

<JICA DEVELOPMENT STUDY>

**THE STUDY
ON
THE MASTER PLAN FOR
QUALITY/PRODUCTIVITY IMPROVEMENT
IN
THE REPUBLIC OF TUNISIA

FINAL REPORT
(MASTER PLAN EDITION)**

JULY 2008

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

JAPAN DEVELOPMENT SERVICE CO., LTD.

IL
JR
08-010

CONTENTS

1.	Analysis of Current Conditions and Issues in the Industrial Sector	1
1.1	Current Conditions of Industry.....	1
1.2	Status of the Manufacturing Sectors of Electric and Electronics and Food Processing	2
1.2.1	Sector-separate Distribution of Enterprises and Employees	2
1.2.2	Geographical Distribution of Enterprises and Employees	3
1.2.3	Movements in the Electric and Electronic Sector and Food Processing Sector.....	4
1.3	Issues in the Electric and Electronic Sector and Food Processing Sector	6
1.3.1	Electric and Electronic Sector.....	6
1.3.2	Food Processing Sector.....	7
1.4	Estimated Impact of the Abolition of Tariffs with the EU on Exports and Imports	8
1.4.1	Impact on Imports	9
1.4.2	Impact on Exports	11
2.	Current Conditions of International Competition and Issues for Strengthening	12
2.1	Current Conditions of International Competition.....	12
2.1.1	Structure of the International Balance of Payments.....	12
2.1.2	Sector-separate Trade Balance	13
2.1.3	Movements in the Share of the Electric and Electronic Sector and Food Processing Sector in the EU Market	14
2.2	Issues for Strengthening International Competitiveness	15
2.2.1	Improvement of Quality/Productivity	16
2.2.2	Strengthening of Parts Processing Capacity	18
2.2.2.1	Reinforcement of Product Making Capability.....	18
2.2.2.2	Transfer of Processing Technology through Attraction of FDI	18
2.2.3	Diversification of Industry (Away from Dependence on the Textile and Apparel Sector).....	19
2.2.4	Diversification of Export Markets and Procurement Sources.....	21
3.	Issues and Recommendations for Improvement of Quality/Productivity	24
3.1	Outline of the Pilot Project and Assumptions in Implementation	25
3.1.1	Outline of the Pilot Project	25
3.1.2	Setting of Assumptions in PP Implementation.....	25
3.1.3	JICA Project Approach (Comparison with EU Project).....	26

3.2	Verification of the PP Outcomes and Assumptions	26
3.2.1	Assumption 1 (For the many Tunisian enterprises that depend almost totally on overseas for components and materials, through seeking to improve not only “manufacturing quality” but also “design quality” and “component quality” for themselves, it will be possible to boost international competitiveness)	27
3.2.2	Assumption 2 (Without resorting to investment into new machines and equipment, many Tunisian enterprises have room to improve quality/ productivity through using existing machines and equipment, and they have the potential to apply various quality/productivity improvement techniques and technologies including Japanese methods)	28
3.2.3	Assumption 3 (Enterprises that have strong commitment from top management can be expected to produce results in the area of quality/ productivity improvement too)	31
3.2.4	Assumption 4 (Setups for promoting multifaceted (comprehensive) quality/productivity improvement activities in Tunisian industry are required)..	33
3.3	Issues Confronting Quality/Productivity Improvement	35
3.3.1	Reinforcement of International Competitiveness in Component Quality and Design Quality (How to Enhance Total Quality).....	37
3.3.2	How to Widely Disseminate Technologies (Techniques) for Quality / Productivity Improvement	37
3.3.2.1	Dissemination in the Two Sectors	37
3.3.2.2	Dissemination to Other Sectors	38
3.3.2.3	Manual Revisions	38
3.3.3	How to Enhance the Awareness of Top Management (and Middle Managers) ...	38
3.3.4	How to Build a Setup (Organizations and Systems) for Promoting Dissemination Activities in All Sectors	39
3.4	Recommendations for Quality / Productivity Improvement	40
3.4.1	Recommendations for Reinforcing Total Quality Capacity	40
3.4.2	Continuation of Kaizen Activities and Implementation of the Trainers’ Training (TT) Program (development of technical dissemination leaders)	45
3.4.2.1	Continuation of Kaizen Activities	45
3.4.2.2	Implementation of the Trainers’ Training Program	47
3.4.2.3	Acquisition and Dissemination of Further Quality/Productivity Improvement Technology (Techniques)	49
3.4.3	Implementation of Training Programs for Top Management (training for the technology receiving side).....	50

3.4.4	Building of the Dissemination Activities Promotion Setup (organization or system).....	52
3.4.4.1	Short to Medium Term Proposal: Strengthening of Linkage for Promotion of Quality/Productivity Improvement Activities (2009~2011)	53
3.4.4.2	Medium and Long Term Recommendation: Establishment of an Organization for Promoting Quality/Productivity Improvement Activities (2012~).....	54
4.	Action Plan for Dissemination of Quality / Productivity Improvement Activities	59
4.1	Characteristics of Business Management in Tunisia	59
4.2	Dissemination Activities	62
4.2.1	Public Information Activities	62
4.2.1.1	Enterprise Award System.....	62
4.2.1.2	Quality Control Certificate Examination System	63
4.2.1.3	PR Activities in Printed and Electronic Media.....	63
4.2.1.4	Implementation of Study Tours to Successful Enterprises	65
4.2.1.5	Introduction of a Quality/Productivity Improvement Month	65
4.2.2	Education Activities	66
4.2.2.1	Staging of Quality/Productivity Improvement Seminars in Tunis and Regional Sites Based on Collaboration between Technical Centers and Private Consultants	66
4.2.2.2	Opening of Business Courses by Private Consultants	69
4.2.2.3	Dispatch of Lecturers to Education Agencies.....	71
4.2.3	Implementation of Technical Support Services	73
4.2.4	Database Building for Productivity Measurement.....	79
4.2.5	Collaboration with Overseas.....	80
4.2.5.1	Staging of a Seminar Targeting Arab and African Countries	80
4.2.5.2	Promotion of Information Exchange with International Agencies	80
4.3	Trainers' Training for Dissemination of Quality/Productivity Improvement Activities....	80
4.3.1	Objectives and Targets of Training	81
4.3.2	Curriculums	81
4.4	Action Plan Execution Schedule	85
4.5	Network Building for Promoting the Action Plan.....	86
4.5.1	Network Building.....	86
4.5.2	Incentive Schemes for Sustaining Activities.....	89
4.5.2.1	Incentive Schemes (see Table 4-7)	89
4.5.2.2	Profitability of Dissemination Activities (see Table 4-8)	92

[Reference Materials]

[Reference Material 1] Overview of the Pilot ProjectA-1

[Reference Material 2-1] Trends of Other Donors in the Industrial FieldA-7

[Reference Material 2-2] Comparison of the JICA Project and EU ProjectA-11

[Reference Material 3] List of PP Implementation Contents and OutputsA-12

[Reference Material 4] Manual CompositionA-14

[Reference Material 5] Recommendations for Quality / Productivity Improvement
(Summary Sheet).....A-17

[Reference Material 6] Review of Measures for Quality / Productivity Improvement
in Tunisia.....A-19

[Reference Material 7] Japanese Experience and Examples in Quality / Productivity
ImprovementA-34

[Case Example] Promotion of the Machine Industry in JapanA-46

LIST OF FIGURES AND TABLES

(Figure)

Figure 1-1	Movements in GDP Share by Sector (at Factor Cost, Unit %)	1
Figure 1-2	Rate of Industrialization and Per Capita GNI (2005, Asia)	2
Figure 1-3	Rate of Industrialization and Per Capita GNI (2005, Europe, Africa)	2
Figure 1-4	Movements in GDP Ratio of Manufacturing Sectors (Unit %)	5
Figure 1-5	Problems of Electric Sector	6
Figure 1-6	Ratio of Materials Imported by Electric and Electronic and Electronic Model Enterprises	6
Figure 1-7	Problems of Food Processing Sector	7
Figure 2-1	Movements in the International Balance of Payments (Unit: MTD)	12
Figure 2-2	Trade of Goods (Unit: MTD)	12
Figure 2-3	Trade Balance of Payments by Sector (Unit: MTD)	13
Figure 2-4	Trade Balance of Payments in electric and electronics and machinery sector (Unit: MTD)	13
Figure 2-5	Share of Tunisian Products in EU imports	14
Figure 2-6	Distribution of imports of apparel articles to EU market by country	15
Figure 2-7	Issues and factors for Reinforcing Competitiveness	16
Figure 2-8	Year-on-year changes in Labor Productivity, Wages and Prices (%)	17
Figure 2-9	Real GDP Growth (%)	17
Figure 2-10	Movements in Sector-separate Share of Export Value (Unit %)	19
Figure 2-11	Distribution of Value Added by Sector in Manufacturing (%)	20
Figure 2-12	Exports by Regions (2006)	21
Figure 2-13	Imports by Regions(2006)	21
Figure 2-14	GDP Growth since 1990 at constant 1990 prices	21
Figure 2-15	Trade Balance by Regions (MTD)	23
Figure 3-1	Linkage of Each Phase	24
Figure 3-2	Interrelationship of the 4 Issues to be Tackled	36
Figure 3-3	Quality/Productivity Improvement Dissemination Activities based on Trainers' Training	48
Figure 3-4	Establishment of Organization for Promoting Quality/Productivity Improvement Activities (2012-)	56
Figure 4-1	Structure of UTICA	66
Figure 4-2	Actions, Expertise and Information needed to Reinforce Competitiveness	67

Figure 4-3	Actions, Expertise and Information needed to Reinforce Competitiveness	69
Figure 4-4	Education System and Professional Training System in Tunisia	71
Figure 4-5	Business Development Services provided to Companies.....	73
Figure 4-6	Comparison According to Number of Employees.....	75
Figure 4-7	Flow of Plant Diagnosis Services	76
Figure 4-8	Providing Diagnosis and Kaizen Solutions along with Long-term Credit of JBIC Loans.....	78
Figure 4-9	Quantitative Analysis of Productivity Improvement.....	79
Figure 4-10	Actions, Expertise and Information needed to Reinforce Competitiveness	82
Figure 4-11	Training of Trainers for Dissemination of Quality / Productivity Improvement into All Sectors.....	83
Figure 4-12	Action Plan Execution Schedule for Quality/ Productivity Improvement Dissemination Activities.....	85
Figure 4-13	Network for Promotion of Quality/Productivity Improvement Dissemination Activities.....	86
Figure 4-14	Diffusion of Quality/Productivity Improvement to Companies	88

(Table)

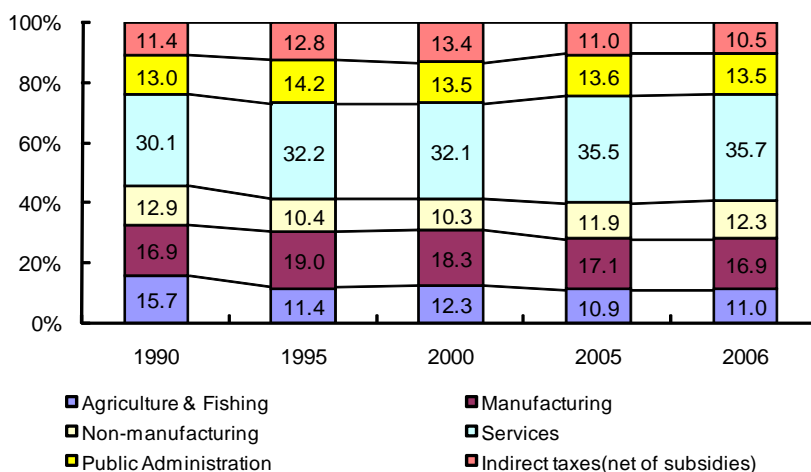
Table 1-1	Sector-separate Distribution of Enterprises and Employees in the Manufacturing Industry (at least 10 employees) (as of February 12, 2007).....	2
Table 1-2	Prefecture-separate Distribution of Enterprises and Employees in the Manufacturing Industry (at least 10 employees)	4
Table 1-3	PMN Activities (1995~End of May 2007, Sector-separate).....	5
Table 1-4	Tunisian Tariff Rates on major Commodities (2007).....	9
Table 3-1	Improvement Techniques deemed to be Effective for Quality/ Productivity Improvement in the Tunisian Manufacturing Industry	29
Table 3-2	Relatively Common Problems and Valid Kaizen Techniques in Food Processing Enterprises.....	30
Table 3-3	Improvement Technologies that the Counterparts have Acquired and Can Use in Future	31
Table 3-4	Kaizen Outputs in the Pilot Project	32
Table 3-5	Required Quality/Productivity Improvement Activities and Existing Implementing Agencies.....	35
Table 3-6	Recommendations for Reinforcing Total Quality Capacity	42
Table 3-7	Procedure of Quality/Productivity Improvement (Kaizen) Guidance	46
Table 3-8	Production Technologies to be Acquired for Future Quality/ Productivity Improvement	49
Table 3-9	Quality/productivity Improvement Dissemination Activities.....	50
Table 3-10	Implementation of Training Programs for Top Management.....	52
Table 3-11	New Organization Setup for Promoting Quality/Productivity Improvement Activities	57
Table 3-12	Quality/Productivity Improvement Promotion Setup	58
Table 4-1	Features of Tunisian Business Management and Dissemination Activities	61
Table 4-2	Proposals for Quality/Productivity Improvement Dissemination Activities	64
Table 4-3	Curriculum of the Quality/Productivity Improvement Seminar	68
Table 4-4	Business Course Curriculums.....	70
Table 4-5	Plan of Trainers' Training for Dissemination of Quality/ Productivity Improvement	81
Table 4-6	Enterprises Receiving Kaizen Guidance during the Trainers' Training Period (Estimate)	84
Table 4-7	Incentive Schemes for Sustaining the Roles and Activities of Agencies Promoting the Dissemination Activities	91
Table 4-8	Profitability of Dissemination Activities (Trial Calculation)	94

1. Analysis of Current Conditions and Issues in the Industrial Sector

1.1 Current Conditions of Industry

Concerning industrial policy in Tunisia, “following independence in 1956, the priority was placed on import substitute industries, however, from the 1980s onwards, as Tunisia joined GATT and promoted internationalization, the priority gradually shifted to strengthening export competitiveness” (MIEPME). Trade with the EU is due to become liberalized by 2008 following conclusion of an agreement in 1995, and it was in response to this advancing internationalization that a program for upgrading industry (PMN: Programme Mise a Niveau) was started in the same year with the aim of reinforcing the competitiveness of enterprises in the manufacturing industry

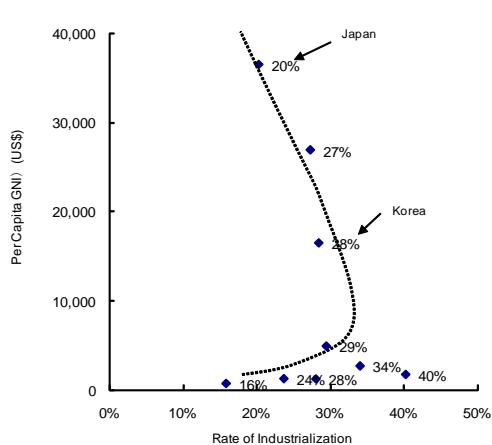
Figure 1-1 shows movements in the industrial structure of Tunisia. From 1990 to 2006, the share of the agriculture and fishing sectors dropped from 16% to 11%, whereas the services sector including restaurants and hotels, etc. increased from 30% to 36%, while the manufacturing industry remained static at around 18%.



Source: Institut National de la Statistique (INS)

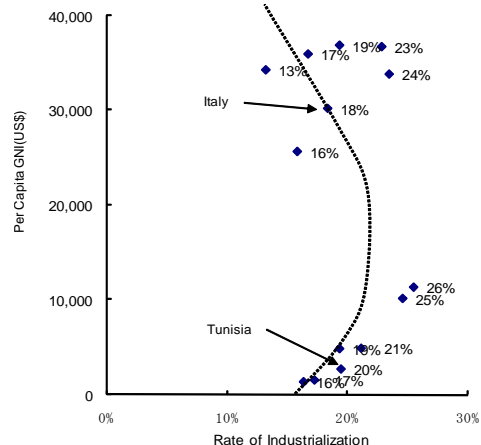
Figure 1-1 Movements in GDP Share by Sector (at Factor Cost, Unit %)

According to the experience of other countries, the rate of industrialization (the ratio of the manufacturing sector to added value GDP) gradually increases in line with economic development and then displays a gradual decline as the economy matures and the services sector becomes more prominent. In Tunisia’s case, however, in order to realize further economic development, in addition to reinforcing the competitiveness of existing enterprises, it is necessary to boost the rate of industrialization through promoting business startups and nurturing small and medium enterprises, etc. (see Figure 1-2).



