technologies department already in the Izumir Atatuk Anatolian Technical High School by cooperation of Germany. It will be transferred to the Mazhar Zorlu School from balance such as institution space.

About the industrial automation technologies department, a part of the curriculum that is to be prepared by Japanese side has already been provided. Therefore, it is

necessary to examine the adjustment between the existing department and that would be opened through the project. The reaction of Turkey side, however, has not reached to the conclusion whether the department would be unified into the department of Japan or would be set in parallel.

3) Maintenance Situations, such as Building and Institution

a) Building

The space for installing the equipment of practical exercise is enough secured in 1st, 2nd and 3rd floor of lecture building, and lighting is well arranged. About electric capacity, there is no drawing and it has not confirmed.

When implementation of this project is determined, and spaces run short at the above-mentioned exercise room, a partition will be furnished in the passage of exercise room of the lecture building (1-3 floor). The approval of the school principal was obtainedthat in case of shortage of space.

For large-sized heavy equipment, there is sufficient space in the practice factory of another building. It is regarded as satisfactory in respect of carrying in, though a setting partition will be needed. Also about a specialist's room, there was a reply that it is ready enough.

If there is furthermore a demand from Japan side, a positive posture is presented to the construction of the building for practice.

(Those mentioned above is the information at the time of short-term study, and later through the exchange consultation of several times at the time of visiting the school and after homecoming adjustment. As to the reconstruction of school building, layout of classroom (workshop), and power source, all are confirmed satisfactory.)

b) Facilities

The equipment for practice currently installed in the plastics departmentis those used at plastics manufacture factory. It is a full automatic injection-molding machine, and it seems like a personnel training institution in a company rather than industrial education. The situation is not considered, even for the practical training, which the education is performed under a systematic plan.

Since there is electric power failure frequently, non-failure power facility is required to be installed for the equipment of computer related instrument.

c) Others

It seems that there is no teacher in the department who understands English,

however, there are few young teachers of English in the school, and a large portion of data of the school were proposed to the study team after translated into English by them. (In addition, about language study, there was a purport that the intensive training in English for the C/P allocated by the Ministry of National Education was ready.)

Izumir is the third city of Turkey and the acquisition of electric and electronic parts seems to be easy, which are required for practice etc.

4) Budget

The for-the-year budget amount for the school in 1999 is as follows.

- Total Amount : 70,986,138,000 Turkish lire (about 13,190,000 Yen)
- Administrative Expenses :56,462,722,000 Turkish lire (about 10,490,000 Yen)
- Working Expenses :14,523,416,000 Turkish lire (about 2,700,000 Yen)

The budget allocation method for each school is based on facilities of the department, the number of students, the school budget of the previous year, and school scales (a building, a workshop, a laboratory, personnel residence for staffs, etc.) and the items that the Ministry of Finance specifies. An additional budget measure is also made to the school to which the bilateral project is performed. The Education Bureau of each state is not involved at all about this budget distribution.

(3) Outline of Project Implementation School (Konya Adil Karaagac Anatolian Technical High school)

1) General condition

It was established in suburbs of Konya in 1999. The place is in the center of Turkey, and is hurried industrialization area. The building of the school was constructed by Adil Karaagac holding company, which is the chemical and drug manufacture, and the management was immediatelytransferred to the Ministry of National Education. The school foundation's establishment is under preparation in order to obtain support smoothly from the local industries.

The school scale is as follows.

Table 3.7 Scale of Konya Adil Karaagac Anatolian Technical High School

Item	Scale etc.
1. Space Area	59,000 m^2
2. Management Building	- m^2
3. Lecture Building	- m^2
4. Number of Classrooms	24
5. Number of Laboratories	5
6. Number of workshops	1
7. Present Number of Instructors - General Subject - Technical Subject	 4 4
8. Number of Students (Anatolian TechnicalHigh School) Department of Chemistry Department of Electrical Machinery& Electronics Department of Computer	3 Departments:72 Prep. Grade students are studying (24 persons x 3 departments)
9. Number of Maximum AccommodationStudents	750

2) Maintenance Situations of Building and Institution

a) Building

Although the inside of a school building is arranged functionally, the space of an exercise room is very narrow. The construction in part will be required for installation of large sized equipment. However, especially the installation about electronic system practice equipment and PLC basic training equipment is satisfactory. When this project is carried out, installation of heavy equipment to the school will be impossible, because the training room being the second floor. When daring to install in the present building, a student dining room of the first floor have to be rebuilt.

(These above mentioned are the information on a short-term study. As for the classroom (exercise room) layout, power source, etc., it was adjusted and confirmed in satisfactory at the time of the visit to the school for implementation study.)

b) Institution

Although an introduction of the fundamental equipment for electric related exercise has started by the school, the quantity and quality seems to be short.

c) Others

The electricity and computer engineering departments are already opened, and the establishment of the industrial automation technologies department will be

appropriate in the relation with other departments of two.

Two companies of Internet providers are in Konya area, and the use of the Internet is possible, but a digital circuit will be furnished around the autumn of 2000.

The teachers of electricity and a computer related subjects are young, and very enthusiastic. On the other hand, there are few teachers in the school who are in excellent with English, and it is predicted that the situation may become a hindrance on an exchange with a specialist.

In the case that the subject of machine, machining of NC related equipment for exercise are introduced, an adjustment is required for the vocational training center which has been already established by the chamber of commerce under the cooperation with Germany. It is considered that the overlapping of the department of the school with the course of the center should be avoided.

3) Budget

The for-the-year budget for the school in 1999 is as follows.

- Total Amount :21,552,312,000 Turkish lire (about 4 Million Yen)
- Administrative Expenses :10,953,747,000 Turkish lire (about 2,030,000 Yen)
- Working Expenses :10,598,565,000 Turkish lire (about 1,970,000 Yen)

3.3 Relations with Japan's Aid Policy

Our country (JICA), is required to help effectively and efficiently to an important subject for Turkey, considering the ownership by Turkey side, since Turkey achieved the economic growth that reached the middle level of middle-income economies.

In the 7th 5-Year Development Plan (1996-2000) of Turkey, current law system and administrative and financial system are improved so that the merit by the Customs Union with EU can be enjoyed to the maximum extent, and structural reform is promoted. While the market environment that meets international competition is improved, the talented personnel who supports the industrialization has to be trained. It makes to promote the introduction and development of the newest technology into importance.

Thus, the main theme of the 7th 5-year plan is reforming many systems in present, and following five fields are referred to as the main structural reform:
1) Human-resources development, 2) Industrial development and internationalization, 3) Improvement in economy efficiency 4) Correction of unbalance among areas, and 5) Recovery and preservation of environment.