Source: UN National Accounts Main Aggregates Database

Figure 1-2 Rate of Industrialization and Per Capita GNI (2005, Asia)



Source: UN National Accounts Main Aggregates Database

Figure 1-3 Rate of Industrialization and Per Capita GNI (2005, Europe, Africa)

1.2 Status of the Manufacturing Sectors of Electric and Electronics and Food Processing

1.2.1 Sector-separate Distribution of Enterprises and Employees

Looking at the number of enterprises (at least 10 employees, as of February 2007) in the manufacturing industry, there are 5,433 companies, of which 1,941 equivalent to 36% of the manufacturing industry belong to the textile and apparel sector. Next, 982 companies (18%) belong to the food processing sector, 515 (9%) to the machinery and metals sector (see Table 1-1), and 320 (6%) to the electric and electronic and electronics sector.

Table 1-1 Sector-separate Distribution of Enterprises and Employees in the Manufacturing Industry (at least 10 employees) (as of February 12, 2007)

Sector	Number of Enterprises			Number of Employees		
	Total	100% Exporting Enterprises		Total	100% Exporting Enterprises	
		Number	Ratio (%)		Number	Ratio (%)
Food processing	982	131	13.3	61,785	12,933	20.9
Building materials	442	23	5.2	28,302	750	2.6
Machinery and metals	515	101	19.6	30,321	7,917	26.1
Electric and electronics and electronics	320	190	59.4	51,334	42,593	83.0
Chemicals	468	83	17.7	33,495	13,234	39.5
Textiles and apparel	1,941	1,556	80.2	195,428	172,943	88.5
Wood products and furniture	194	30	15.5	9,362	1,180	12.6
Leather and shoes	279	181	64.9	28,148	24,455	86.9
Others	292	59	20.2	15,509	3,421	22.1
Total	5,433	2,354	43.3	453,684	279,426	61.6

Data: API

In terms of the number of employees, the manufacturing industry overall employees 454,000, of which 195,000 (43%) belong to the textiles and apparel sector, 62,000 (14%) to the food processing sector, and 51,000 (11%) to the electric and electronic and electronics sector.

Looking at the characteristics of these sectors, the food processing and leather and shoes sectors use locally produced resources such as olives, dates, cattle and sheep hides, etc., while the textile/apparel and electric and electronic/electronics sectors conduct labor-intensive assembly and processing making use of relatively cheap labor, which gives them a relative advantage.

Furthermore, another feature is the high level of export dependence. Out of 5,433 enterprises in the manufacturing industry, 2,354 or 43% of the total completely depend on exports for their market. As the background to this statistic, numerous enterprises operate as subcontractors for European corporations based in France and Italy, etc. For example, Co. A, which is a women's blouse and jacket manufacturer located in the outskirts of Tunis, manufactures brand items such as PRADA, NEXT and ESCADA, etc. as a subcontractor for French, Italian and British corporations and it exports 100% of its products to Europe.

1.2.2 Geographical Distribution of Enterprises and Employees

Looking at the geographical distribution of enterprises, 2,704 (50%) are located in the seven northern prefectures that center around Tunis, while 2,008 (37%) are located in the four central prefectures of Mahdia, Monastir¹, Sfax and Sousse. This means that 87% of enterprises are concentrated in the said two regions (see Table 1-2).

1 Monastir Prefecture was previously a center for the sewing and embroidery of women's traditional clothes. These skills have been passed on and this prefecture is now home to overseas affiliates such as Benetton of Italy, etc. It is a major center for apparel makers.

Table 1-2 Prefecture-separate Distribution of Enterprises and Employees in the Manufacturing Industry (at least 10 employees)

Prefecture	Number of Enterprises			Number of Employees		
	Total	100% Exporting Enterprises		Total	100% Exporting Enterprises	
		Number	Number		Number	Ratio (%)
Ariana	271	124	45.8	15,726	9,208	58.6
Ben Arous	569	190	33.4	50,484	23,125	45.8
Bizerte	341	208	61.0	45,672	37,903	83.0
Manouba	190	97	51.1	18,510	11,037	59.6
Nabeul	707	386	54.6	66,335	46,761	70.5
Tunis	416	139	33.4	41,753	20,593	49.3
Zaghouan	210	80	38.1	15,877	10,298	64.9
Mahdia	133	78	58.6	10,522	7,785	74.0
Monastir	698	496	71.1	62,987	50,993	81.0
Sfax	665	157	23.6	37,687	16,323	43.3
Sousse	512	283	55.3	43,834	28,973	66.1
Gabes	86	18	20.9	7,840	4,617	58.9
Medenine	124	8	6.5	5,305	253	4.8
Tataouine	11		0.0	649		0.0
Beja	58	10	17.2	4,444	1,536	34.6
Jendouba	63	8	12.7	2,531	566	22.4
Le kef	49	3	6.1	2,694	369	13.7
Siliana	40	12	30.0	2,603	1,941	74.6
Kairouan	104	21	20.2	6,143	1,946	31.7
Kasserine	42	1	2.4	2,832	65	2.3
Sidi Bouzid	44	6	13.6	2,847	576	20.2
Gafsa	50	2	4.0	2,071	1,006	48.6
Kebili	24	8	33.3	862	368	42.7
Tozeur	26	19	73.1	3,476	3,184	91.6
Total	5,433	2,354	43.3	453,684	279,426	61.6

Data: API

1.2.3 Movements in the Electric and Electronic Sector and Food Processing Sector

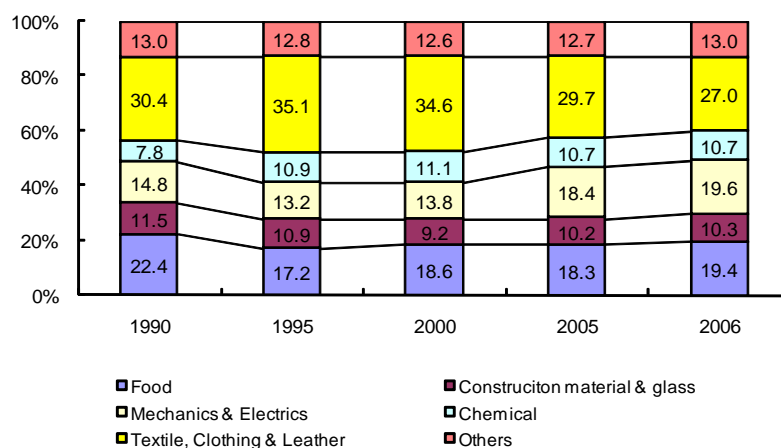
Under the industrial upgrading program (PMN: Programme Mise a Niveau) that began in 1995, support was provided for the modernization of existing enterprises in the manufacturing industry. Specifically, subsidies for plant investment geared to modernization were provided from the MIEPME Fund (FODEC), and costs were partially subsidized with respect to non-plant investment fields such as the introduction of new management tools, financial management, new products development and human resources training. Between the start of the PMN in 1995 and the end of May 2007, support such as this was provided in 2,527 cases², of which 1,090 were in the textiles and apparel sector, 330 were in the food processing sector and 310 were in the electric and electronic and electronics sector.

2 The 11th Five-Year Plan (2007-2011), aims to provide support to 1,200 enterprises in the manufacturing industry and 300 enterprises in services (plant maintenance, etc.) over five years (MIEPME, Enterprise Support Department).

Table 1-3 PMN Activities (1995~End of May 2007, Sector-separate)

	Food processing	Shoes and leather	Chemicals	Other	Building materials and glass	Machines and electric and electronics	Textiles and apparel	Total
Approved cases(a)	330	193	139	341	124	310	1,090	2,527
Approved investment amount(MTD)	796	151	271	537	756	659	789	3,959
Approved investment amount by sector (%)	20.1%	3.8%	6.8%	13.6%	19.1%	16.6%	19.9%	100.0%
Approved investment for non-plant investment (MTD)	86	37	34	63	48	102	154	524
Subsidies (MTD)	106	24	36	79	76	98	141	560
Projects under review (b)	206	74	69	194	116	171	422	1,252
Total (a + b)	536	267	208	535	240	481	1,512	3,779

Within the support indicated above, the weight occupied by food processing in the added value of manufacturing has remained static, while the weight occupied by the machines and electric and electronics sectors gradually increased to approximately 20% by 2006 (see Figure 1-4). As for the textile and apparel sector, which employs the most workers in the manufacturing industry, its weight fell from 35% in 1995 to 27% in 2006.



Source: INS

Figure 1-4 Movements in GDP Ratio of Manufacturing Sectors (Unit %)

1.3 Issues in the Electric and Electronic Sector and Food Processing Sector

1.3.1 Electric and Electronic Sector

According to a questionnaire survey³ of 15 model enterprises targeted by the pilot project for improvement of quality/productivity in the electric sector, the problems faced by enterprises are as follows: Promotion of exports (60%), Productivity improvement (53.3%), Consolidation of products' competitiveness (46.7%), Improvement of products' quality (33.3%) and so forth.

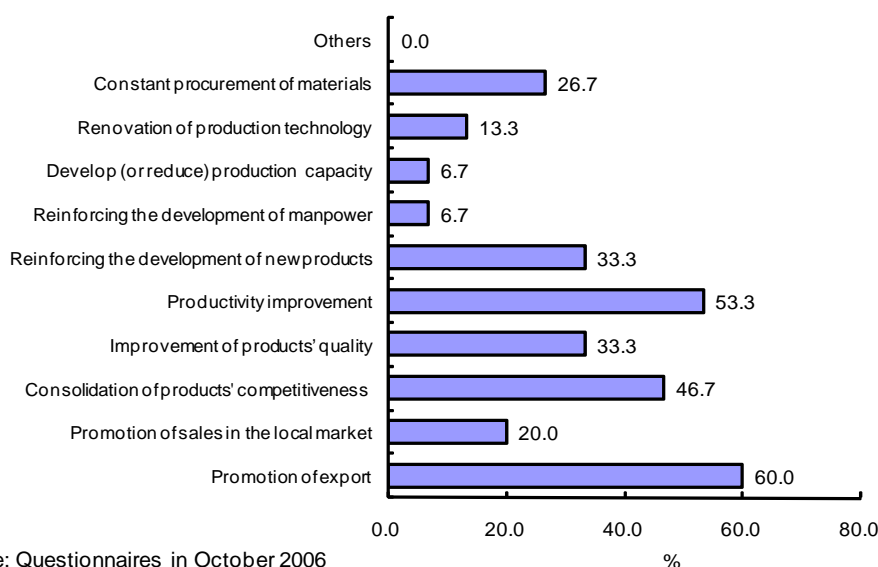


Figure 1-5 Problems of Electric Sector

Accordingly, as measures for the immediate future: 1) it is essential to work on improving quality/productivity so that exports will be promoted, while 2) it is also necessary to work on measures for the consolidation of product competitiveness.

Currently, many enterprises in the electric and electronic sector rely on imports from abroad for components, semi-finished products and other materials, while they conduct labor-intensive assembly operations internally. Figure 1-6 shows the ratio of raw materials that are imported by model

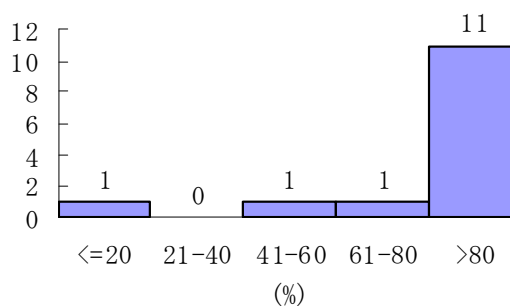


Figure 1-6 Ratio of Materials Imported by Electric and Electronic Model Enterprises

³ Concerning the issues faced by enterprises, respondents were asked to select three out of the 11 items shown on the vertical axis in Figure 1-5.

enterprises in the pilot project. Concerning 14 enterprises for which data was obtained, 11 rely on imports to provide at least 80% of their raw materials.

Accordingly, in order to improve the quality and reinforce the price competitiveness of products in the electric industry, it is necessary to, 1) secure competitive suppliers of components and semi-finished products, and at the same time 2) accumulate component processing technology and process components internally. Alternatively, as an issue for the electric and electronics sector, it is necessary to develop the components manufacturing industry.

1.3.2 Food Processing Sector

According to a questionnaire survey⁴ of 14 model enterprises targeted by the pilot project in the food processing sector, the problems faced by enterprises are as follows: Productivity improvement (64.3%), Improvement of products' quality (57.1%), Promotion of exports (50.0%) and so forth (see Figure 1-7).

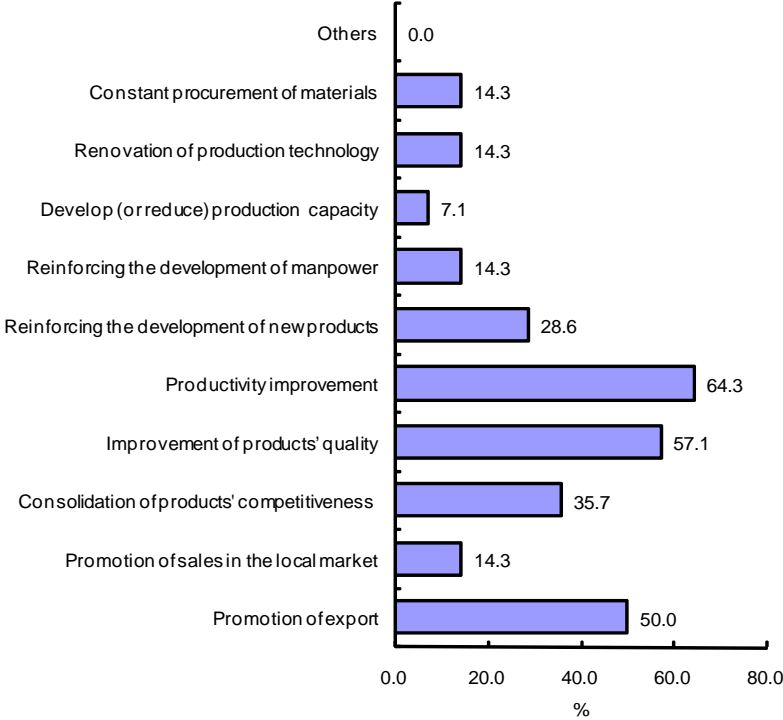


Figure 1-7 Problems of Food Processing Sector

4 Same as Note 3.

Enterprises in the food processing sector procure almost all raw materials within Tunisia. They process local products such as olives, grapes, tomatoes and other fruits and vegetables and export roughly half of their products (export ratio of enterprises targeted in the pilot project: 54%).

Olive oil, which is the largest sub-sector within the food processing field, is the fourth largest item in terms of export value⁵. Most exports of olive oil are made in bulk to Italy and Spain, where it is blended with local olive oils and then exported to destinations such as Japan and the United States, etc. as brand products of Italy and Spain. Therefore, in addition to improving levels of quality/productivity, it is necessary to promote exports through launching Tunisian brands and own company brands and gaining recognition for these in international markets.

Furthermore, as an issue facing the food processing industry overall, many of the pilot project enterprises were found to display insufficient attention to sanitary supervision and prevention of intrusion by foreign materials, which are basic requirements for food processing. Accordingly, in order to improve quality, it is necessary to reform the awareness of enterprise owners regarding food processing.

1.4 Estimated Impact of the Abolition of Tariffs with the EU on Exports and Imports

One of the issues facing the industrial sector concerns how to respond to the abolition of tariffs with the EU in 2008. The impact that this will have has been estimated using micro data.

Incidentally, until now tariffs with the EU have been gradually reduced according to each commodity group since 1996 with a view to realizing the total abolition from 2008. In other words, tariffs on raw materials, partly finished goods, capital goods and other products not in competition with Tunisian products were totally abolished in 2001, while tariffs on other commodities will be totally removed in phases according to the level of competition from 2008. Table 1-4 shows tariffs on major products in 2007, the year prior to total abolition. According to this, the commodity groups that had the highest tariffs placed on imports from the EU were, apart from wine which is intrinsically linked to the domestic farming industry, jeans, TV receivers, shoes and other commodities in competition with domestic industries, and the tariff rate applied to these products was 4.73%.

5 Looking at the top five items in terms of export value in 2006 (unit: 100 million TD), these are 1) apparel (30.5), 2) crude oil (15.6), 3) knitwear products (9.0), 4) olive oil (8.3), and 5) electric cable and wire (7.7). These five items account for 46.4% of the total value of exports (153.2).

Table 1-4 Tunisian Tariff Rates on major Commodities (2007)

	HS Number	Description	Tariff (%)	Tariff vis-a-vis the EU (%)
Raw materials, intermediate goods, partly finished goods	7201	Pig iron	20.00	0.00
	7308	Steel products (for building)	27.00	2.97
	4001	Rubber	10.00	0.00
	7010	Glass bottles	43.00	1.72
	8529	TV components	43.00	1.72
	5208	Cotton textiles	27.00	2.97
	6217	Apparel partly finished goods	27.00	0.00
Capital goods	8452	Sewing machines	27.00	1.08
	8458	Lathes	0.00	0.00
Products	6203	Men's suits	43.00	4.73
	6203	Jeans	43.00	4.73
	8528	TV receivers	43.00	4.73
	2204	Wine	43.00	43.00
	6401	Shoes	43.00	4.73
	8703	Automobiles	43.00	1.72

Data: Worldtariff Co. Website

The economic effects of abolishing tariffs are as follows: 1) expansion of trade, 2) ripple effect of trade expansion on the Tunisian economy, and 3) attraction of FDI seeking the benefit from trade expansion. In the following section, trial estimation is carried out on 1) using macro data.

1.4.1 Impact on Imports

In order to gauge the impact that abolition of tariffs imparts on price competition, the following import function was estimated:

$$\log (\text{quantity of imports}) = a \times \log (\text{actual GDP}) + b \times \log (\text{import price index}/\text{domestic price index}) + c$$

In other words, since abolition of tariffs causes import prices to drop by the amount of the tariff, it is forecast that the relative price compared to domestic prices will change and so will the quantity of imports (increase).

- Results of estimation:

$$\log (\text{quantity of imports}) = \frac{0.940227}{(10.81)} \times \log (\text{actual GDP}) - \frac{0.40108}{(-1.45)} \times \log (\text{import price index}/\text{domestic price index}) - \frac{0.07975}{(-0.22)}$$

Figures in parentheses () are t values.

Determination index adjusted for the degrees of freedom = 0.9528

Term of estimation: 1990-2006

According to the results of this estimation, because the price elasticity of the import quantity is minus 0.401⁶, a 1% drop in the price of imports will lead to a 0.401% increase in the quantity of imports. Accordingly, assuming that the tariff rate for all imported products before abolition is 4%, the abolition of tariffs will lead to a 1.6% (4% x 0.401) increase in the quantity of imports.

Such an increase in imports will put pressure on the business of domestic makers, but the question is how much of an impact this will have. According to the maker of quality women's shoes that records 65% of sales in Tunisia, "Since we place emphasis on products for high income earners and the tariff has already been phased down, next year's tariff reduction will only be minor and won't have an impact." Moreover, according to an official of the Federation of Machinery and Metals Industries, "Tariffs with the EU will be scrapped from 2008, however, they have already been brought down and markets have become open over the past 10 years, so the reduction will only be around 4% in some sectors. Therefore, I think local industries are ready to adapt to the new order." According to the Ministry of Industry, Energy and Small and Medium Enterprises, "Although tariffs with the EU will be scrapped in 2008, measures to deal with this have been implemented for a number of years now and tariffs have already been removed for some commodities, so we don't think there will be an effect." The Textiles Technology Center also takes an optimistic view, stating that "In the case of textiles, we are not worried at all because trade has already been liberated from 2005 and the domestic market is very small anyway." On the other hand, concern is raised by the Federation of Electric and Electronic and Electronic Industries, which says "The conditions facing small enterprises will become harsher as markets are opened. Moreover, concerning domestic electric and electronics, it will become cheaper to import finished products rather than assemble them at home using imported components." Moreover, the Union of Tunisian Industry, Commerce and Arts has expressed the following stance regarding the need to qualitatively transform the operating environment: "As far as UTICA is concerned, concerning the abolition of tariffs with the EU from next year, we are striving to establish relatively competitive industrial brands as a means of reinforcing enterprises, and to reform awareness so that added value is enhanced."

6 Incidentally, when the import function is estimated for the electric and electronic, textile and apparel sectors, the results are as shown in the following table.

Log (actual value of imports)	Regression Coefficient (t value in parentheses)			Determination index adjusted for the degrees of freedom	Term of estimation
	Log (actual GDP)	Log (import price/ domestic price)	Constant term		
Electric and electronics (HS code: 85)	2.9117 (4.08)	-0.8616 (-6.81)	-6.388 (-2.10)	0.9875	2000-2005
Apparel excluding knitwear (HS code: 62)	1.3960 (1.87)	-0.9980 (-3.86)	-0.5746 (-0.18)	0.7643	

(Note 1) The actual import amount is deflated by the HS code double digit import amount; electric and electronics are deflated by the import unit price of color TV receivers (HS code 852812), and apparel is deflated by the import unit price of men's cotton trousers (HS code 620342).

(Note 2) Concerning domestic prices, the industrial sale price index (CBT) was used for both electric and electronics/machinery and apparel/leather.

Considering that the production lines of Tunisian enterprises still have ample room to improve quality/productivity, it should be possible to respond to price drops of around 4~5%, however, as may be gathered in the above comments from the Union of Tunisian Industry, Commerce and Arts, in addition to enhancing price competition, it will be necessary to pursue other assets and added values and to build core competence that is unique to companies.

1.4.2 Impact on Exports

In order to gauge the impact that abolition of tariffs imparts on export price competition, the following export function was estimated:

$$\text{Log (export quantity)} = a \times \log (\text{actual GDP in EU}) + b \times \log (\text{export price index/price index in EU}) + c$$

Results of estimation:

$$\log (\text{import quantity}) = \frac{1.9182}{(13.03)} \times \log (\text{actual GDP in EU}) - \frac{3.581}{(-6.28)}$$

Figures in parentheses () are t values.

Determination index adjusted for the degrees of freedom = 0.9548

Term of estimation: 1995-2003

The variable reduction method was used to select variables when estimating the function, however, because the parameters pertaining to the price variable are not significant (F value < 2.0), the price variable was excluded and only the income variable was significant. The increase in Tunisian exports to the EU depends on the degree of increase in EU incomes; if incomes increase by 1%, the quantity of exports from Tunisia will increase by 1.9%.

Concerning the background to why the price variable does not significantly change, many exporting enterprises in Tunisia so far have been companies based on direct investment from European countries such as France and Italy, and these companies have exploited low wages in Tunisia to manufacture and export products intended solely for the growing EU market. The primary objective of enterprises that were founded on direct investment from Europe has been to respond to demand in the European market based on the presumption that Tunisian products are cheap.

2. Current Conditions of International Competition and Issues for Strengthening

2.1 Current Conditions of International Competition

2.1.1 Structure of the International Balance of Payments

The structure of Tunisia’s international balance of payments is such that a surplus in the capital balance augments a deficit in the current account (see Figure 2-1). The deficit in the current balance of payments arises because the deficit in the trade balance (import and export of goods) exceeds the surplus in the service balance (tourism, etc.) and balance of transfer account, while the surplus in the capital balance of payments derives from FDI going into manufacturing and the energy sector, etc.

Looking at movements in the trade balance of payments (see Figure 2-2), the deficit increased from 2.3 billion TD in 1995 to 4.5 billion TD in 2006, so it cannot be said that Tunisian industry on the whole has strengthened its international competitiveness.

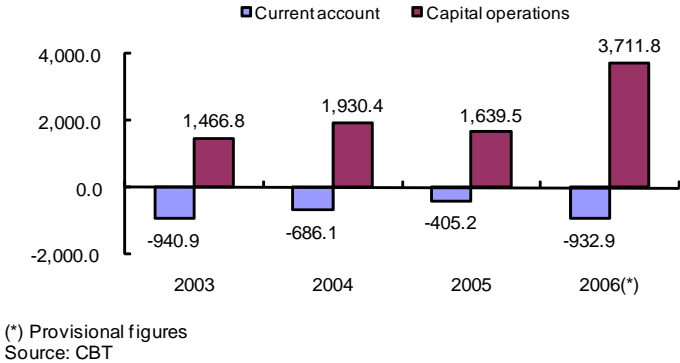


Figure 2-1 Movements in the International Balance of Payments (Unit: MTD)

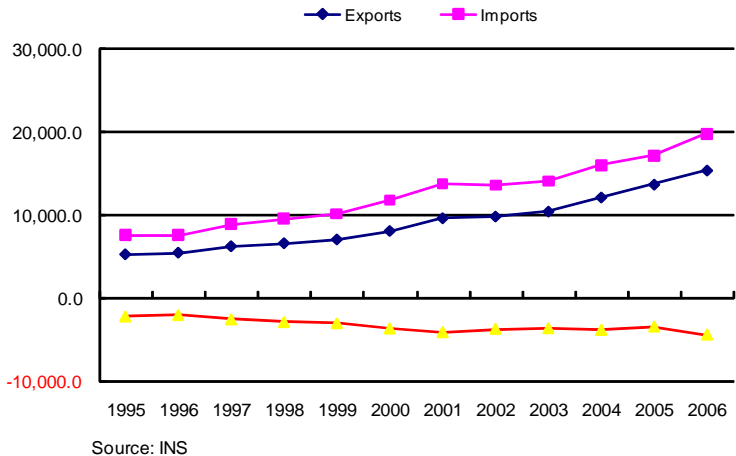


Figure 2-2 Trade of Goods (Unit: MTD)

2.1.2 Sector-separate Trade Balance

Looking at movements in the goods trade balance by sector (see Figure 2-3), the following features can be seen: 1) expansion of the deficit in the electric and electronic and machine sector, 2) reduction of the deficit in the food processing sector, and 3) peaking of the surplus in the textile and apparel sector. Moreover, Figure 2-4 shows movements in the trade balance upon splitting the electric and electronic and machinery sector into the sub-sectors of electric and electronics and machinery⁷. Whereas the electric and electronic sector just about achieved a surplus from 2005, the machinery sector has recorded a growing deficit.

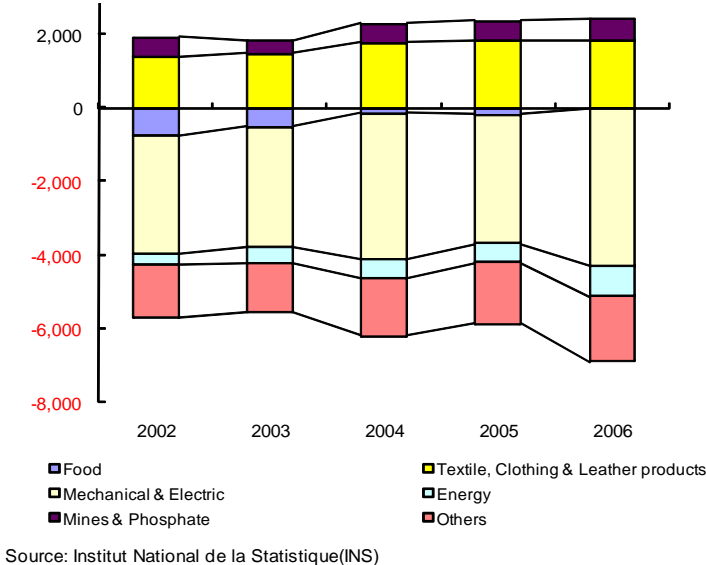


Figure 2-3 Trade Balance of Payments by Sector (Unit: MTD)

Exports in the electric and electronic and machine sector increased almost twofold from 1.9 billion TD to 3.9 billion TD between 2002 and 2006, and this was far in excess of the growth in exports overall (roughly 1.6 times from 9.7 billion TD to 15.3 billion TD). In spite of this, the deficit in the trade balance has increased, because enterprises rely on imports to provide the components, semi-finished products

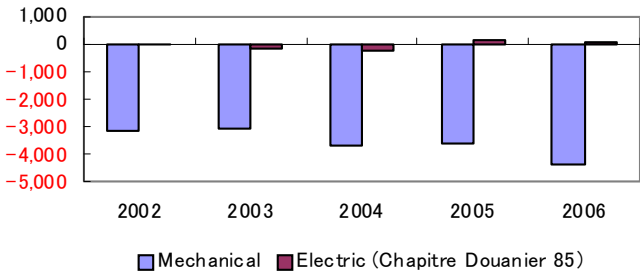


Figure 2-4 Trade Balance of Payments in electric and electronics and machinery sector (Unit: MTD)

⁷ Since the National Statistics Agency (INS) does not disclose statistics separately for the electric and electronic and machine sectors, figures for the electric and electronic sector were obtained by adding items classified under HS code 85 (electric devices and partly finished goods) from the item-separate export and import statistics (INS).

and production equipment used in production from overseas. Incidentally, the model enterprises targeted in the pilot project import on average 87% of their materials requirements. Accordingly, in order for development of the electric and electronic and machine sector to contribute to improvement of the trade balance of payments, as was mentioned in Section 1.3.1, it is desirable to move away from the present operating mode of assembly processing and to adopt production systems that incorporate the internal processing of components and semi-finished products, or alternatively to develop component industries.

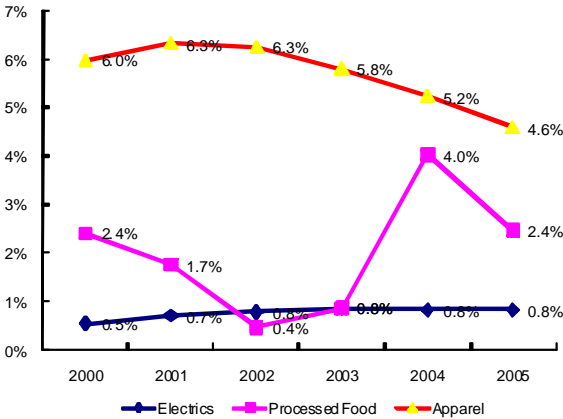
The reduction in the deficit in the food processing sector derives from the growth of olive oil, which is the largest export item in this sector. Tunisian olive oil has won high acclaim at international fairs staged in Mediterranean olive-producing countries, and it accounts for more than half the total value of olive oil imports to EU countries (76% in 2004, 51% in 2005).

As for the textile and apparel sector, which generates the largest surplus, as may be gathered from Figure 2-3, the surplus appears to have peaked. This is due to the fact that abolition of the Multi-Fiber Arrangement in January 2005 has led to the intensification of competition with products from emerging Asian nations such as China and India in the EU market.

2.1.3 Movements in the Share of the Electric and Electronic Sector and Food Processing Sector in the EU Market

Looking at the overall value of exports in terms of export destination, Europe accounts for 80% (81% in 2002, 80% in 2006). This bias is the characteristic feature of the export market, however, here we take a look at the competitiveness of Tunisian products in the electric and electronic and food processing sectors in terms of their export share in the EU market.

Figure 2-5 shows the share of Tunisian products out of total imports to EU countries for the sectors of textiles and apparel (the largest), electric and electronics and food processing⁸.



Source: UN Commodity Trade Statistics Database

Figure 2-5 Share of Tunisian Products in EU imports

⁸ Figures for the textile and apparel sector are obtained by adding data for HS (Harmonized Commodity Description and Coding System) codes 61 and 62 (knit products and accessories, and apparel and accessories

In the electric and electronic sector, the share of Tunisian products in the EU market increased gradually from 0.53% in 2000 to 0.81% in 2005. Incidentally, the major export items from the model enterprises in the pilot project are wire harnesses, fluorescent light fixtures, discharge current stabilizers, indoor lamp fixtures and other products manufactured utilizing cheap labor. Accordingly, in future international markets, considering that competition with emerging nations that can exploit low wages will intensify, it is desirable to internalize the manufacture of parts that entail high level processing technology and to reinforce competitiveness in this area as a sector to replace the textile and apparel sector.

In the food processing sector, the situation is largely determined by exports of olive oil; however, as was mentioned previously, it is necessary to develop processing setups that stretch to bottling processes and to establish own company brands with a view to gaining market recognition and enhancing added value.

In the textiles and apparel sector, the share of Tunisian products has been in decline since 2002 (see Figure 2-6), and this has been brought about by the emergence of China, gains by India and Bangladesh, and a decline in the price competitiveness of Tunisian products due to wage increases at home.