To such Turkey's required fields of development, as a guideline which contributes to the effective and efficient cooperation implementation, our country proposed following four fields as main cooperation points on the project confirmation study (policy discussion) in March, 1997. Those were confirmed by both countries. The same assistance important fields were reconfirmed also in the policy discussions in September 1998.

a) Environmental improvement
b) Promotion of the personnel training for economic and social development
c) Improvement of the basic life fields such as agriculture, fishing, health and medical treatment, etc. for correcting gaps among areas
d) Support of South－South cooperation

The object of this project corresponds to 2) "Industrial Development and Internationalization" among the five fields mentioned above. Our country pointed out b) "The Promotion of Personnel Training for Economic and Social Development" as the most important problem for achieving the purpose. The training of the mid-level technician for corresponding to an advancement (i.e. automatic control) of industry is carried out through the technical cooperation project system to a vocational education field. Accompanied by the predominance of our country's technology in this field, the cooperation of our country is extremely important.

The above is the meaning on the cooperation strategy of our country (JICA). The concrete relation between our country and Turkey, where the above serves as the background of the strategy, is shown below.

(1) Bilateral Personal Exchange

Japanese government provided the urgent goods and grants-in-aid of 2 million dollars while we dispatched a rescue and medical team at the time of the Turkey great earthquake in August 1999. Also after that, a personal exchange, information exchange, etc. prospered to Turkey that is an earthquake frequently occurring country like our country. (Dispatched personnel such as a specialist of earthquake-proof study and a lifeline restoration specialist etc)

(2) Bilateral Diplomatic Relations

The diplomatic relations between our country and Turkey began from the Republic of Turkey's recognition on August 6, 1924, and the next year, both governments established the embassy in each other. Although diplomatic relation was temporarily stopped from January 1945. The Turkish embassy in Japan was reopened in 1952 (next year in Turkey, too), and in 1965 the Japan embassy in Istanbul was opened, which was promoted to the consulate general in 1972. Those have continued till now.

About an important person's visit traffic from 2000, as an outside guest Foreign Minister Cem in April, Deputy Prime Minister エルシュメル visited Japan in June for former Prime Minister Obuchi funeral attendance. Moreover, in order to attend the Tokyo Mosque opening ceremony, State Minister Unlu has visited Japan in the same month. The number of Japanese residents is 1,166 as of October 1999.

Four cities in our country (five cities in Turkish side) have connected the sister city relation with Turkey. Turkey and the Japanese Fund Culture Center opened in 1998.

(3) Bilateral Economical Relation

The current trade and investment situations among both Turkey and Japan are as Table 3.8. The exports from our country to Turkey are mainly a transportation machine (including auto parts) and an industrial machine. A sharp reduction of the amount of export to Turkey in 1999 was influenced from the domestic economy that suited the decelerating trend from one year before the time according to the earthquake occurred in the August. The main imports from Turkey occupy the weight with food (processed tomato), fish and shellfishes, tobacco, etc., and also they have a mineral product etc. The large elongation of the amount of investment in 1997 is based on

advance of a tire maker.

The Japanese manufacturing industries which have advanced to Turkey are 12 companies (company of 10% or more of the Japan side investment) in December, 1999, and as a type of industry, seven companies are in a transport machine and its related field and others are the companies in the field of seeds-and-saplings rearing, food processing, and the fastener for garments.

The total capital of the advanced Japanese manufacturing industry is about 147,990,000 dollars, and the average is 16,440,000 dollars per company. It can be said that an investment scale is small as comparedto the amount of single company average of the Western advanced company of 21,260,000 dollars.

It can also be said that the marketability which has 62 million population, and a geographical advantage called the node of Asia and Europe are still very attractive as well as the investment environment as a production base within the sphere of EU, if domestic politics and economy are stabilized and the affiliation to EU will be in prospect in the future, while there are few chances that the trade and direct investment from our country will increase abruptly at present.

Table 3.8 Trade/Investment Situation between Japan and Turkey

(unit: million dollars)

	1996	1997	1998	1999
Export to Turkey (track, auto parts, etc.)	1,117	1,756	1,660	902
Import from Turkey (food and raw materials)	238	169	142	160
Direct investment to Turkey (approval base)	21	127	17.5	13.7*

Source: data of JETRO / Note: The amount of direct investment is an actual result by January to August 1999.

(4) Cooperation in a related field

As described in 2.4, our country aimed at expanding of the vocational technical education of Turkey in response to the Turkey government's request in 1987. A technical cooperation of " Tuzula Technical and Vocational High School " was implemented. Then, a short-term specialist for the aftercare of this project was dispatched from January 1997 to March. According to the request about an applied technology and new technology, a short-term specialist was dispatched from February 1999 to March.

By this project, many textbooks were prepared by the Japanese specialists and

Turkish side C/P, which are useful to the vocational education and training in Turkey. From a view point that if Tuzula school is based on the fact which serves as the present as-a-leader position in the educational field of Turkey with high technical level this project can be evaluated the success example that brought a great achievement to the exchange between our country and the Republic of Turkey.

4. Project Strategy

4.1 Project Strategy

(1) Scope of cooperation

As described from Chapter 1 to Chapter 3, for the industrial promotion which is the priority problem to develop the Republic of Turkey, it was confirmed that the project objective is to finally achieve the training of mid-level technicians in the field of automatic control, who can contribute to the modernization of industry.

For this achievement, the implementation of the project was determined, selecting Anatolian Technical High School as the object, which seemed the most suitable for the training of the mid-level technicians among organizations related to the personnel training. However, from the viewpoint of scale of the objective which should be achieved, it seems to be impossible to achieve within the 5-year project cooperation. Then, the whole project activities are divided into two stages, and it was agreed that our country's cooperation would be implementedfor the first stage.

- The first stage: Establishment of the training system of mid-level technician in the field of automatic control, at the selected school among Anatolian Technical High Schools.
- The second stage: Spread the system established

Here, it is necessary to be implemented on the assumption that the second stage is to be implemented, because it is not appropriate, from the point of costperformance of the project, to implement the first stage only. The technology must be spread besides the object school. In a word, the activity which is for the preparation of the spread will be included in the first stage our country's cooperation, although the second stage is to be basically implemented by the Turkish government.

(2) Field of cooperation

The industrial automation technology can be roughly divided into two groups; one is automatic control technology applied to the machinery, and the other is automatic control of the manufacturing process. In this project, though the name of the department newly set up in Anatolian technical high school is called as "Industrial Automation Technologies Department", two sub-departments are provided which are; ① "Information Electronics" which is for the automatic control technology applied to machinery, and② "Information Machinery" which is for the automatic control of manufacturing process. Both of these meet the needs of electronic control (automatic

control by the computer) in recent years. This differs from the industrial automation technologies department of German type. For, in case of the German type, it aims at the automatic control of manufacturing process of the above ②, and puts focus on the hydraulic and the air pressure control rather than the electronic control.

As a future image of the personnel trained, they will be divided into two kinds that the former becomes a staff in a product planning section and the latter becomes the mid-level technician or manager in charge of the control at a factory control section.