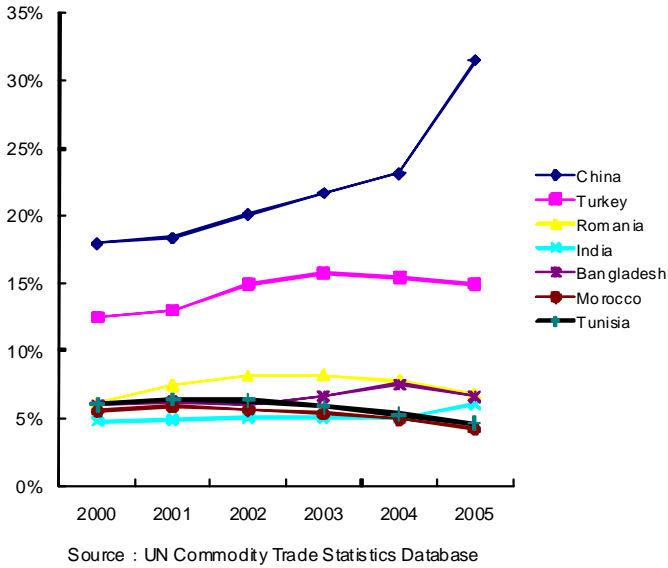


Figure 2-6 Distribution of imports of apparel articles to EU market by country

2.2 Issues for Strengthening International Competitiveness

Section 2.1 looked at the current state of international competitiveness of Tunisian industries, and the background factors to this are summarized in Figure 2-7. In order to work on these factors and reinforce competitiveness, the following issues need to be tackled: 1) improvement of quality/productivity, 2) reinforcement of parts processing capacity, 3) diversification of industry (breakaway from dependence on textiles and apparel), and 4) diversification of export markets and procurement markets.

excluding knitwear); those for the electric and electronic sector are obtained by adding data for HS code 85 (electric devices and partly finished goods); and those for the food processing sector are obtained by adding data for HS codes 15, 16 and 22 (animal and vegetable fats, prepared meat and fish products, and beverages and alcohol.

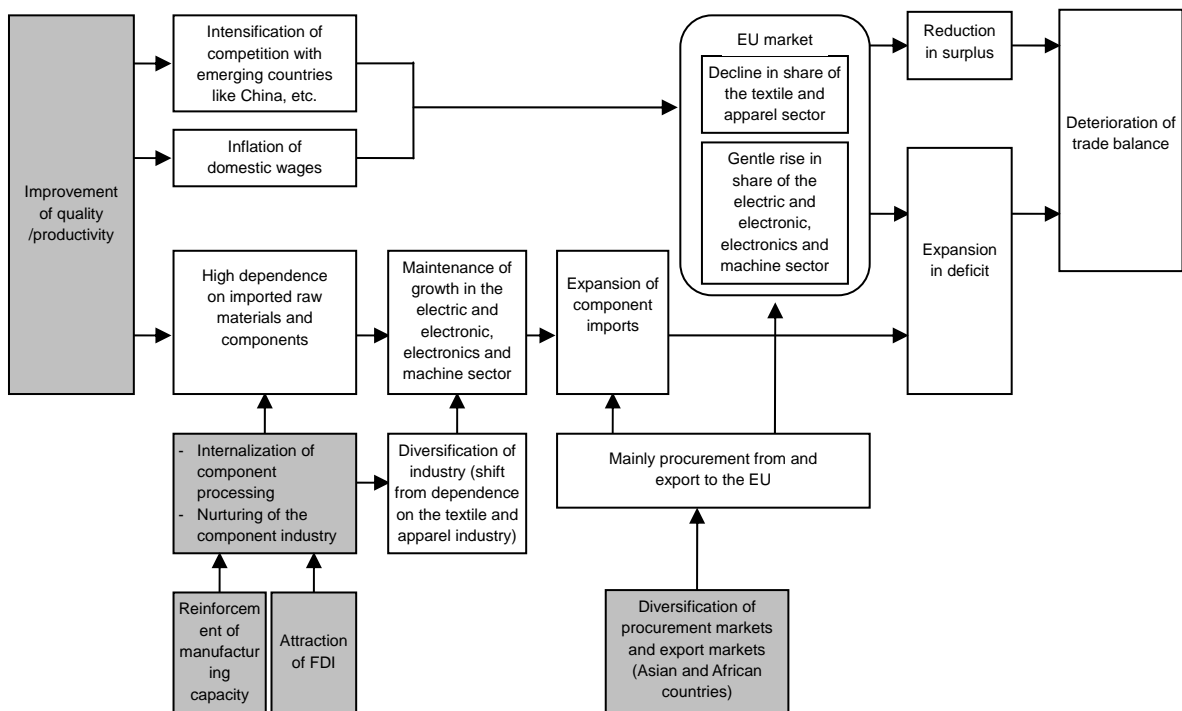


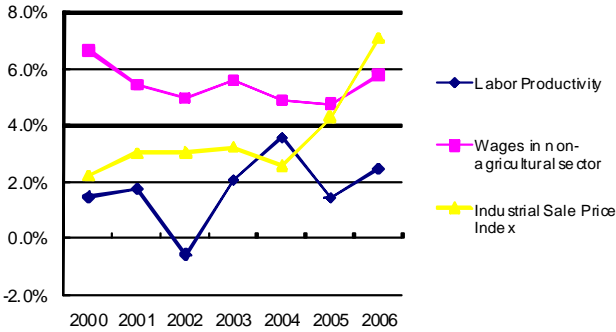
Figure 2-7 Issues and factors for Reinforcing Competitiveness

In the pilot project that was carried out between January and October 2007, quality/productivity improvement (Kaizen) activities were implemented within the model enterprises using the existing mechanical equipment and human resources. Among the subjects, cases were reported where, as a result of conducting layout improvement and the 5S, the plant environment was cleaned up, ample work space was secured and operators' moving distances were shortened, leading to an immediate improvement in human productivity of 30%. Accordingly, in order to reinforce competitiveness, in line with promoting the following long-term measures (2)), it is first necessary to 1) establish KAIZEN activities within the daily corporate routine.

2.2.1 Improvement of Quality/Productivity

As was described in Section 2.1.3, the reason why the share of Tunisia's textile and apparel sector is going down and the share of the electric and electronic sector is creeping up is because increasing wages at home have led to inflation of product prices, making Tunisia more vulnerable in price competition with emerging nations such as China. Accordingly, it is first necessary to improve the quality/productivity of existing sectors.

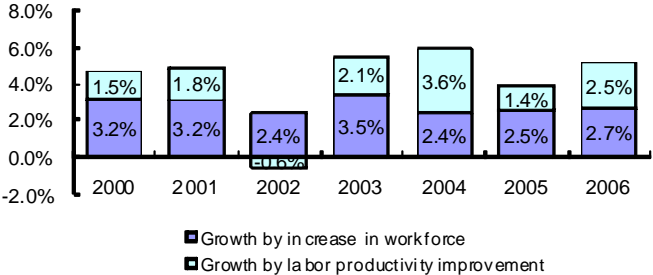
A number of enterprises are attempting to compensate for their price disadvantage through improving quality and seeking differentiation with Chinese rival products. For example, a women’s blouse maker located in the outskirts of Tunis predicted that competition with China in international markets would intensify some five or six years ago, so it shifted the focus of its operations to high quality brand items as a subcontractor for European apparel makers. In future, this company aims to utilize the skill it has built up to improve turnover through developing products and uncovering new customers based on its own designs.



Source: Institut National de la Statistique (INS)
 Note: Labor Productivity= Real GDP/Labour force

Figure 2-8 Year-on-year changes in Labor Productivity, Wages and Prices (%)

Concerning the background to the need for higher productivity, as can be seen in Figure 2-8, the rate of wage inflation has constantly exceeded growth in labor productivity, leading to upward pressure on industrial product prices, and this trend has been particularly prominent since 2005. Therefore, in order to reinforce international competitiveness, it is necessary to realize enough improvement in productivity to absorb wage inflation in the labor market and to stabilize prices.



Source: Institut National de la Statistique (INS)

Figure 2-9 Real GDP Growth (%)

Looking at the real GDP in recent years, except for a temporary drop in 2002 following the 9-11 terrorist attacks, this has maintained steady growth of 4~6%. Figure 2-9 breaks real GDP down into the working population and labor productivity and shows the level of contribution made by both these factors.

According to this, more than 50% of the growth so far achieved in real GDP has been brought about by the increase in workforce. Accordingly, considering that there is no more spare labor supply in line with the gradual decline in the unemployment rate, it will be necessary to expand production through further enhancing labor productivity in order to attain and maintain the domestic growth target of 6.1% that has been raised in the 11th Five-Year Plan.

2.2.2 Strengthening of Parts Processing Capacity

2.2.2.1 Reinforcement of Product Making Capability

As was described earlier, the share of the Tunisian electric and electronic industry in the EU market is increasing, although it is still at a low level and is only growing at an extremely slow rate. Concerning the reasons for the slow rate of growth, as in the textile and apparel sector, it is possible that the appearance of emerging nations with access to cheap labor is leading to more intense competition. For example, B. Co., which is located in Tunis, assembles TV sets for domestic consumption while also assembling PCBs as a subcontractor for a French maker, however, the ratio of these subcontracting activities has suddenly dropped from 75% to 20%, indicating the possibility that the maker has transferred orders to other countries. In the case of C Co., which conducts the injection molding of plastic lamp covers for automobiles, it exports 60% of products as repair parts to North African countries such as Morocco and Algeria, etc., where its chief competitors are Chinese companies offering prices that are roughly 20% lower.

Expectations are being placed on the electric and electronic sector to take the place of the textile and apparel sector to generate surplus in the balance of trade, however, in order for this to happen, it is desirable to move away from the present setup of low added value manual labor whereby products assembled and processed utilizing cheap labor are exported, and to shift to production setups that incorporate the internal processing of core components and semi-finished products, or otherwise to develop the domestic component sector. In order to achieve this, it will be necessary to conduct technical training geared to acquiring basic skills in the areas of metal pressing, plating, machine processing, casting and forging, etc.

2.2.2.2 Transfer of Processing Technology through Attraction of FDI

It is necessary to attract FDI in order to introduce new technologies to existing industries and to support the reinforcement of component processing capacity. Currently 13 techno parks are planned in Tunisia. Of these, the El Ghazala Techno Park in Tunis has already been completed and is reaching out to IT enterprises. The 12 other techno parks are currently under construction, however, they are all expected to attract research and development-oriented enterprises. The Borj-Cedria Science and Technology Park, which is being constructed on the outskirts of Tunis (as of February 2007), comprises three areas, i.e. the technical development area (including business incubation center), an industrial estate, and a university area, and it will serve as a technical resource center linking the functions of research, technical development and production. In specific terms, this park will specialize in the 1) bio, 2) water treatment and 3) renewable energy (solar power, etc.) sectors.

The techno park in Sousse plans to attract machine and electric and electronic industries. Although these techno parks must depend on a lot of FDI, efforts must also be made to attract enterprises that will contribute to strengthening the component processing capacity of existing industries.

2.2.3 Diversification of Industry (Away from Dependence on the Textile and Apparel Sector)

So far exports in the electric and electronic and machine sector have surpassed the rate of growth in exports overall, while the share in terms of export value has gradually increased from 19.5% in 2002 to 25.2% in 2006. Meanwhile, the export value share of the textile and apparel sector seems to have peaked and has steadily decreased from 48.6% in 2002 to 33.6% in 2006 (see Figure 2-10).

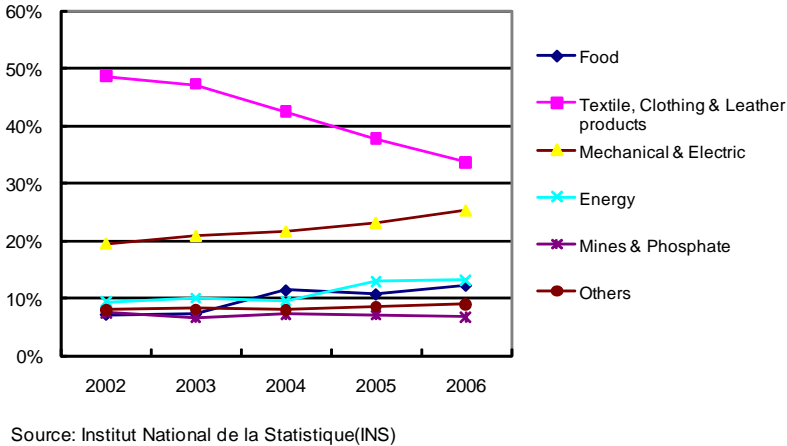
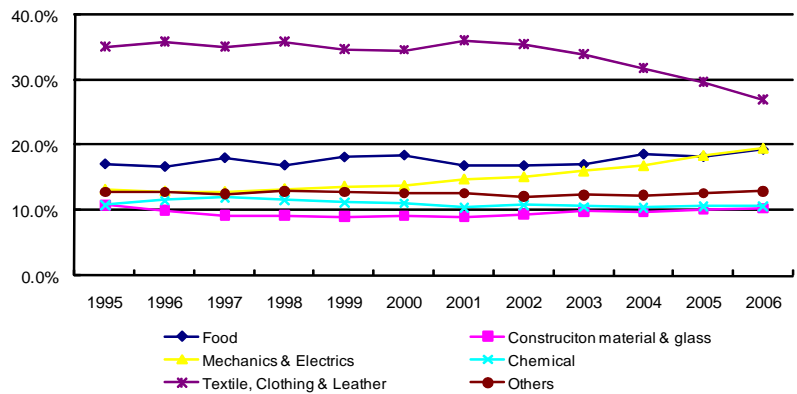


Figure 2-10 Movements in Sector-separate Share of Export Value (Unit %)

As economic development has progressed, the structure of exports has shifted from light industrial sectors such as food, textiles, apparel and leather products to heavy industrial sectors such as metals, machinery and electric and electronics, etc., and according to the pattern observed in numerous other countries in the past, it is likely that heavy industries will replace light industries as the leading export sector. As of 2006, the export share of electric and electronics and machinery was still lower than that of textiles and apparel, however, it is expected that the positions will be reversed in the near future.

However, in order for this to occur, it is necessary for the domestic industrial structure to break away from excessive dependence on the textile and apparel sector. Figure 2-11 indicates movements in each sector’s share of added value in the manufacturing industry. Until around 2000, the textile and apparel sector maintained a high share (35~36%), while the electric and electronic and machinery sector was static at a low level (13~14%), however, from 2000 there has been a decline in textiles and apparel and an increase in electric and electronics and machinery. Accordingly, in order to solidify this trend, it is necessary to reinforce component processing capacity in the manner described in Section 2.2.2.



Source:INS

Figure 2-11 Distribution of Value Added by Sector in Manufacturing (%)

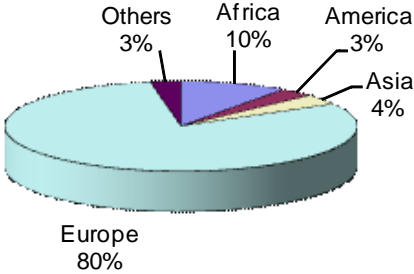
The proposal here is to correct the over-dependence on textiles and apparel and to impart foreign currency earning capacity to the other industrial pillars of electric and electronics and machinery, however, this does not preclude efforts to reinforce the competitiveness of textiles and apparel. In addition to strengthening the competitiveness of local enterprises through improving quality/productivity on production lines, steps are required to help enterprises grow away from being subcontractors for European corporations to becoming independent enterprises that possess integrated design, production and marketing processes and have the capacity to establish Tunisian brands. According to the Textile Technology Center, only approximately 300 out of 2,000 textiles and apparel makers in Tunisia primarily supply products to the domestic market, while the majority of companies are dependent on exporting to the EU market. Considering this fact, there is a very high need to promote the shift of enterprises to independent corporations that are capable of launching unique Tunisian brands.

Moreover, as was indicated in Section 2.1.3, Figure 2-6, since the share of Tunisian textiles and apparel products in the EU market is only around 5%, which is smaller than the share of other countries such as China and Turkey, in order for textile and apparel makers to survive, it may be better for them to move away from mass production of limited models geared to securing merits of scale and aim for niche markets through producing numerous models in smaller quantities. It will also be necessary to utilize existing sewing technology in order to develop customers in different fields. For example, businesses can be extended horizontally to household textile products such as curtains or car interior furnishings, etc.

2.2.4 Diversification of Export Markets and Procurement Sources

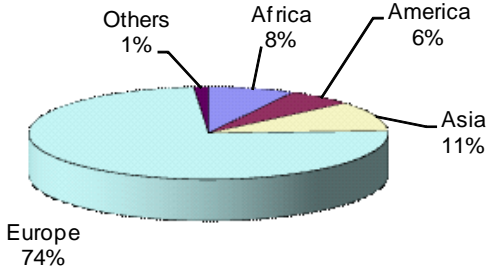
Looking at the geographical distribution of export destinations in 2006, Europe accounted for 80% (see Figure 2-12), remaining almost unchanged from 81% in the first year of data collection in 2002. The top three countries were France, Italy and Germany, accounting for 32%, 22% and 8% of exports respectively or 62% combined.

Looking at the geographical distribution of import sources, Europe accounted for 74% (see Figure 2-13), which was slightly down from 78% in 2000, reflecting the increase in imports from Asia after 2002. Having said that, imports like exports display an imbalance towards Europe. Here too, the top three import sources were France, Italy and Germany, accounting for 23%, 19% and 8% of exports respectively or 56% combined.



Source: Institut National de la Statistique (INS)

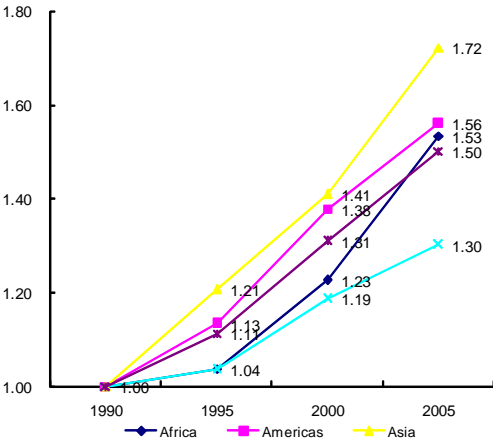
Figure 2-12 Exports by Regions (2006)



Source: Institut National de la Statistique (INS)

Figure 2-13 Imports by Regions (2006)

Tunisia’s over-dependence on Europe in terms of export markets and import sources is partly due to its geographical proximity, however, another factor is that many exporting enterprises in Tunisia are subcontractors or directly invested joint affiliates of European corporations based in France and Italy, etc. and they receive components and semi-finished products from those parent companies.



Source: UN National Accounts Main Aggregates Database

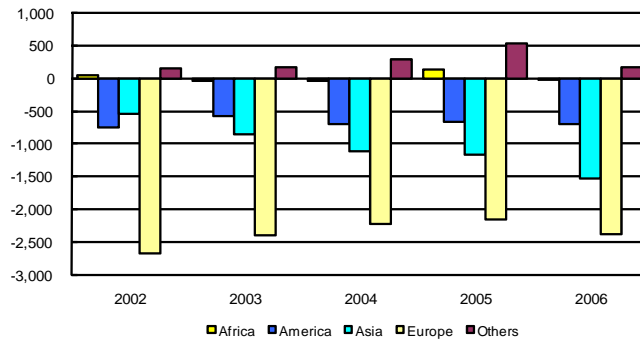
Figure 2-14 GDP Growth since 1990 at constant 1990 prices

According to the questionnaire survey that was implemented in the third field study in the project, 63.2% of enterprises responded that they want to diversify export markets in order to reinforce their international competitiveness. D Co., which is a maker of leather products such as bags and belts, etc., sells 70% of its products in Tunisia and the remaining 30% to European countries such as France and Italy. Concerning its exports, the company conducts OEM (Original Equipment Manufacturer) production as the subcontractor of European corporations, whereas concerning its domestic operations, it has established its own brand and places emphasis on design through employing two designers and so forth. In terms of technical level, through raising quality under guidance from ordering corporations ever since its establishment in 1987, the company has reached a level that is acceptable in Europe and in future aims to export products under its own brand name.

Among the pilot enterprises, E Co., which produces power cable connectors, previously purchased raw materials from its parent company in France, however, following negotiations with the parent company, it recently received consent to procure its own raw materials. This, however, is an unusual case. Since the diversification of procurement markets will directly lead to improvement in the quality of raw materials and components and reduction of costs, it is very necessary.

Regarding export markets, greater effort is needed to sell to Asia, where growth in demand is outstripping other regions, as well as nearby North African nations (Morocco, Algeria and Libya), where sales have been poor in spite of a population of approximately 70 million. As for procurement sources, greater attention needs to be directed towards Asia, which is developing into the world's manufacturing center.

Diversification of export markets should also be tackled from the viewpoint of improving the trade balance of payments on Tunisia. Looking at the trade balance of payments in geographical terms, the trade deficit with Europe is the largest, however, looking at movements from 2002 onwards, the trade deficit with Asia has been growing every year and is closing in on the deficit with Europe (see Figure 2-15). This is due to the fact that whereas exports are only growing at an average rate, imports from China and so on are growing much faster. According to CEPEX, the Export Promotion Agency, the diversification of markets is the issue. Although it has no office in Asia, it views the Asian market as large and attractive. In order to stem this deterioration in the trade balance of payments, it is urgently necessary to develop new sales routes in the Asian market.



Source: Institut National de la Statistique (INS)

Figure 2-15 Trade Balance by Regions (MTD)

3. Issues and Recommendations for Improvement of Quality/Productivity

The overall objective of the project is to conduct survey and analysis of the electric and electronic and food processing sectors, which are important industries for Tunisia, and to compile a master plan comprising policies, implementation setup and action plan, etc. for improvement of quality and productivity.

The overall project is divided into three phases. In Phase I, a fact-finding survey of enterprises was carried out and the pilot project target enterprises were selected. In Phase II, the pilot project was implemented, and during this a manual corresponding to current conditions in Tunisia was compiled. In compilation of the master plan, various assumptions that were set ahead in advance were verified during implementation of the pilot project, and the results were compiled into recommendations (Phase III). (See Figure 3-1)

In this chapter, the following activities are described:

- 1) Verification of the assumptions that were set ahead of the pilot project. Verification was implemented during implementation of the pilot project.
- 2) Based on the results, extraction of the priority issues that Tunisia needs to work on in future in order to improve quality/productivity.
- 3) Proposal of recommendations concerning “What needs to be done” in order to resolve the said issues.

Concerning the contents that are proposed in Chapter 3, Chapter 4 will specifically describe how these should be realized. Chapter 4 describes the action plan.

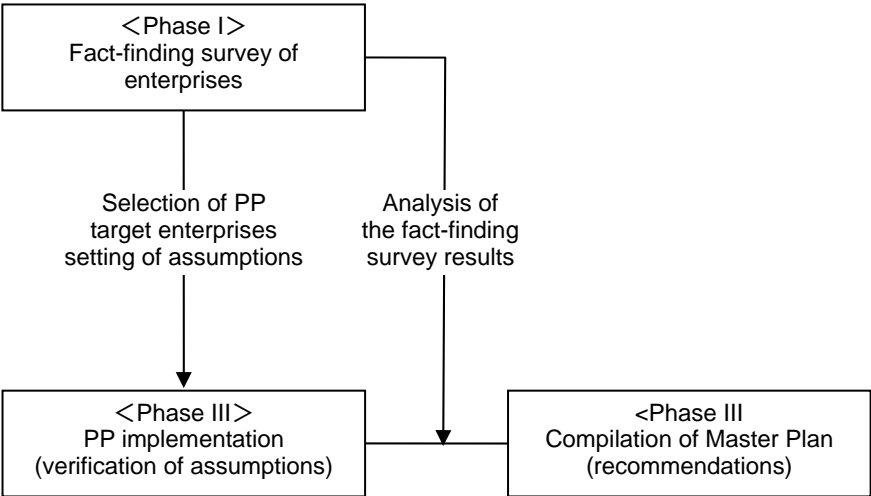


Figure 3-1 Linkage of Each Phase

3.1 Outline of the Pilot Project and Assumptions in Implementation

3.1.1 Outline of the Pilot Project

The pilot project was launched at the Kick-off meeting on January 16, 2007 and completed at the closing ceremony on October 25. Whereas the number of targeted enterprises was 15 in the electric and electronic sector and 14 in the food processing sector, this fell to 14 and 13 enterprises respectively over the nine months or so of pilot project implementation⁹.

Company diagnoses were implemented at each of the target enterprises, and then the enterprises, counterparts (C/P) and JICA Team collaborated in trying out Kaizen activities (quality/productivity improvement activities)¹⁰ in each enterprise. (See Reference Material 1 for the detailed contents of the pilot project).

3.1.2 Setting of Assumptions in PP Implementation

As was mentioned above, in implementing the pilot project, the following assumptions were set based on the findings of the fact-finding survey of enterprises and visits to industrial groups and public agencies, etc.

[Assumption 1] For the many Tunisian enterprises that depend almost totally on overseas for components and materials, through seeking to improve not only “manufacturing quality”¹¹ but also “design quality”¹² and “component quality”¹³ for themselves, it will be possible to boost international competitiveness.

[Assumption 2] Without resorting to investment into new machines and equipment, many Tunisian enterprises have room to improve quality/productivity through using existing machines and equipment, and they have the potential to apply various quality/productivity improvement techniques and technologies including Japanese methods.

[Assumption 3] Enterprises that have strong commitment from top management can be expected to produce good results in the area of quality/productivity improvement too.

9 There were 15 enterprises in the electric and electronic sector and 14 in the food processing sector at the time of the kick-off meeting, however, one of the enterprises in the electric and electronic sector was unable to spare personnel because it was preparing to acquire ISO certification, and one of the food processing enterprises withdrew from the project because it was purchased by a foreign corporation.

10 In this report, the term “Kaizen” is almost synonymous with “quality/productivity improvement.”

11 Manufacturing quality: Is the planned quality reflected?

12 Design quality: Are products made according to design?

13 Component quality: Do they satisfy requirements as the component elements of products?

[Assumption 4] Setups for promoting multifaceted (comprehensive) quality/productivity improvement activities in Tunisian industry are required.

This chapter verifies these assumptions based on the experience of the pilot project and, based on the results, extracts the issues that need to be tackled in Tunisia for quality/productivity improvement and reflects them in the master plan (by making recommendations for their resolution).

3.1.3 JICA Project Approach (Comparison with EU Project)

In implementing the pilot project, differences in approach with the projects of other donors especially in the EU were ascertained in advance. (See Reference Material 2-1 for trends of other donors).

Currently the EU is conducting assistance for Tunisia in the field of quality improvement. However, the approach adopted in this differs from the approach of the JICA project. The content of “quality improvement assistance” in the EU project is actually support for the acquisition of ISO (International Organization for Standardization) certification. In contrast to this, the JICA project aims to assist the improvement of manufacturing quality and productivity on manufacturing lines. Whereas the contents of guidance in the EU project are based on unified international standards (concerning, for example, management systems and documentation, etc.) regardless of the enterprise, the issues tackled in the JICA project differ according to each target enterprise, so the techniques and approaches that are adopted also differ according to each issue.

These two approaches are not mutually exclusive, but rather they form a complementary relationship. In reality, a certain enterprise gained an advantage in its efforts to acquire ISO certification through taking part in the pilot project, whereas another enterprise that had already acquired ISO certification realized higher productivity thanks to the pilot project. (See Reference Material 2-2 for a comparison of the JICA project and the EU project).

3.2 Verification of the PP Outcomes and Assumptions

Here, the assumptions described earlier are verified based on the implementation results of the pilot project.

3.2.1 Assumption 1 (For the many Tunisian enterprises that depend almost totally on overseas for components and materials, through seeking to improve not only “manufacturing quality” but also “design quality” and “component quality” for themselves, it will be possible to boost international competitiveness)

This assumption can be pre-supposed because almost all exporting Tunisian enterprises operate as subcontractors for European corporations, however, some enterprises in Tunisia are now taking actions to back it up.

Many enterprises in Tunisia are in subcontractor relationships with overseas corporations based mainly in Europe. They import components and materials from overseas and use them to assemble products for export. However, in this model, because components and product designs come from overseas, enterprises are unable to autonomously respond in the event where they receive complaints. Unless enterprises have the systems required to immediately respond to complaints, they are at a disadvantage in terms of international competitiveness. Furthermore, compared to manufacture of components and design of products, assembly-based operations entail a low added value, and enterprises can only improve their added value to a certain degree.

Having said that, some enterprises in Tunisia are challenging such limitations.

For example, some enterprises in the food processing, leather, furniture, electric and electronic and electronics (batteries, breakers, switches, transformers, ballasts, cables, refrigerators, washing machines, etc.) sectors process and manufacture components internally and are striving to improve quality levels.

Moreover, one of the pilot project enterprises internally conducts design activities and is advancing preparations to compete in international markets. This company is a maker of florescent lights; it produces many of its components internally and designs its own products while incorporating the wishes of customers. Among the enterprises that were targeted in the pilot project, this one conducted the production with the highest added value. Moreover, another enterprise that was troubled by a high rate of nonconformities in imported components was able to reduce its nonconformity rate by 80% through acquiring its own molds and manufacturing its own components. In this way there are sure signs of enterprises in Tunisia producing and processing their own components, conducting their own design activities and striving to build setups that can immediately respond to market complaints; however, the numbers of such enterprises are still small.

Thus Tunisian enterprises are becoming aware of the fact that international competitiveness can only be reinforced to a certain extent based on improvement of manufacturing quality, and that it is also important to build systems that enable design quality and component quality to be internally improved.

3.2.2 Assumption 2 (Without resorting to investment into new machines and equipment, many Tunisian enterprises have room to improve quality/productivity through using existing machines and equipment, and they have the potential to apply various quality/productivity improvement techniques and technologies including Japanese methods)

This assumption was demonstrated via the concrete examples indicated below. Many of the enterprises targeted in the pilot project were able to realize quality/productivity improvement while using their existing machines and equipment. It is fair to say that the Japanese style quality/productivity improvement techniques and approaches that were applied were accepted to a large degree. (See Reference Material 3 for a general summary of the implemented contents and outputs at the enterprises targeted in the pilot project).

<Case of the Electric and Electronic Sector>

In the pilot project, improvement themes were set for each model enterprise, and improvement activities were implemented using techniques deemed to be effective for each theme.

Looking at concrete examples of the Kaizen activities, an enterprise that introduced 5S realized a 20% increase in plant space and 30% improvement in productivity. A company that specializes in producing a large variety of models in small quantities was able to reduce time loss by half through reducing its mold changeover times. A molding plant was able to discover the cause of defects and reduce its nonconformity rate from 20% to 1% upon introducing the 7 tools of QC. One-third of the enterprises that took part in the pilot project were able to show numerically expressible outputs within the pilot project period (nine months from January to October 2007). Many enterprises in Tunisia have spare capacity to improve productivity and quality without having to make investments into new plant.

Table 3-1 shows the theme-separate improvement techniques and improvement outputs that were demonstrated in the pilot project and are deemed to be valid for Tunisian industry in future. Incidentally, among the techniques that were adopted, unique Japanese group activities such as 5S and QC circles were included.

Table 3-1 Improvement Techniques deemed to be Effective for Quality/Productivity Improvement in the Tunisian Manufacturing Industry

№	Kaizen Technology (Theme)	Applied Enterprises	Main Kaizen Techniques	Level of Achievement of Kaizen Outputs		
				A	B	C
1	Layout	9	PQ analysis / Transfer distance analysis / Process proximity analysis	7	1	1
2	Operation man-hours balance	7	Operation man-hours balance analysis	6	1	
3	Shortening of set-up times	3	Single set-up (SMED)	2	1	
4	5S	6	5S/Visual control		5	1
5	QC circles	2	7 tools of QC		1	1
6	Quality of manufacturing process	1	7 tools of QC			1
7	Quality of injection molding process	1	7 tools of QC	1		
8	Operating rate of pressing process	1	7 tools of QC		1	

[Remarks] Level of achievement of Kaizen outputs: A indicates enterprises where concrete (quantitative) quality/productivity improvement was confirmed during the PP period; B indicates enterprises where concrete (quantitative) quality/productivity improvement is expected in the near future; and C indicates enterprises where Kaizen techniques were acquired only. Incidentally, the reason why totals do not number 14 is because enterprises were allowed to implement multiple Kaizen technologies (themes).

As is shown in Table 3-1, the enterprises that adopted layout and operation man-hours balance as their Kaizen themes realized a high level of achievement of Kaizen outputs. Moreover, in the plastic injection molding process and other processes that use dies, techniques for shortening set-up times led to a high level of kaizen outputs. Japanese style small-group activities such as QC circles and 5S¹⁴ only showed low levels of outputs achievement, however, this was because the implementation period was too short. When conducting activities such as these, it is first necessary to educate operators and raise the level of awareness towards quality/productivity. Since Kaizen techniques such as the 7 tools of QC¹⁵ and so on are practically acquired one at a time after that, this takes a long time. TQM (Total Quality Management) and TPM (Total Productive Maintenance) are also company-wide activities that take a long time to produce outputs. For this reason, these technologies were not raised as Kaizen techniques in the pilot project here.