(3) Project Site and the Function

Izmir Mazhar Zorlu Anatolian Technical High School and Konya Adil Karaagac Anatolian Technical High School are selected as the project site among 157 Anatolian technical high schools in the whole country, considering the degree of industrialization, needs of the industries and the installation balance of existing departments. The role of these two schools is; Izmir school as a base school and Konya school as the spread school. Konya School is positioned as a model of the spread school to which the established course will betransferred from the base school. This is to make a model for the case in future that the same industrial automation technologies department is opened in other Anatolian Technical high school of other industrial cities. To put it concretely, the information electronics department, one of two departments to be opened in Izmir school, will be also established in Konya school. "Communication Network" technology, which is one of the core technologies, will be used so effectively that the department can be managed by utilizing the various data information, opened on the home page digitized in Izmir school, which includes a public textbook, teaching material, guidance book and other instruction method etc. As a result, by sharing the same teaching materials developed in the base school, it will be possible to make an efficient and effective education system in other schools in the future. Furthermore, it enables the practice effectively to make communication between remote places (a control of factory by a remote computer for example) by locating two schools, which is indispensable for the information society.

Izmir is the third biggest city in Turkey where enterprises have developed further than Konya, and is convenient for the practice in enterprise etc. because of the development of surrounding industries. From these reasons, Izmir school was selected as the base school. Also, from the viewpoint described in Chapter 3 where the capacity of school facilities isreferred, Izmir can be the preferable location.

(4) Necessary Consideration for Establishing the System

It is necessary to consider the two directions on both education and industrial sides, in order to establish a training system for mid-level technicians in the field of automatic control technology, in Anatolian Technical High School. The Ministry of National Education directly supervise any of the education relations, such as a new curriculum, making a syllabus based on the curriculum, preparing a teaching material which becomes a teacher's guidance book or a students' text book, provision of equipment and its usage, and teachers' training about an instruction know-how including all of these. The new industrial automation technologies department can be established by taking such a series of measures.

For the industrial side, it is planed to organize the activities which always can obtain feedback from the industries, verifyingthe needs, during the teaching material preparing and even after the material's completion, after a study whether the developed teaching material and other content related to the industrial automation department would meet the needs of the industries. Furthermore, it is scheduled that the digitized information, edited through the training, will be opened, and also that a publicity work and a spreading activity will be performed by having æseminar.

It is expected to raise the efficiency and effectiveness in ensuring the employment of graduate by combining the education with the industrial fields, which often becomes a problem in case of our country's cooperation with any of the human-resource development organization.

(5) Availability of Necessary Human Resources of Japanese side

Prior to the implementation of this project, the personnel in the specific field to be input at the present stage is a long-term expert in the four fields of product design, network system design, automatic production technology and FA system technology. Excellent teachers in this field are in great demand even in Japan, because the technology is remarkably progressing, in the local technical high school which promotes to educate the personnel who can support the industrialization of Japan. There are few teachers in the industrial field, who can transfer the technology in English. However, it makes sure that it is possible to allocate the required personnel of our country because the cooperation and support from the Ministry of Education and Science are very strong with regards to the international cooperation in the automatic control field, where Japan has priority over it.

4.2 Implementation Arrangements

(1) Capacity of the Counter Part Organization

a) Appropriateness of the C/P Organization

The Directorate of Technical and Vocational Education, the Ministry of National Education, is responsible for all the vocational education of training a skilled worker.

The project sites where the experts reside will be Izmir Mazhar Zorlu Anatolian Technical High School. Anatolian Technical High School is supervised directly by the Directorate of Technical and Vocational Education, the Ministry of National Education. Then, the Ministry is responsible for the budget measures for the implementationof the project and the C/P allocation, as for the establishment of the new industrial automation technologies department.

Approvals, such as for a new curriculum, by other related organization (Board of Education) are required though, it is expressed that the Ministry will take responsibility for all the procedures and it can be considered appropriate as the C/P organization.

After the project starts, it is necessary to maintain a close contact and cooperation with the Ministry and Anatolian Technical High School of the project site.

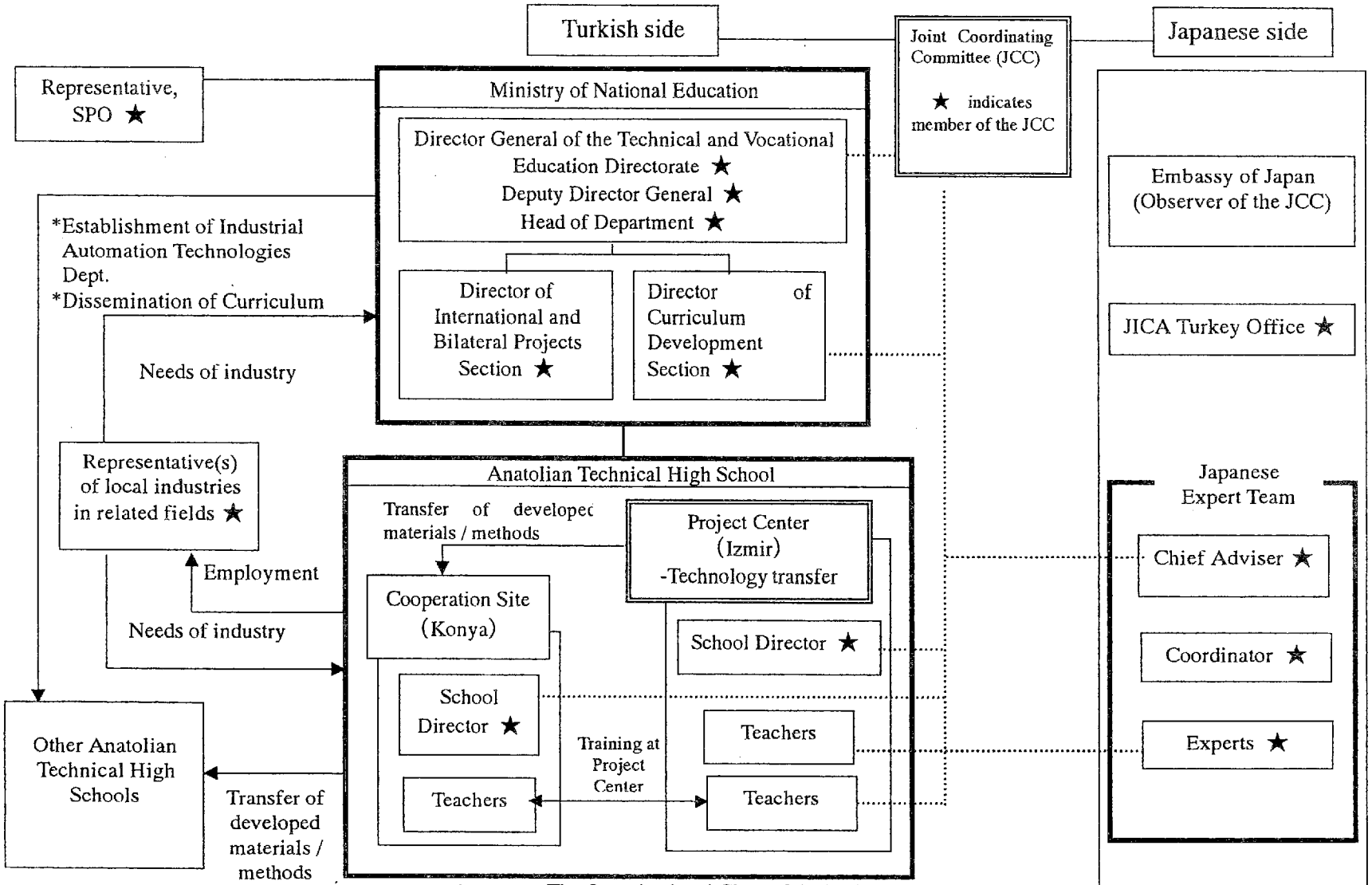
b) Budget Allocation

With regard to the budget of the Ministry of National Education of ten years from 1991 to 2000, the share among the national total budget has a tendency of decrease year by year from 14.2% in 1991 to 7.17% in 2000. Moreover, the budget share on the vocational and technical education among the Ministry's budget has decreased from 6.12% in 1991 to 4.97% in 2000; so severe is the budget situation.

With regard to the idea of "Secure the necessary funds" as a subject to the implementation of the project, proposed by JICA, the Directorate of Technical and Vocational Education confirmed to arrange, by the Turkish side, all such as the schoolhouse remodeling at project site, classroom (practice room) layout, power source, English education for teachers, etc. It is necessary to secure the actual funds continually even after the project starts.

c) Institutional Arrangements

Figure 2.3(2-13 pages) shows the chart of organization of the Ministry of National Education which is related to the project. The chart of management control organization including both Izmir school and Konya school is shown inFigure 4.1



Figuar.4.1 The Organizational Chart of the Project

d) Management Ability of the Organization

As for the C/P organization of this project as described in part f) in below, the management ability of the organization is sufficient, because the similar project was implemented in the past. Moreover, during the period of study of this project, it took an initiative in the formation of the project.

However, it is necessary to pay attention at the implementation stage because it is assumed that the school principal and teachers are not accustomed to the cooperation with JICA.

e) Counter Part Allocation

It is confirmed, at the time of the implementation study, that 13 personnel to Izmir school and 5 to Konya school will be allocated as teachers to whom the technology is transferred directly. An interview was carried out, during the study, with teachers about the situation at that time. They have quite a high level of technology so that the project will be furnished with a good C/P allocation in quality and quantity.

f) Past Achievements

The past achievements of the Directorate of Technical and Vocational Education, the Ministry of National Education, to have accepted the similar project are as follows. The details are described in the above section 2.4:

Table 4.1 Similar project which Turkish side has accepted in the past

Donor	Project
Japan	Turkey Tuzula Technical and Vocational High School Project (1987) Aftercare study (1997 and 1999)
World Bank	Technical school project (1985-92)
World Bank	Non-formal vocational training project (1987-)
Germany	Turkey-German vocational training center project
Germany	Anatolian technical high school Industrial automation department project
Germany	The Ankara ボラトリ vocational high school project
France	The Istanbul カギタン・プロフィロ Anatolian Technical High School Project

Source: Data of Ministry of National Education

(2) Implementation Structure

The Directorate of Technical and Vocational Education, Ministry of National Education, will be responsible for all the implementation of the project, as a project

director of the Turkish side. The principal of the base school (Izmir Mazhar Zorlu school) will be responsible for the project management, as a project manager.

It is scheduled to establish a joint arrangement committee, in which the Directorate of Technical and Vocational Education, the Ministry of National Education, will be a chairman, aiming at a smooth and effective project implementation. The committee will be held at least once a year or when required. The attendance to the Committee, from industries related to the State Planning Committee, ensures the project implementation by the Ministry.

From the Japanese side, the JICA Turkey office will support the project, by arranging various kinds of coordination with the Ministry of National Education. Figure 4.1 shows the implementation structure.

4.3 Coordination Arrangements

This project is implemented based on a technical accumulation built up in the past, such as the Japanese cooperation to Tuzula Technical and Vocational High School, as well as the German cooperation to establish an industrial automation technologies department. It is necessary to utilize the basic part of the curriculum in these existing technologies, so that the curriculums of 4 years can be transferred, by means of technology cooperation, in a 5-year project. It is expected to improve the efficiency of the project by the use of the results, even without any cooperation and direct relation with those.

With regard to the establishment of the industrial automation technologies department and the transfer of the technology, which are the primary objective of the project, it is expected to reinforce the coordination arrangements by an information exchange with a private company and training in enterprise etc., because the needs from the industries are also immense.

4.4 Sustainability

(1) Institutionalization

This project aims, as a project objective, to establish a new spreading model of the education system for the training of mid-level technicians who meet the needs of the industries, in the field of automatic control technology. It is implemented at Izmir and Konya Anatolian technical high schools. As a project overall goal, it further aims that the newly developed education system in automatic control field will be transferred to other Anatolian technical high schools than these 2 high schools.

As a strategy for it, it is scheduled to open and send it to the other high schools and

the industrial field through an Internet, after digitizing the information such as a new curriculum which is transferred to the schools of the project site, a newly developed study material, teaching materials, training system for teachers (including a instruction know-how) etc. Meanwhile, seminars for both the high school and the enterprise will be held in order to spread the new education system. Moreover, in order to spread the new education system widely to the other schools, the Directorate of Technical and Vocational Education, the Ministry of National Education, expressed that the C/Ps in both schools will be allocated as an expert in this field of technology in Turkey after the completion of the project.

In addition, a monitoring and an evaluation system will be established, as a part of the project activities, for the evaluation at the middle, completion and afterward of the project.

According to the activities mentioned above, this project is provided with not only the appropriate institutionalization in associate with the project site schools, but also the sufficient sustainability to achieve the overall goal.

(2) Factor to Secure the Sustainability

a) Strategic Framework in Host Country and the Priority

The 7th 5-year plan, as a National Strategy in Turkey, clearly directed about the progress of industrialization and the establishment of education. The introduction of the new education system in the field of automatic control technology to Anatolian Technical High School of the whole country, which is an overall goal of the project, is to bring the talented mid-level technicians to the industries. From this viewpoint, the national strategy and the overall goal of the project are coincided with each other in the direction, so that the sustainability can be kept even after the project completion as far as any special situations would not arise in the country in future.

b) Organization Management

Ministry of National Education, the C/P organization of this project mentioned above, is responsible for the whole education (including the vocational education and training), with a strong leadership and capability of the organization management. From the viewpoint of the participation of local power in two areas where the project site schools locate, positive cooperation can be expected from the study result, because of the high needs for engineers who would be brought from the technology transfer in the automatic control field.

c) Budget Background

The budget allocation to the project site schools at present, as described in the above 4.2 1)-b), remains some unstable factors in the future. Therefore, it is necessary to observe not to obstruct the sustainability.

d) Technical Consideration

The content of the technology transferred in this project, which is partly described about the curriculum (draft) in Annex 8.2, is appropriate in corresponding to the Turkish society.