<Case of the Food Processing Sector>

The types of Kaizen techniques that are effective in Tunisia are determined according to the types of quality/productivity problems that are most commonly found there. The following problems were frequently observed in the pilot project enterprises and plants other than those targeted in

14 5S is taken from the initial letters of the words Seiri (sorting), Seiton (systematic arrangement), Seiso (sweep), Seiketsu (scrub) and Shitsuke (self-discipline) and refers to those items that must be thoroughly practiced in the manufacturing and service industries.

15 The 7 tools refer to Pareto diagrams, check sheets, histograms, scatter diagrams, control drawings, graphs and cause and effect diagrams. These basic tools are used to read various kinds of information from data.

the pilot project. Table 3-2 summarizes these together with the improvement techniques that were found to be effective via the pilot project activities.

Table 3-2 Relatively Common Problems and Valid Kaizen Techniques
in Food Processing Enterprises

Division	Relatively Common Problems	Effective Kaizen Techniques
Quality	Lines are cluttered with unnecessary items	7S ¹⁶
	Poor product shapes	7 tools of QC, design of experiments
	Intrusion of foreign materials	7S, 7 tools of QC
	Unsanitary manual work, sanitary environment	HACCP
Productivity	Long resetting times	Operation analysis, SMED, 7S
	Machine failures and long repair times	PM
	Work in progress between processes and inefficient transfer	Operation analysis, materials management analysis
	Manual operation procedures and methods entailing a lot of variation	Operation analysis

[Note] HACCP: Hazard Analysis Critical Control Point, PM: Preventive Maintenance

Two points became clear through the pilot project activities in the two sectors.

First, among the tried quality/productivity improvement techniques were distinctly Japanese techniques such as 5S and QC circles, however, in spite of differences in culture, values and thinking, a number of these techniques and technologies were transferred to the Tunisian side as shown in Tables 3-1, 3-2 and 3-3. This indicates that differences between the two countries in terms of culture and values can be overcome to a large degree according to the method of transfer and guidance.

The other point is that many of the techniques and technologies used for quality/productivity improvement can be commonly applied to different sectors. Certainly the electric and electronic and food processing sectors have their own features, however, many quality/productivity improvement techniques and basic approaches such as 5S, QC circles, layout improvement, work balance and SMED are commonly applicable across different sectors.

<Transfer of techniques to the counterparts>

Table 3-3 shows the types of Kaizen technologies that the counterparts (consultants¹⁷ that belong to public technical centers such as CETIME and CTAA) acquired during the pilot project and are capable of mastering by themselves in future.

16 7S is taken from the initial letters of the 5S words Seiri (sorting), Seiton (systematic arrangement), Seiso (sweep), Seiketsu (scrub) and Shitsuke (self-discipline) and adds the words of Shodoku (disinfection) and Sakkin (sterilization).

17 Tunisia has eight technical centers under the Ministry of Industry, Energy and Small and Medium Enterprises

Table 3-3 Improvement Technologies that the Counterparts have Acquired and Can Use in Future

№	Improvement Technology	Contents and Techniques of the Technology
1.	Layout improvement	PQ analysis / Transfer distance analysis / Process proximity analysis
2.	Work man-hours balance improvement	Time research (stopwatch method) / Operation research
3.	Shortening of setup times	Single setup (SMED) method / Video analysis
4.	QC circles	Analysis using the 7 tools of QC / 7 areas of waste elimination
5.	5S	Tag method / Color display / Visual control / Dividing lines

A manual was prepared during the pilot project implementation stage, however, technology center counterparts (C/P) were in charge of the above technologies and it is thought they possess sufficient theoretical understanding. In future, it is anticipated that the C/Ps educate each other and build up further experience in conducting practical diagnosis and guidance regarding the above five areas of Kaizen technology in enterprises.

3.2.3 Assumption 3 (Enterprises that have strong commitment from top management can be expected to produce results in the area of quality/productivity improvement too)

This assumption can also be demonstrated through clear examples observed in the pilot project.

Electric and electronic sector enterprises that recorded good outputs in the pilot project have owners who recognized the importance of quality/productivity improvement and took a positive attitude to the pilot project (see Table 3-4). In some cases, the enterprise owners were not fully aware of quality/productivity improvement from the start of the pilot project. At the start, they were skeptical about the advice and suggestions made by the JICA/UGPQ (CETIME and CTAA) consultant teams and were unenthusiastic about execution, however, they adopted a more positive attitude once they understood the contents. This is evidence that enterprise owners have the desire to improve quality and productivity once they realize that it will lead to higher sales and profits. The same is true of the owners who remained skeptical until the end of the pilot project; the only difference was that the advice and suggestions provided were not enough to convince them.

(MIPME). In this study, the UGPQ is the direct counterpart, however, in reality the personnel of two technical centers, i.e. CETIME (electric and electronic and machinery sector) and CTAA (food processing sector) were mobilized. These personnel are referred to as consultants inside and outside of the technical centers.

Table 3-4 Kaizen Outputs in the Pilot Project

[Electric and electronic sector]		Level of Kaizen Achievement		
		A	B	C
Degree of owner's positive attitude towards Kaizen	a	6	1	
	b	3	2	1
	c			1

[Food sector]		Level of Kaizen Achievement		
		A	B	C
Degree of owner's positive attitude towards Kaizen	a	2		
	b	2	3	3
	c			3

[Source] JICA Study Team

[Note] Level of Kaizen achievement: A indicates enterprises where concrete outputs were achieved during the PP period; B indicates enterprises where concrete outputs are expected in the near future; and C indicates enterprises where Kaizen techniques were acquired during the PP.

In the electric and electronic sector, greater Kaizen achievements were observed in small and medium enterprises during the pilot project, and this indicates that it is easier to realize quality/productivity improvements when the enterprise owner makes direct decisions and displays initiative. However, similar outputs can also be anticipated in large enterprises provided that the top management delegates authority to middle managers.

The same is true in the food processing sector. The level of commitment of business owners towards Kaizen is an important factor in determining the success of the pilot project. If supervisors feel that business owners lead from the front or that they have an interest in Kaizen and will offer support in the event of problems, they will be more motivated towards making improvements. In the food processing sector, business owners have hardly any involvement in actual management affairs irrespective of the size of the enterprise, however, in cases where top managers were delegated by owners to act as liaisons for the pilot project, it was easier to advance the project activities and realize outputs.

<Management information is biased>

The impact of a positive attitude and approach by top management on management outputs was demonstrated by the pilot project in the area of quality/productivity improvement. However, when it comes to viewing the situation from the wider perspective of reinforcing international competitiveness, there is an important issue that Tunisian enterprise owners need to tackle.

The management information that Tunisian enterprise owners need in order to make managerial decisions is biased.

In an environment of advancing globalization, enterprise owners need to make decisions based on global information; however, because the export and import trade partners of Tunisian enterprises are concentrated in specific countries (in Europe especially), the market information they have access to is also biased. For example, even though there are numerous low price and high quality components and materials available in Asia, particularly East Asia and Southeast Asia, Tunisian enterprise owners are not aware of them. If Tunisian enterprises were able to use high quality components and materials, they would be able to improve product quality and reinforce their competitiveness. There is a need to diversify sources of information.

3.2.4 Assumption 4 (Setups for promoting multifaceted (comprehensive) quality/productivity improvement activities in Tunisian industry are required)

In Tunisia, the UGPQ is an organization that promotes quality improvement across all sectors. The UGPQ was established with a five-year mandate under Ordinance No. 2101 on July 27, 2005 within the Ministry of Industry, Energy and Small and Medium Enterprises (MIPME). Its major activities currently consist of providing guidance to enterprises for acquiring ISO and HACCP certification and conducting training geared to nurturing instructors. The UGPQ is also the secretariat charged with making preparations for “Quality Week,” which has been designated as the final week of March 2008, and the “Quality Grand Prix,” whereby enterprises that display great achievements in quality improvement will be commended during the said week.

Meanwhile, concerning improvement of productivity, there is no agency that covers all sectors. The only public department responsible for productivity improvement affairs belongs to CETIME, which covers the electric and electronic sector.

The pilot project on this occasion targeted only electric and electronics and food processing but omitted all other sectors. Even in the two targeted sectors, enterprises that weren’t targeted in the pilot project have strong needs for techniques and approaches geared to improving quality and productivity, and similar needs have been confirmed in other sectors too (for example, the textile and apparel sector, paper manufacturing sector, woodworking and furniture sector and so on); however, Tunisia does not currently possess the setup (systems or organizations) for responding to these needs.

In order to promote quality/productivity improvement across all sectors, it is desirable that fine-tuned dissemination activities be promoted. Regarding the types of dissemination activities that are available, looking at the experiences of Japanese related agencies¹⁸, the following kinds of activities are implemented¹⁹:

18 For example, the Union of Japanese Scientists and Engineers (UJSE), Japan Productivity Center for

- Training and education regarding technology (techniques) for quality/productivity improvement
- Mobile seminars for quality/productivity improvement
- Consulting activities geared to providing support services for quality/productivity improvement
- Editing, issue and distribution of manuals, guidebooks and technical books concerning quality/productivity improvement
- Award system and qualification system for providing incentives to the acquisition of technology (techniques) concerning quality/productivity improvement
- Public information and publishing activities for quality/productivity improvement
- Collection and provision of information from important countries concerning quality/productivity improvement
- Encouragement of participation in international activities and conferences concerning quality/productivity improvement

Table 3-5 shows activities deemed to be necessary for disseminating quality/productivity improvement, and it also gives the agencies that are currently engaged in quality/productivity improvement activities in Tunisia. It can be seen that organizations and agencies currently involved with quality/productivity improvement activities in Tunisia are extremely limited and consist of standardization organizations such as INORPI, agencies such as TUMAC for certifying compliance with ISO, etc., UGPQ, the technical centers in each sector, and a limited number of universities and private sector consultants.

Socio-Economic Department (JPC-SED) and the Japanese Standards Association (JSA), etc.

¹⁹ Moreover, in Japan's case, these activities have almost exclusively been implemented by private industrial groups.

Table 3-5 Required Quality/Productivity Improvement Activities and Existing Implementing Agencies

Activities targeting Private Enterprises	Organizations and Agencies Promoting the Activities on the Left	Remarks
1) Training and education regarding technology (techniques) for quality / productivity improvement (including mobile seminars)	UGPQ (mainly stages training opportunities for acquiring ISO certification, etc. Themes other than ISO are covered by the JICA project). Technical centers (TC) Private sector consultants Some universities (theoretical, not practical)	Education and training activities are the most important activities in dissemination, however, the training conducted by UGPQ is mainly linked to ISO. Agencies and organizations capable of providing guidance on quality/productivity improvement are limited.
2) Consulting activities geared to providing support services for quality / productivity improvement	Some TCs Private sector consultants	Support for enterprises is implemented based on international standards such as ISO, however, agencies and organizations capable of responding to individual enterprise issues are limited.
3) Editing, issue and distribution of manuals, guidebooks and technical books concerning quality / productivity improvement	Some TCs UGPQ (Implemented under the JICA project)	(The manual prepared in the PP should be reviewed, supplemented and corrected at regular intervals).
4) Award system and qualification system concerning quality / productivity improvement	UGPQ (Quality Grand Prix)	The Quality Grand Prix will be implemented from March 2008. Currently there is no qualification system.
5) Public information and publishing activities for quality / productivity improvement	Some TCs issue newsletters.	Quality Week will be implemented from March 2008. (Public information activities that cover multiple sectors should be expanded).
6) Collection and provision of international information concerning quality / productivity improvement techniques and trends	Implemented by some TCs?	(In future, activities that cover multiple sectors will be required).
7) Encouragement of participation in international activities and conferences concerning quality /productivity improvement	Implemented by the UGPQ and some TCs	(Participation of officials in international conferences and events should be promoted).

3.3 Issues Confronting Quality/Productivity Improvement

Based on the outputs of the pilot project, the issues that need to be confronted in order for Tunisian industries to expand quality/productivity improvement across all sectors can be summarized into the following four points:

- (1) Rather than simply focusing on “manufacturing quality,” how to devise ways for improving “component quality” and “design quality.” (Resolution of this issue is of utmost priority and is common to all industries concerning quality and productivity).
- (2) How to widely disseminate (to other regions and sectors) the quality/productivity improvement technologies (techniques) that were transferred to the Tunisian side (counterparts) during the pilot

project. (Issues on the side of parties responsible for conducting dissemination and parties transferring techniques, and issues concerning dissemination activities by the technical centers)

- (3) How to enhance the awareness of top managers and middle managers. (Issues on the side of parties receiving dissemination and issues concerning diversification of management information)
- (4) How to build a setup for comprehensively promoting quality/productivity improvement activities.

(1) and (3) are issues that need to be tackled by industries and enterprises (although at the moment government support is needed), whereas (2) and (4) are issues that should be tackled by the government. (2) and (3) relate to the parties responsible for conducting dissemination and parties transferring techniques as well as the parties that receive dissemination. The setup for comprehensively promoting quality/productivity improvement activities in (4) is dependent on the nurturing of (2) and (3) and the building of the environment required for their respective development. Figure 3-2 gives a simplified illustration of the relationships involved.

Moreover, although the counterparts acquired specific technologies (techniques) via the pilot project, they do not possess adequate experience in using these to conduct guidance. Accordingly, it is necessary to seek support from experts who possess rich international experience.

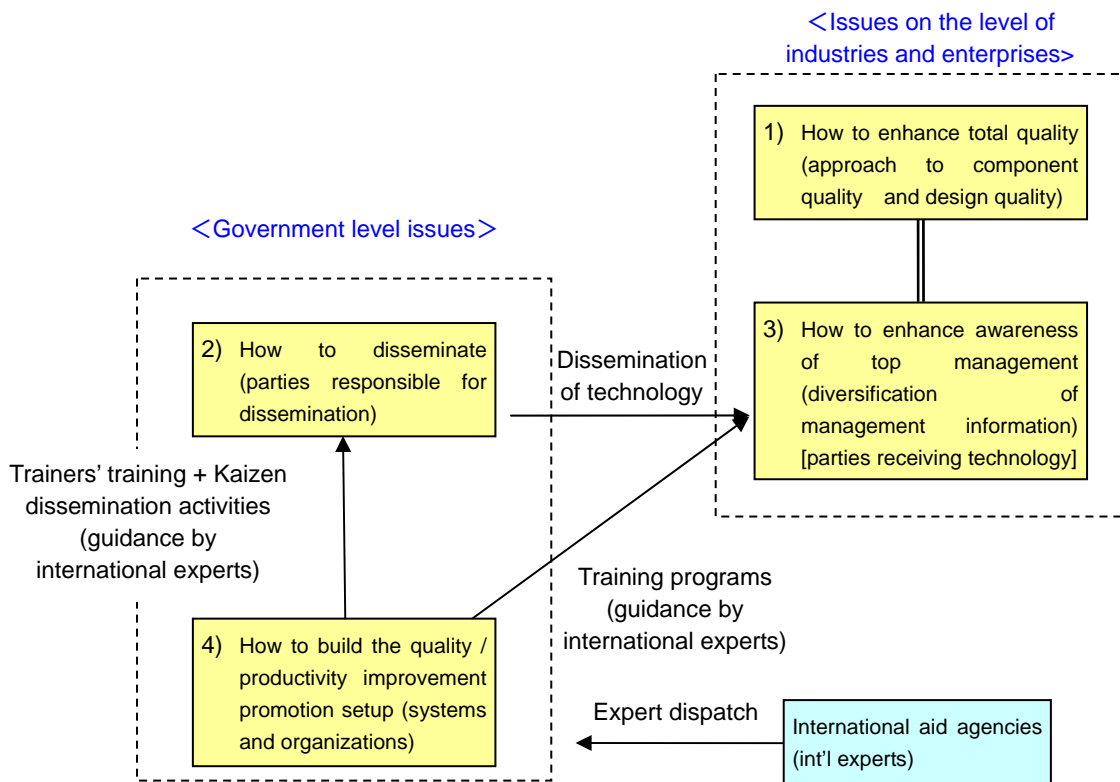


Figure 3-2 Interrelationship of the 4 Issues to be Tackled

The four issues shown above are described in greater detail below.