However, as for the plan of the Internet application as a measure to spread the education system, which is the overall goal of the project, it is necessary to pay efforts to build up an infrastructure such as the extension of the domestic telephone line and the improvement of accessing situation.

e) Social Consideration

No negative impact is expected by the project implementation. Any special consideration is not required.

f) Environmental Consideration

No negative impact is expected by the project implementation. Any special consideration is not required.

(3) Commitments from Turkish side

Since the commitments during the project period are sufficiently made by Turkish side, the C/P organization and the Turkish government, no special problem would be expected. From the viewpoint of the sustainability, the key factor is how the Turkish government and the C/P organization would take initiative to spread the established training system for mid-level technicians in automatic control field after the project completion. That is the stage, positioned as the second phase in the project strategy. This point can be evaluated by the indications of PDM, which is the number ofnewly established industrial automation technologies department ofAnatolian technical high school, as well as the number of the subject to be operated. As described about the overall goal in section 5.1, however, no commitment has been made with a specific figure at this moment. The Ministry of National Education plans toestablish the same department in other industrial cities at the time that the technical cooperation would be evaluated successful by the industries etc. Therefore, the actual expansion can be surely

expected, judging from the spreading procedures of the existing industrial automation technologies department (spreading to other 6 schools after the establishment of the department management in Istanbul Haydarpasa Anatolian Technical High School). The detailed planning will be an important theme in the future.

4.5 Special Consideration

No negative impact would be expected by the project implementation, on the issues such as of the Environment, Population, AIDS and Gender. Any specialconsideration is not required.

5. Project Design

For the project design, the following framework of the project cooperation was planed, based on the PDM (Project Design Matrix/refer to the separate material 8.1) prepared in the PCM workshop, considering the possible range of the technological cooperation from Japanese side.

5.1 Overall Goal

(1) Project Ultimate Goal

"To fill the demand for mid-level technicians and engineers in the industrial automation technology field in the Republic of Turkey"

(2) Project Overall Goal

"To introduce a new educational system for industrial automation technology for other Anatolian Technical High Schools."

Originally, the " Ultimate goal" was regarded to be an overall goal. However, the scale of the goal was judged too large to be achieved within several years after the project completion. Then, the overall goal was modified to that of being surely achieved within the period. Generally, the overall goal is defined with indicators of a specific figure for it, considering the capacity of the C/P organization from the sustainability viewpoint.

Since there were some uncertain factors such as a budget allocation, however, it has not been provided. It is necessary to set clear indicators with specific figures, at the interim evaluation where the future image of the project becomes clearer to some extend.

The ultimate goal can be achieved if the needs of the enterprise, as an external condition, for the engineers in the automatic control field would exist consistently, upon the achievement of the overall goal.

5.2 Project Objective, Outputs, Activities

(1) Project Purpose

"To establish a new educational system as an extension model in the Izmir and Konya Anatolian Technical High Schools in order to train mid-level technicians that will meet the requirements of industries utilizing automation technology,"

The objectively verifiable indicators to measure the achievement of the project

purpose are set as the following 1) to 5). However, it has not been figured since the past graduates of the industrial automation technologies department have not been traced, and there is no data about the enrolled students. The indicators will be figured within a year upon the project start, collecting the related information through the project activities. As the relation with the goal, it is to be verified in terms of; 1) and 2) with the justification of the industrial needs, 3) and 5) with the evaluation by students and education world, and 4) with the evaluation by teachers.

1) Ratio of students finding employment in industries using automation technology against the overall number of students finding employment.
2) Degree of satisfaction enterprises have for the capabilities of graduates
3) Number of applicants to Izmir Mazhar Zorlu and Konya Adil Karaagac Anatolian Technical High Schools
4) Proportion of Anatolian Technical High School teachers that understand the new educational system.
5) Entrance examination scores of successfull applicants to both schools

The inportant assumptions are listed as follows. The project will reach to the overall goal, if these are satisfied upon the achievement of the project purpose.

1) The needs of enterprises for technicians trained in automation technology do not change significantly.
2) The project continues to receive the support of the Ministry of National Education.
3) Teachers that have received training do not enter private employment.
4) Continuous funding of the project is secured.

(2) Outputs

It is expected that the items listed below from 1) to 8) will be satisfied in order to achieve the goal objectives.

1) Development of an innovative curriculum
2) Development of suitable learning materials
3) Development of suitable teaching materials
4) Establishment of a training system for teachers (including teaching method) and improvement of teachers' capabilities
5) Introduction of suitable equipment to meet the requirements of industry
6) Proper operation and maintenance of equipment mentioned above
7) Outputs 1) – 6) above are disseminated to the public, other schools and industries

via the Internet

8) Establishment of a new system for industrial automation technologies department in Anatolian Technical High Schools that meets the needs of industry, and creation of an extension system

The indicators, which measures each achievement, has not been figured, since it will be determined in conjunction with a detailed plan of the project implementation. It is scheduled that a monitoring system is prepared to set a figured indicators within half a year after the project start. The current situation of setting the indicators, and the subject to fix the indicators in the future are listed as follows.

1) First of all, it is necessary to specify thetime when; the curriculum which is the base of the newly established department, and the syllabus based on it are developed, and also approved by the Board of Education. The confirmation is required whether the curriculum meets the needs of the related industries.
2) It is necessary to specify the time when the study material (study material/textbook) of each school year is prepared.
3) It is necessary to specify the time when the teaching material (experiment guidance book, teaching guidelines and demonstration model) of each school year is developed.
4) It is necessary to provide the evaluation method, preparing a monitor system in order to measure the teacher's training (content of teaching subject, teaching method and management of the department).
5) It is necessary to confirm whether the equipment, to be provided, meets the needs of industry, and to specify the time for the installation.
6) It is necessary to prepare a monitoring to confirm how teachers use the equipment and how they master the operation, and to determine the evaluation system. Also, it is necessary to specify anappropriate value for the equipment operation rate and provide a recording system for it. In addition, it is necessary to make a recording system whether the equipment operation rate is not proper due to the shortage of spare parts or expenditure supplies.
7) It is necessary to digitize as much information as possible, aiming at the digitization rate 100% and the open rate 100% (or certain appropriate rate if not available), and to prepare a recording system for it.
8) On considering the sustainability of the project, the indicators are the most important item. The indicators are to be set with an assumption that; first of all,

the Ministry of National Education would express clearly to adopt the system, and the check will be made once a year in respect to the performance such as the seminar for the other schools and enterprises, the number of teachers who are given the teaching instruction, the selection of the school where the new education system is applied and whether the needs ofenterprises are fulfilled

The project objective is achieved if the indicators could evaluate the achievement clear, and if the external condition, that "the needs of enterprises in the field of the industrial automation technology, which were summarized in the needs study, will not greatly change" would be satisfied.

(3) Activity

The activities are listed below; 1-1 and 1-2 correspond to the out put 1) and 2-1 and 2-2 correspond to the output 2) respectively.

1) An innovative curriculum is developed.
1-1. Formulation of curriculum
1-2. Drawing up of a Syllabus based on the curriculum
2) Suitable materials are developed.
2-1. Production of learning materials (for practice)
2-2. Production of textbooks
3) Suitable teaching materials are developed.
3-1. Production of teachers' manuals for practice
3-2. Drawing up of a teaching guidancefor training
3-3. Drawing up of a demonstration model
3-4. Implementation of a model lesson by experts
4) Training system for teachers (including teaching methods) is established and the teachers' capabilities are improved
4-1. Development of teacher's training materials
4-2. Technology transfer related to training methods
4-3. Implementation of the teacher's training, using learning and teaching materials produced under 2. and 3 above
5) Suitable equipment to meet the requirements of industry is introduced
5-1. Drawing up of a list of training equipment
5-2. Procurement of equipment
6) Skills for the use of equipment and the maintenance are mastered, and the equipment is maintained properly.

6-1. Technology transfer related to the correct use of equipment

6-2. Implementation of training on the maintenance of equipment

6-3. Formulation of a plan for acquiring e necessary spare parts

7) Outputs 1) to 6) above are disseminated to the public, other schools and industries via the Internet

7-1. Establishment of a Database of information resulting from items 1) to 6).

7-2. Extension of the information to the public via the Internet and establishment of a management system

8) The industrial automation technologies department, that meet the needs of industry, is established in Anatolian Technical High Schools and the extension system is created.

8-1. Understanding of the automation technology needs of industry

8-2. Work to gain certification from the Turkish Ministry of National Education for the new education system

8-3. Implementation of seminars for other schools aimed at extending the new education system

8-4. Implementation of seminars for enterprises aimed at introducing the new education system

8-5. Implementation of the teachers' training courses for instruction of specific subjects

8-6. Support in selection of schools to implement the new education system

8-7. Support for the career guidance /job placement system

8-8. Strengthening of the network with industry

(4) Relation between the outputs and activity

The relation between the out puts and the activity is as shown in Figure5.1.

Actions for the out puts 8 is not to be implemented, later than all the actions correspond to the out puts from 2 to 7 is completed. It can be implemented according to the project progress (e.g. completion of the teaching material of each school year, which is to be digitized).

5.3 Project Objective other than the above

Nothing especially.

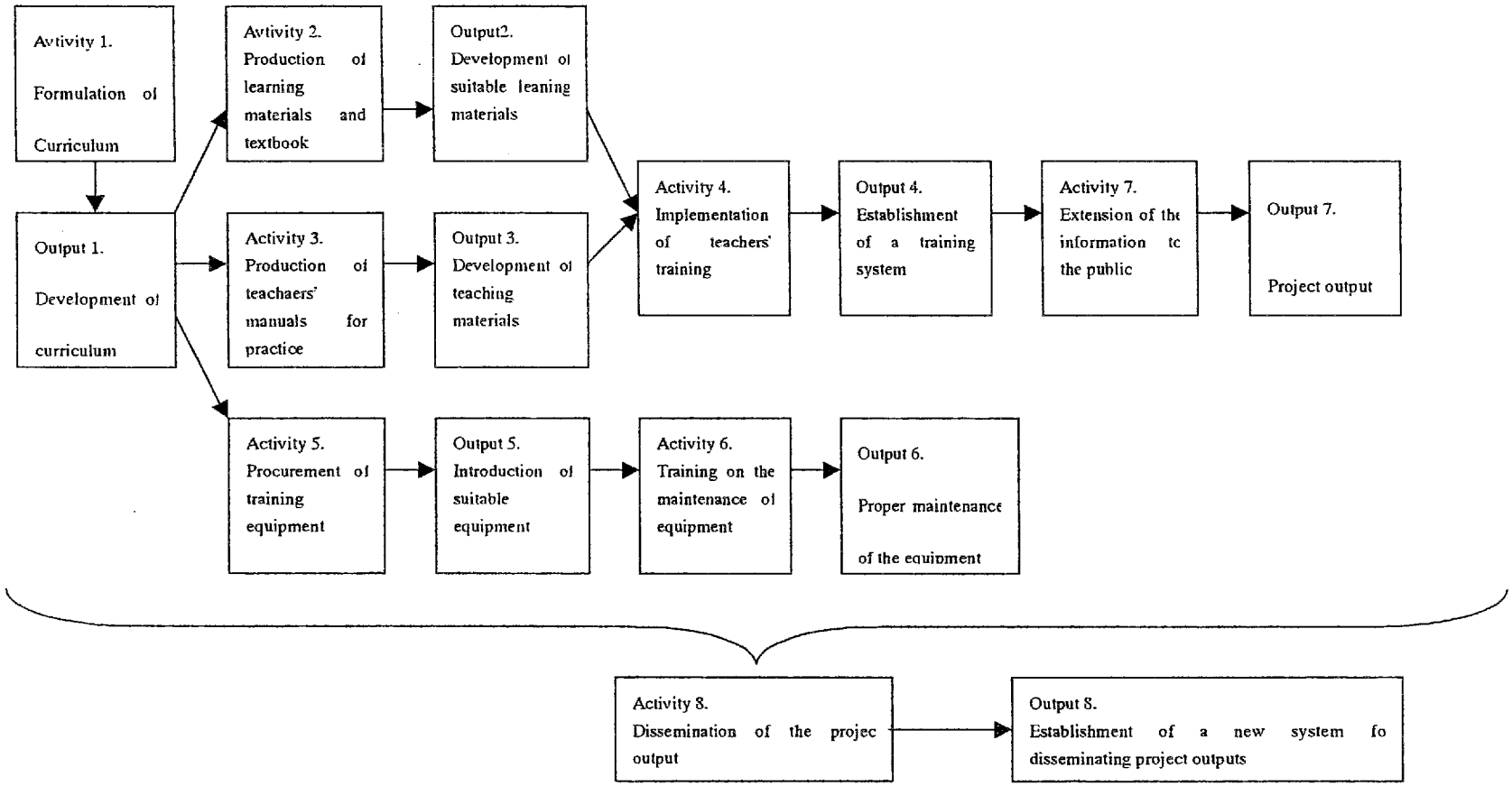


Figure 5.1 Relation between output and activity

5.4 Inputs

(1) Input

1) Japanese Side

①Long-term Experts: 6 persons

Chief adviser, General affair, Information electronics: 2 persons (Product design, Network design), Information machinery : 2 persons (Automatic production, FA system)

②Short-term experts : 4 persons/year (Microcomputer, CAD etc.)