3.3.1 Reinforcement of International Competitiveness in Component Quality and Design Quality (How to Enhance Total Quality)

In the case where a large proportion of components are imported from overseas as seen with numerous Tunisian enterprises, even if quality is improved in the manufacturing phase, it is not possible to improve the quality of components. Moreover, in cases where products are designed overseas, the Tunisian enterprises are unable to improve the design quality. Many enterprise owners seem to believe that manufacturing is the main determinant of quality, however, in reality manufacturing quality only impacts added value to a very limited degree. Generally speaking, the order of importance for determining added value is design quality, component quality, manufacturing quality; in other words manufacturing quality is the least important factor. Therefore, in order to reinforce international competitiveness via quality improvement, it is important to build setups within enterprises and inside the country that will enable component quality and design quality to be improved. Put another way, if Tunisian enterprises depend on overseas sources for components and product designs, they will be unable to make independent and prompt responses when market complaints arise. In order for Tunisian industries and enterprises to break away from their subcontracting makeup, it is important for them to develop total quality capability that covers not only manufacturing quality but also design quality, component quality and “market quality”²⁰ (if Tunisian enterprises acquire planning and design competitiveness, they will be able to develop their own unique products). Not only will this lead to reinforcement of international competitiveness, but it will also lead to higher added value.

3.3.2 How to Widely Disseminate Technologies (Techniques) for Quality / Productivity Improvement

3.3.2.1 Dissemination in the Two Sectors

Technical centers in two sectors, i.e. the CETIME and CTAA counterparts, received transfer of technology (techniques and philosophy) through the project. First of all, it is important for the counterparts to transfer the acquired technologies to other consultants in the centers, and at the same time to disseminate technologies to private sector enterprises in the respective sectors via Kaizen guidance activities. A total of 27 enterprises in the two sectors of electric and electronics and food processing were able to take part in the pilot project, and it will first be necessary to instruct and disseminate technologies to the enterprises in the same sectors that couldn't take part. This type of expansion within the same sectors shall be referred to as “vertical expansion,” as opposed to the

²⁰ “Market quality:” The quality demanded by consumers and users in reality. How are these needs responded to? This includes after-sales service, warranty service and the contents (quality) of responses to complaints.

expansion to other sectors described later. The method for achieving this vertical expansion is proposed in the next section.

3.3.2.2 Dissemination to Other Sectors

It is fair to say that the counterparts (consultants in CETIME and CTAA) have the responsibility (no exaggeration to say the duty) of disseminating technologies to TC consultants in other sectors. In particular, considering that the manual compiled here can be effective for improving quality and productivity in other sectors too, great expectations are placed on the counterparts who helped with the compilation work. However, consultants in general have a prideful aversion to learning from other consultants, while consultants on the teaching side also have some resistance about teaching consultants from technical centers in different sectors. However, adopting a broad perspective, realizing the “horizontal expansion” of the technologies imparted to CETIME and CTAA in the project to the TCs of other sectors will be an important issue.

3.3.2.3 Manual Revisions

When it comes to both the vertical expansion and horizontal expansion of quality/productivity improvement technologies, since the manual compiled in the project will be utilized in both production and training settings in future, it will need to be supplemented and corrected as the need arises.

Moreover, the technologies that were transferred to the Tunisian side through the project represent only a small percentage of numerous technologies that are available, and it is thought that various other technologies will be effective for Tunisia in the future. For example, it will be necessary to acquire and disseminate technologies and techniques relating to safety, inventory control, cost control and high density mounting, etc. according to the progress of industry, and in line with this it will be necessary to revise the contents of the manual.

3.3.3 How to Enhance the Awareness of Top Management (and Middle Managers)

Through the pilot project and the fact-finding survey, it was reconfirmed that the depth of awareness and attitude of top management and middle management towards quality/productivity improvement determine the extent of Kaizen outputs. The top managers of the enterprises that took part in the pilot project were relatively positive in their approach, however, this is not always the case among top and middle managers in Tunisian enterprises in general.

For example, many enterprise owners regard quality to mean “manufacturing quality.” However, as was described in Section 3.3.1, quality also incorporates design quality, component quality and market quality, and there is scant awareness that industries need to acquire total quality in order to realize stronger international competitiveness and higher added value.

Moreover, many enterprise owners think that “productivity” refers to recruiting new personnel and introducing new machinery and equipment. However, a number of enterprises in the pilot project were able to raise productivity without resorting to new investment. Therefore, before considering new investment behavior, top managers and middle managers on production lines should first work on raising quality and productivity using their existing manpower, equipment and machines.

Tunisia is scheduled to abolish all tariff barriers with the EU in 2008. Ever since the agreement was reached with the EU in 1995, tariffs have been gradually reduced and preparations made for the total abolition, and it is forecast that competition with European products will intensify as a result. However, the pilot project revealed that top managers in Tunisia have little awareness of the importance of reinforcing international competition. As globalization advances, an important issue for top managers will be the approach they take towards reinforcing international competition.

3.3.4 How to Build a Setup (Organizations and Systems) for Promoting Dissemination Activities in All Sectors

As was mentioned earlier (Section 3.2.4), only the UGPQ exists as an agency for promoting quality improvement across all industrial sectors. Although the UGPQ conducts training activities, these are limited to guidance and seminars geared to helping enterprises acquire ISO certification and so on, however, apart from explanations on the Quality Week and provision of information concerning ISO, etc., it conducts hardly any public information activities (regular publications, web page operation, etc.) or quality/productivity improvement information activities that are essential for realizing dissemination.

Furthermore, concerning promotion of productivity improvement, there are no sector-wide agencies; indeed the only organization that possesses a department specializing in productivity improvement is CETIME, which is a public technical center for a single sector.

As was mentioned earlier, in order to promote quality/productivity improvement activities across all sectors and over the whole country, it is desirable for multifaceted activities to be implemented, for example, human resources development (training and education including trainers’ training), public information activities (periodicals, home page, events, etc.), awards system, qualification system,

survey and research (including productivity measurements, etc.), and information collection and provision.

The UGPQ was established with the objective of improving quality across all sectors, however, it has a limited mandate and is not a permanent agency. Only CETIME in the electric and electronic and machinery sector has a specialist department for promoting productivity improvement. If Tunisia hopes to promote quality/productivity improvement activities across all sectors in future, the building of the setup for doing this will be vital. This setup may consist of a network of related agencies or it may be an independent organization. There are two broad approaches: 1) A coordinated setup (system or network) whereby public and private agencies involved in the promotion of quality/productivity improvement activities pool their experiences, strengths and characteristics and sustain synergy based on complementing each other, or 2) An independent organization that covers all sectors, separate from the specialist agencies active in each technical field.

Many countries have a productivity headquarters or productivity centers for conducting productivity improvement activities, however, concerning quality improvement activities, there are various organizations and agencies. Even if organizations are established with the aim of working on quality or productivity, many of their activities tend to overlap as they progress. Moreover, as was ascertained in the pilot project, since Kaizen activities on production lines make no distinction between these two fields, it is desirable to construct a comprehensive setup that covers the elements of both fields that are common to all sectors. Specific recommendations are described below.

3.4 Recommendations for Quality / Productivity Improvement

3.4.1 Recommendations for Reinforcing Total Quality Capacity

Whether it is manufacturing quality, design quality, component quality or market quality, the responsibility for conducting improvement lies with each enterprise, and the awareness of the enterprise owner is an important factor.

However, since there are limits, both financial and technical, to capacity when viewed on the level of enterprises and industries, government support is indispensable. For example, concerning the internalization of component production, it is necessary to train and reinforce die technicians, molding technicians, quality control technicians and so on. For small and medium enterprises especially, since it is near impossible to acquire such technologies independently, it is necessary to receive technical guidance from technical center consultants or guidance and support from technical experts based on international cooperation.

The recommendations here are broadly divided into two strands: the first pertains to efforts on the industrial and enterprise level, and the second concerns efforts on the government level.

On the level of industries and enterprises, in the short to medium term the policy emphasis should be enlarged to include improvement of component quality in addition to improvement of manufacturing quality. Concerning the method adopted for realizing component quality improvement, enterprises should work on procuring good quality components or diversifying component suppliers, whereas stronger enterprises can work on internalizing components. Moving on to the medium to long term, industries and enterprises should place more emphasis on improving market quality. This incorporates products for enhancing the degree of satisfaction of customers, high quality after-sales services, rapid and pertinent responses to customer complaints, and the internalization of components for this purpose.

On the government level, efforts are required to provide indirect support for industries and enterprises based on a new setup (either a network of related agencies or a new independent organization). As was mentioned earlier, efforts to improve quality and productivity should inherently be tackled by industries and enterprises as an important area of corporate activities.

Accordingly, while industries and enterprises vigorously tackle such issues, the role of the government should be to provide indirect support only in cases where industry and enterprise efforts can only go so far, and to build an environment where industrial sectors and individual enterprises are able to acquire international competitiveness. In recommendations for the reinforcement of total quality capacity, one of the activities that should be specifically promoted by the government should be the staging of seminars and workshops for the education and training of enterprise owners. Such seminars and workshops should provide advice and practical contents geared to helping industries and enterprises tackle the themes indicated below. In order to make such seminars and workshops really effective, experts (professionals) who have ample international experience should be invited as lecturers or instructors. Such human resources probably exist within Tunisia, however, their numbers are thought to be extremely limited. Accordingly, it is recommended that such experts be secured on the international cooperation base.

Table 3-6 Recommendations for Reinforcing Total Quality Capacity

	Short-Medium Term (2009~2011)	Medium-Long Term (2012~)
Efforts on the industry and enterprise level	Priority policy: Build setups that can immediately respond to component quality on the level of industries and enterprises.	Priority policy: Build a design quality improvement setup that can immediately respond to market quality on the industrial or enterprise level.
1) Component quality steps	- Support for upgrading component quality control (training, inspection equipment, information provision) Building of setups that can immediately respond to component quality	- Promotion of component industry upgrading (technology, management, equipment, information, funding) Building of setups that can immediately respond to design quality and market quality.
2) Design quality steps	- Promotion of the localization of component design (training, inspection equipment, information provision)	- Local model development design support (technology, equipment, information, funding)
3) Market quality steps	- Support for the strengthening of quality assurance setups (training, inspection equipment, information provision)	- Support for customer satisfaction improvement activities (management, information, funding)
Government level efforts	Promotion of support for industry and enterprise efforts based on the new setup (network), and environment building for internationalization	Promotion of support for industry and enterprise efforts based on the new setup (independent organization), and environment building for internationalization
[Remarks]	Acceptance of experts with extensive international experience based on international cooperation The above industry and enterprise themes should be incorporated into training programs for business owners.	Acceptance of international experts based on invitations from industrial groups or international cooperation. The above industry and enterprise themes should be incorporated into training programs for business owners.

(1) Component Quality Steps

Short Term-Medium Term (2009~2011)

- Support for upgrading component quality control (training, inspection equipment, information provision)

Considering the current situation of Tunisia, it will not be immediately possible to domestically produce and internalize components that are imported mainly from EU countries. Accordingly, in the short to medium term, the key points in improving quality will be to build systems for upgrading quality control in the acceptance of purchased components so that nonconforming parts are not introduced to production lines. For this reason, first the training of human resources in the acceptance inspection department will be required. It is recommended that technical center consultants act as lecturers in this training and that the technical centers provide training and inspection equipment information to enterprises and industries. As for the training items, the following contents are considered.

- CS²¹ mind (thorough awareness that later processes are the customer, that nonconforming products must not be passed to later processes)
- 7 tools of QC (usage of Pareto diagrams, histograms and control drawings, etc.)
- FIFO²² (building systems whereby components are released to production lines in the same order that they enter stocks)

Medium Term-Long Term (2012~)

- Promotion of component industry upgrading (technology, management, equipment, information, funding)

Tunisian enterprises will fail to reinforce international competitiveness if components currently imported from EU countries are not produced domestically or internally within enterprises in the future. So long as enterprises depend on imported components, they will not realize cost competitiveness and will not secure customer satisfaction due to inability to promptly respond to product nonconformities caused by poor component quality. Accordingly, it is recommended that support be provided in order to upgrade the component industry so that high-function components currently imported from the EU can be produced domestically within the country or internally within enterprises. Specifically, the following measures for upgrading technology in base industries and small and medium enterprises are considered:

- Establishment of a Base Industry Technology Upgrading Center (for example, establish within CETIME. Initially transfer management, production and control technologies from Japan and promote dissemination).
- Policies to support technical upgrading in small and medium enterprises (implement training and plant equipment investment support measures to encourage parent companies in the EU to produce components in Tunisia (Tunisian localization)).

(2) Design quality steps

Short Term-Medium Term (2009~2011)

- Promotion of the localization of component design (training, inspection equipment, information provision)

The flow of product design starts from product planning and develops into design drawings, mock-ups, exterior design, mechanical design, electrical design and so on. The exterior design and mechanical design are further developed into individual component designs.

21 CS: Customers Satisfaction

22 FIFO: First in first out

Since component design is the furthest downstream element of the product design flow and can be implemented by relatively inexperienced designers, it is most realistic to start from this when implementing component design. In specific terms, as part of the above-mentioned technology upgrading support policy for small and medium enterprises, training and plant investment support should be implemented in order to encourage parent companies in Europe and so on to localize component design in Tunisia.

Medium Term-Long Term (2012~)

- Local model development design support (technology, equipment, information, funding)

In the medium term, the localization of production design shall be promoted from the downstream to the upstream indicated in the above product design flow, while in the long term, the target shall be to localize activities from model development to product design. In addition to supporting manufacturing quality/productivity improvement, it is recommended that the technical centers implement technology, equipment and information support geared to promoting the localization of design and improvement of design quality as their medium and long-term goals. Specifically speaking, as part of the abovementioned policies to support technical upgrading in small and medium enterprises, training and plant investment support should be implemented in order to encourage parent companies in Europe and so on to localize activities from model development to product design in Tunisia.

(3) Market quality steps

Short Term-Medium Term (2009~2011)

- Support for the strengthening of quality assurance setups (training, inspection equipment, information provision)

Many of the enterprises targeted in the pilot project have already acquired ISO quality certification, however, there are some enterprises where the quality assurance setups are inadequate and market return rates are high. Quality control (assurance) departments need to be established separately from manufacturing departments in order for quality assurance setups to function, however, such conditions are insufficient. Setups are required whereby appropriate cause analysis is conducted and prompt recurrence prevention measures can be implemented in response to market claims. Therefore, as the short and medium term response to market quality, it is recommended that support be provided in order to reinforce quality assurance setups. Specifically, it is recommended that technical center consultants implement training concerning quality assurance setup reinforcement and that each technical center provides training and information concerning quality assurance to enterprises and industries.

Medium Term-Long Term (2012~)

- Support for customer satisfaction improvement activities (management, information, funding)

Awareness of customer satisfaction (CS) is lacking not only in individual enterprises but throughout industry in general in Tunisia. As the medium and long term steps for improving market quality, it is recommended that activities geared to firmly rooting such awareness be supported. It is particularly important to thoroughly instill CS awareness into the minds of enterprise owners. If CS awareness takes root among large numbers of enterprise owners, it is anticipated that they will convey it to all levels of personnel within their enterprises and that the CS concept of regarding later processes as customers will initiate a change in thinking throughout industry overall. It is recommended that the technical centers take the initiative in conducting training geared to promoting such CS attitudes.

3.4.2 Continuation of Kaizen Activities and Implementation of the Trainers' Training (TT) Program (development of technical dissemination leaders)

3.4.2.1 Continuation of Kaizen Activities

Consultants who have already received transfer of technology should pass on those techniques to other consultants in the same sectors (i.e. electric and electronics and food processing), and the consultants that acquire techniques in this way should provide Kaizen guidance to enterprises in the said sectors. This is vertical expansion. In addition, consultants should pass on techniques to the consultants of other technical centers, so that enterprises in those sectors too can receive guidance. This is horizontal expansion. Within these activities, the manual that was compiled in the pilot project stage should be utilized.

Whether it is vertical expansion or horizontal expansion, the ultimate targets are enterprises. Regarding the approach to Kaizen activities for enterprises, a certain model can be derived from the experience of the pilot project as indicated below.