③Provision of equipment (Personal computer, Machining center, Robot etc.)

(Refer to a reference material concerning the item, quantity and amount etc. of the equipment provided.)

④Training in Japan: 3 to 4 persons per year (Information electronics, Information machinery)

2) Turkish Side

①Assignment of personnel

- Izumir: Information Electronics: 7 persons
  Information Machinery: 6 persons
- Konya: Information Electronics: 5 persons

②Buildings and facilities

(Office, Classroom, Library, Warehouse etc.)

③Furniture and consumable materials

④Budget allocation for project management (running cost)

5.5 Important Assumption and Risk Analysis

(1) Important Assumption

The external condition mentioned above is divided into four parts. The possibility of each condition is as follows.

①Needs of Enterprise

Judging from the economic situation and the State Development Plan described above, the possibility which the needs of enterprise in this field last continuously is quite high.

②Support by the Ministry of National Education

An entire support (personnel, hardware, and budget) was expressed and the continuity can be expected.

③Outflow of teachers to the private employment

The issue is referred in Chapter 3 as one of the problems related to the existing industrial automation technologies department. On the other hand, however, some teachers, among teachers who are interviewed during the short-term study, resigned from private companies, because they took the teaching job seriously. It is extremely important to keep the teachers who receive a technology transfer in the project, and it is necessary to request continuously the effort of the Ministry of National Education.

④Communication infrastructure

A communication infrastructure has been building up and the computers have been spreading remarkably in Turkey. It can be expected that the communication infrastructure will be further established.

(2) Risk analysis

①A future change of the foreign currency introduction into Turkey or the export may effect on the needs for the mid-level technicians in manufacturing, depending on the economic situation of Turkey and the international economy situation. From the viewpoint of industrialization, it seems that the needs will not lost at all but it is necessary to grasp the needs and exchange the information with the industries, because it is impossible to precisely forecast the change of international economy.

②The situation mentioned above may effect on the expansion of the industrial automatic technology department in the field of the vocational education.

③The Directorate of Technical and Vocational Education, the Ministry of National Education, expressed the priority inputs of the resources into the project. However, some unexpected situation (the earthquake or other) may effect on the objective achievement, for example, in case of the budget shortage.

5.6 Pre-conditions and prerequisites

As shown in the Minutes of the implementation study, the Turkish side will assign 9 persons at the start of the project, 13 persons in Izumir school and 5 persons in Konya school; totally 18 persons of C/P in 2004. Assignment plan is shown in Table 5.1

Table 5.1 Assignment plan

School	Sub-department	2001	2002	2003	2002	2005
IZMIR	Information Electronics	3	4	5	6	6
	Information Machinery	3	4	5	6	6
KONYA	Information Electronics	3	4	5	6	6
	Total	9	12	15	18	18

The budget arrangement shall be secured, at an appropriate time, for expenses such as the preparation of building and related facilities, project management (a running cost), household goods and expenditure supplies.

6. Project Justification

6.1 Public Benefit and Fairness ofthe Project

(1) Fairness

The groups who receive direct benefits by this project are the student who receives vocational education and trainingat the concerned school, and the private enterprise that accepts the graduate, as mentioned above.

Since the student who has received the primary school education (compulsory education) of the country has the propriety of entrance into the school, as for the concerned school upon determined in conformity with a fair entrance examination system. Therefore, the fairness to a student is secured. On the other hand, the graduate of the concerned school will not be placed to a specific company by force, and naturally it would be satisfactory to fairness if the benefit were followed by the result of employing the graduate of the concerned school.

However, in the initial stage of this project, in order that the concerned school may carry out only in a specific region called Izmir andKonya, only the student who enters the school and the private enterprise located around the school will receive benefit of " Industrial Automation Technologies " which our country transfers in precedence.

However, also in other Anatolian technical high schools, the establishment of the system that transfers the same technology is scheduled as the concerned school. And the fairness can be secured in the last stage of this project asthe project advances.

(2) Public Benefit

" Industrial Automation Technologies " transferred in this project becomes an aid which performs human developmentas a part of education; it gives the Turkey external economy effect with high public benefit

Moreover, although training in enterprises can be seen partly in present Turkey, the correspondence to the vocational education of " Automatic-control field " for the mid-level technician training, which does not remain in mere a maintenance operation, has not yet been prepared. It can be said that is one of the factors to the industrialization and the development of industry of future Turkey.

6.2 Appropriateness of Technology

In Turkey, the training of the mid-level technicianin the field ofindustrial automation technology is a pressing need as indicated in above Chapter 2to Chapter 3, and as in Annex 8.1PDM. The technology and the equipment, etc. which are transferred in this

project will be suitable and appropriate accordingly.
In addition, the curriculum (draft) to the concerned school is attached as in Annex 8.2 (2) as well as the equipments list as in Annex 8.7 as for the contents of the technology to be transferred.

6.3 Reasons for Assistance from JICA

Our country advocates " Technology State " and actually it has a high manufacturing technology in a global aspect Especially in the automatic control field, in order that our country overcome a global competition, high quality and highly value added products have been targeted to supply a market in large quantities and stably At the same time there are circumstances, which have covered the problem of personnel expenses that our country followed on developing and soared, by improving the productivity.

The know-how of the automatic control field that is one of the technologies, which the engineers of our country hold from the past achievement, can be said that it is maintaining predominanceamong advanced countries along with Germany or the U.S., and it is the optimum technology transferable in this project.

In addition to the predominance in the side purely technical as mentioned above, it is suitable that this is carried out in a project system technical cooperation as the cooperation measures. The followings are the reasons.

① Since the object curriculum extends in four years, and contents of the curriculum are advanced, it is necessary to dispatch the long-term specialists of 4 fields continuously for five years.

② The equipment according to the advanced curriculum suitable for the needs of industry need to be supplied over several years on the settled scale.

③ It is necessary to provide the training in Japan continuously and in a long term.

④ By the above ① to ③, the project objective is to settle the new educational system, and it is necessary to provide a comprehensive cooperation including management.

6.4 Expected Effects of the Project

(1) Each Effects of the Project

1) Effects for the development policy framework

As the project objective A spreading model of the new education system for a mid-level technician training that meets the needs of the automatic control related industries, is established in the two object schools", it produces qualitatively a talented engineer who can support the manufacturing industry of Turkey, and leads the

industrialization policy to progress as the country is headed for.

2) Effects for the institutional framework

When this project is implemented and the technology transfer is completed, an epoch-making educational system is established. Through such system as by applying Internet etc., the technology contents transferred to the concerned school will be sent to Anatolian technical high schools of the whole country, and adapted there.

In the education system of Turkey, this system may be established as a new spreading measure of education.

3) Effects for the Socio-economy

a) Description of the Beneficiaries

The beneficiaries of this project are the students and the related industries.

b) Number of Beneficiaries

By 2006, which the project ends, the number of students who will receive direct benefit will be 450 on the roll at the concerned two schools and 90 graduates, a total of 640 students as the following table.

Also the industries, which accept the students, receive equivalent benefit at the time.

Table 6.1 Transition of Number of Automatic Control Related Department Graduation / Enrollment Students (Persons)

School	Sub-department	2001	2002	2003	2004	2005	2006
Izmir	Information Electronics	30	60	90	120	150	180
	Information Machinery	30	60	90	120	150	180
Konya	Information Electronics	30	60	90	120	150	180
	Total	90	180	270	360	450	640

In the second half from the middle stage of the project, it is expected that a beneficial group expand further through the teacher engaged in the vocational education of the related field in other schools, the seminar to the related industries, and a freedom of information by Internet etc. A concrete number of the objected persons will be set up in the project implementation stage.

c) Contents of Benefits

The benefit by entering the concerned school enable the student becoming a working member of society as a highly skilled technical expert after acquiring the general technology, including the information electronics andinformation machinery in the field of automatic control.

Moreover, for the industries, which accept these graduates, it becomes possible to employ such a talented personnel who is skillful inthe automatic control and such a personnel is precious at present in the country. As well as it may become a potential asset greatly in the business activities; it can shorten a term for training in enterprises.

4) Effects from the technical standpoint

a) Number of Counterparts

The number of teachers trained for the automatic control related department in Izmir school and Konya school is 18 by the 2005 fiscal year. The teacher assignment plan is as follow.

Table 6.2 Teacher assignment plan (persons)

School	Sub-department	2001	2002	2003	2004	2005
Izmir	Information Electronics	3	4	5	6	6
	Information Machinery	3	4	5	6	6
Konya	Information Electronics	3	4	5	6	6
	Total	9	12	15	18	18

b) Contents of the Capacity Building

The C/P, in receiving such technology transferof the overall technology related to the industrial automation (information electronics and information machinery) based on the knowledge accumulated by them, becomes possible to instruct the technology of higher level rather than the automation technology.

5) Economical benefits

The super goal, which this project is finallyaims at, is that "the demand the mid-level technician and an engineer in the field ofindustrial automation technology is fulfilled in the Turkey." Upon the achievement of the super goal, the country becomes easy to ensure the talented personnel then domestic and foreign investments become active to pursue various industries to be integrated. The country may serve as a manufacturing center position for industrial product within the EU sphere, which Turkey will join in

the future.

As a result, the decrease of the unemployed by the creation of employment produces social stability accompanied by stable tax revenue i.e. financial health. Consequently an improvement of the trade balance by the increase of export to EU may contribute to Turkish economy. At the same time, it leads to correct the income differential between individuals.

In addition, high inflation that has affected the present Turkish economy is influenced greatly by a structural problem of the country, which appears in the low rate of energy self-support, as well as by the government policy in financial supplement to the electricity charge of household use. Factors to accelerate the inflation are small compared to the predicted rapid increase of employment; it is rather necessary to restructure the energy supply.

Additionally, one of the factors that make investment stay opposed is in the future power situation, which Turkey is already anxious about. It is a possible notion that the unavoidable outflow of excellent personnel to overseas becomes more serious because of an insufficient supply of employment, even though the government acquires enough talents.

The government needs to be aware that the foreign currency introduction to Turkey as well as the fluctuation of import and export depends upon the international economic conditions could generate a negative effects on those mid-level technicians in their work in manufacturing by any chance.

(2) General Analysis of the benefits

This project is distinctively profitable in many aspects as from the viewpoint of the vocational education and training of Turkey and the viewpoint on the industry, economy and the policy of Turkey, as described above. At the same time it should work out well in high possibility.

As a main point of this project," Industrial automation technology " is highly evaluated in the respect of the needs by the students and the industries in the beneficial group of this project, also the teachers who receives direct technology transfer.

Therefore, this project is acknowledged to pursue with its significance and its validity.

7. Monitoring and evaluation

7.1 Monitoring

(1) Implementation Structure

Regarding the daily activities of the project, a monitoring system will be prepared in collaborate with Turkish side and the Japanese side in order to collect required data for the project. As for example, teams can be set up to arrange as a routine work in separate purposes such as "Study of company needs", "Progress check on teaching materials " and " Equipment maintenance record ".

(2) Outline

Progresses of the project activities will be checked, verifying with the PO and the divided details from the PO. Furthermore, a monitoring collects the required information on the levels of out puts and project objectives after specifying (or in order to specify) the index of PDM.

(3) Item

There are two ways to obtain the data, which should be the object of monitoring Some are possible within the project and another is to get from outside the project. The former should be included in the project activities itself, such as the record of the progress of each activity, an evaluation of specific event, record of operation rate of equipment, etc. The latter regards to the investigation of the related company, data of the Ministry of National Education, etc. necessarily may not be included directly in the project activities. It needs to build an additional data collecting system.

(4) Implementation Plan

A monitoring system of out-puts level will be prepared within half a year after the project start. Based on the record on this out-puts level, the index for the achievement will be figured within a year, and the monitoring result is submitted by the outputs level for every quarterly year.

7.2 Evaluation

(1) Timing of Evaluation

- Interim evaluation: After 3 years (Year of 2003)
- Final evaluation: after 5 years (Year of 2005)

- Follow up evaluation will be made after 3 to 5 years and after 10 years upon the completion of the project.

(2) Method of Evaluation

Prior to evaluate, it is necessary to set up " Each Index " in PDM concretely. Then the evaluation should be performed comparing the result (it is called a prior evaluation outline table) checked along five items (efficiency, the degree of final result, effects, validity, sustainability) thatare described in Chapter 2 to 6, with the result of evaluation at the time of interim and the final by thesame measure.

8.Annexes

8.1 PDM-draft (PDM at Project Start)

(Annex) Refer to page 1.

8.2 Plan of Operation-draft (Operation Plan and Evaluation, Time of Report etc.)

(Annex) Refer to pages 2.

8.3 TOR of Long-Term Experts

(Annex) Refer to page 17.

8.4 TOR of Counterpart

(Annex) Refer to page 18.

8.5 Information Sheet of the Related Project to be Referred

(Annex) Refer to page 19.

8.6 PCM Workshop Report

(Annex) Refer to page 20.

8.7 Detailed Specification of Inputs Equipment

(Annex) Refer to page 26.

8.8 Counterpart Organization and Commitment from Turkish Government