First, when a technical center receives a request for Kaizen (quality/productivity improvement) guidance from an enterprise, a brief diagnosis (first enterprise visit) is conducted. Following that, the enterprise is given the assignment of collecting and analyzing data for "theme selection" by the time of the next visit. In the second visit to the enterprise, the themes are selected upon taking into account the brief diagnosis, the data analysis and conditions on the enterprise side. Following selection of the theme, a mini-seminar cum orientation is staged for the enterprise officials in order to examine the future approach to Kaizen activities. After that, the enterprise is given around two weeks to collect data necessary to implement the Kaizen activities for each theme. In the third enterprise visit, the

Kaizen plan is examined and decided based on the analysis data. The enterprise implements the Kaizen plan based on the decision. The time required for this varies depending on the themes, however, between 2~4 weeks is necessary. The enterprise may be visited during this period in order to check on the state of progress. Following that the fourth enterprise visit is made in order to confirm the Kaizen outputs. Then, evaluation is made in order to bring the process to an end. In the evaluation, the consultant may give guidelines and recommendations concerning the future Kaizen activities.

This is just one model of Kaizen activities in an enterprise and is summarized in Table 3-7. This model also takes into consideration the development of counterparts by international experts.

Table 3-7 Procedure of Quality/Productivity Improvement (Kaizen) Guidance

Step	Time/Term	Step Contents	I/C	C/P	M/C
1. Brief diagnosis	** hours	Determine the purport of theme selection for quality/productivity improvement	●	○	△
[Assignment]	2 weeks	PQ analysis: Express the enterprise's products and production volume on a Pareto diagram.	-	-	●
2. Theme selection	** hours	Determine upon considering the brief diagnosis, PQ analysis data and conditions on the enterprise side	○	○	●
	2 hours	The J/P stages a mini seminar cum orientation for the C/Ps and enterprise officials.	●	○	○
[Assignment]	2 weeks	Instruct the necessary data analysis based on the decided theme: - In case of layout: (distance x weight or capacity) analysis - In case of man-hours balance of work: analysis of the number of process-separate operators and man-hours balance of work - In case of SMED: internal and external set-up time analysis - In case of quality nonconformity improvement: NG rates, ABC analysis of NG phenomena, stratified analysis - In case of poor operating rate: poor operating rate, ABC analysis of NG phenomena, stratified analysis	-	-	●
3. Decision of the Kaizen plan	** hours	Examination and determination of the Kaizen plan based on the analysis data	○	○	●
[Assignment]	According to the themes: 2~4 weeks	Implementation of the decided Kaizen plan	-	-	●
4. Confirmation of the Kaizen results	** hours	Confirmation of results by the Kaizen activities participants	○	●	○
5. Evaluation	** hours	Evaluation by all participants Prepare a report containing guidelines and recommendations for future kaizen activities, and present it to the enterprise.	●	●	●

[Note] Prepare based on the experience of the pilot project

PQ : Product Quality Analysis, I/C: International Consultant, C/P: Counterpart, M/C: Model Company

●: Responsible Actor, ○: Supporting Actor, △: Supervising Editor, Indicate the level of autonomy.

Concerning the number of visits to the enterprise, four is sufficient if things proceed smoothly, however, generally six are needed.

3.4.2.2 Implementation of the Trainers' Training Program

In order to promote quality/productivity improvement activities across all industrial sectors in Tunisia, it is essential that the eight technical centers under the management of the MIPME play a role. Accordingly, it is first necessary for CETIME and CTAA, which acquired techniques and technologies in the pilot project, to transfer and disseminate this know-how to the other technical centers. This is an important point when viewed from the national perspective. However, it is forecast that difficulties will arise when CETIME and CTAA consultants attempt to instruct consultants of the other technical centers.

Accordingly, with a view to developing instructors in quality/productivity improvement from the national perspective, it is recommended that a trainers' training program be compiled and provided to public agencies. These agencies shall stage the trainers' training program with a view to securing the participation of the consultants that need to be developed. When doing this, the UGPQ should be the supervisory department overseeing the program. In that case, it will be necessary to reinforce personnel within the UGPQ.

In all of the above cases, it will be necessary to obtain support from internationally experienced experts (professionals) for program implementation. . Figure 3-3 shows the schematic diagram of this. (If the CETIME and CTAA consultants who took part in the pilot project can receive the trainers' training program, they will add to their practical experience and be able to display expert know-how regarding quality and productivity improvement even after support by the international experts has ended).

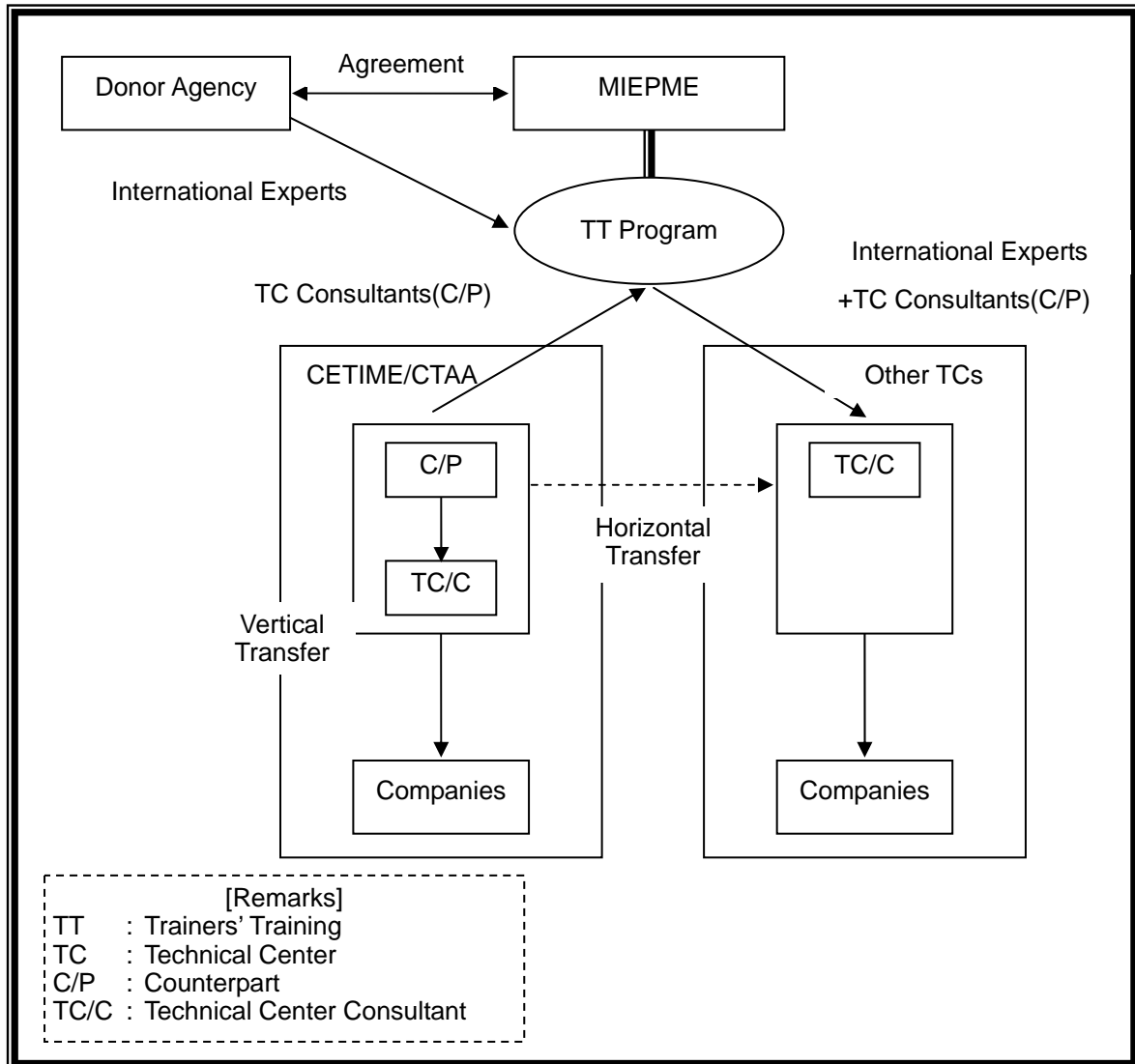


Figure 3-3 Quality/Productivity Improvement Dissemination Activities based on Trainers' Training

The manual that was prepared in the pilot project should be utilized in a number of ways: as a text when technical center consultants conduct Kaizen guidance at enterprises, as a teaching resource for teachers' training, as a reference resource in quality/productivity improvement seminars, and as a supplementary teaching resource in universities. Moreover, it is desirable that the manual undergo amendments according to the need, or that it undergoes periodic review. For this reason, it is desirable that a committee charged with editing and reviewing the manual is established in a specific department of the MIEPME or within a multi-sector agency such as the UGPQ, etc.

3.4.2.3 Acquisition and Dissemination of Further Quality/Productivity Improvement Technology (Techniques)

In the pilot project, the technologies (techniques) that were acquired by the counterparts were limited to layout improvement, man-hours balance of work, SMED, 5S, QC circles and PM, etc. Such techniques are effective for many enterprises in Tunisia at the moment. In addition, there are various other techniques that can prove useful for Tunisian enterprises in future.

In addition to the technologies acquired in the pilot project (see Tables 3-1~3-3), the Tunisian counterparts (consultants of CETIME and CTAA) should acquire other Japanese Kaizen technologies such as TPM (Total Productive Maintenance) and JIT (Just-in-Time) production systems (including the Kanban system). TPM is an indispensable Kaizen technology for quality/productivity improvement in manufacturing sectors based on mechanical equipment, while JIT is a production system that should be applied to Tunisian enterprises that produce numerous models in small quantities. However, it will be difficult to introduce this to enterprises that depend on imports for many components, and adjustments will need to be made according to actual conditions.

Concerning quality/productivity improvement diagnosis and guidance for enterprises in the electric and electronic sector, international consultants endowed with expertise should provide services (technology) in the production technology field. This field requires human resources that combine lengthy experience with theoretical know-how, and it is not possible for technical officers (counterparts) belonging to the technical centers in Tunisia to transfer the required technology in the short term. The production technologies imagined here are as indicated in Table 3-8. It will be essential for international consultants possessing specialist knowledge to provide complementary support for imparting these.

Table 3-8 Production Technologies to be Acquired for Future Quality/Productivity Improvement

No	Type of Operation	Production Technology Field	Contents of Quality/Productivity Improvement Technology
1.	Assembly	LCA ²³ technology	(Semi) automation of assembly operations
		Surface treatment technology	Hot stamp / Printing / Plating
		Joining technology	Soldering / Ultrasonic welding / Caulking / Welding
		High density mounting technology	Technology for densely mounting electronic components onto PCB ²⁴
2.	Processing	Injection molding technology	Quality/productivity improvement of plastic injection molding parts
		Press technology	Quality/productivity improvement of press parts
		Machine processing technology	Quality/productivity improvement of machine processing parts

23 Low Cost Automation

24 Printed Circuit Board

In these production technology fields, it is generally more difficult and requires more specialized knowledge to realize quality improvement than productivity improvement. The project counterparts (technical center consultants) are able to conduct guidance in nonconformity cause analysis methods using the 7 tools of QC, however, it is not possible to conduct guidance in nonconformity cause analysis and countermeasures without specialist know-how. Concerning the Japanese technicians that are needed in the production technology field, it is necessary to secure people who possess wide-ranging expertise and experience of line guidance.

Table 3-9 summarizes the above recommendations taking into account time elements. Short to medium term (2009~2011) activities are described in detail as the action plan in the next chapter.

Table 3-9 Quality/productivity Improvement Dissemination Activities

	Short-Medium Term (2009~2011)	Medium-Long Term (2012~)
1. Continuation of Kaizen activities (vertical expansion)	Dissemination by the counterparts (C/Ps) who acquired technology via the pilot project (PP)	Promotion of Kaizen activities with C/Ps on the Tunisian side taking the initiative.
2. Implementation of trainers' training (TT) program	Transfer of technology to the consultants of other technical centers (TCs) with the cooperation of C/P who received training in the PP	Promotion of training activities with TC consultants acting as trainers
3. Utilization of manual	Utilization in Kaizen activities, TCs and universities Establish a committee to implement periodic review, supplementation and revision	Improvement of contents with the Tunisian C/Ps taking the initiative (Acceptance of international experts)
4. Expansion of quality / productivity improvement technologies (techniques) targeted for dissemination	In addition to the technologies (techniques) transferred by the C/Ps through the PP, acquire and disseminate further technologies.	Promotion of dissemination activities with the Tunisian C/Ps taking the initiative
[Remarks]	Throughout the above, accept internationally experienced expert teams under international cooperation.	Promotion of dissemination activities with the Tunisian C/Ps taking the initiative (with partial acceptance of international experts)

3.4.3 Implementation of Training Programs for Top Management (training for the technology receiving side)

Raising the awareness of top management is not an easy thing. However, through the pilot project it was confirmed that top managers in Tunisia are latently aware of the importance of quality/productivity improvement, and they are ready to take a positive attitude towards Kaizen activities providing that their real needs are addressed and their problems and concerns are listened to. Enterprise owners who were negative and skeptical about the advice and suggestions made by the consultant teams at the start of the pilot project improved their awareness as the project advanced.

Accordingly, training opportunities consisting of practical seminars and workshops should be provided so that owners can improve their awareness.

Government agencies such as the UGPQ and technical centers as well as industrial groups such as UTICA and related federations should vigorously provide such opportunities. The key point will be how to secure professionals (experts) who are capable of enhancing the awareness of top managers and middle managers regarding the said themes. Although these professionals don't necessarily have to be foreigners, the only experts possessing the necessary international experience are foreign. Industrial groups may be able to invite such experts at their own expense, however, they may have trouble searching for appropriate personnel. It is likely that expectations will be placed on experts dispatched under international cooperation initiatives.

Concerning the themes of training programs, based on the contents described in Sections 3.3 (Issues Confronting Quality/Productivity Improvement), 3.4.1 (Recommendations for Reinforcing Total Quality Capacity) and 2.2 (Issues for Strengthening International Competition), the following headings can be considered (these partly include the industry and enterprise level themes described in Table 3-6).

- (General) The special features of Tunisian enterprises and approaches to quality/productivity improvement (How to enhance total quality capacity)”
- “Effective techniques and philosophy of quality/productivity improvement for Tunisia”
- “Reinforcement of component processing capacity and international competitiveness” or “Reinforcement of total quality capacity and international competitiveness”
- “Diversification of industry and international competitiveness”
- “Diversification of export and procurement markets and international competitiveness”

Lecturers, as mentioned previously, shall be selected from internationally experienced experts (professionals).

The training times (or days) will be determined according to each theme. Also, individual counseling and guidance will be provided for those seeking it.

Table 3-10 summarizes the contents of the above recommendations with time elements also taken into account.

Table 3-10 Implementation of Training Programs for Top Management

Targets	Short-Medium Term (2009~2011)	Medium-Long term (2012~)
Top management	Industry and enterprise activity themes for reinforcing international competitiveness (corresponding to the above themes and Table 3-6)	Industry and enterprise activity themes for reinforcing international competitiveness (corresponding to the above themes and Table 3-6)
Middle management	Practical training in production control and quality control, etc. (including some parts the same as in the training for top management)	Practical training in production control and quality control, etc. (including some parts the same as in the training for top management)
Remarks	Regarding the above activities, acceptance of internationally experienced experts under international cooperation	Acceptance of internationally experienced experts on invitation or under international cooperation

In future, maybe Tunisia should direct its attention primarily to products from Asian countries. Good quality products that are cheaper than European rivals are joining the competition in international markets (especially from China, Korea and Taiwan). Since these countries can offer cheap and high quality components, materials, equipment and machinery, etc., it is recommended that Tunisian enterprises look beyond Europe and compare economic and product information from Asia too when making management decisions.

For this reason, in addition to participating in training and seminars, enterprise owners in each sector should seek opportunities to not only “Look East” but also “Go East.” This is a rapid and effective way to reinforce international competition. At seminars that are staged in Tunisia, participants always ask “What does Tunisia need to improve in order to realize industrial development like Japan?” In the final analysis, the main disparity arises not out of differences between employees but between the demands that top managers place on employees. There is not a problem with the ability of Tunisian managers, however, the information they possess is concentrated on Europe and they do not adopt a truly international point of view. The fastest way to realize the vitalization of industries and enterprises in Tunisia will be to promote business management that is based on the diversification of information. From the viewpoint of industrial strategy too, it is necessary to install setups and organizations to promote the diversification of information in Tunisian industries and enterprises. The dissemination activities promotion setup described next should play a part in this.

3.4.4 Building of the Dissemination Activities Promotion Setup (organization or system)

As was mentioned earlier, the UGPQ is the only organization that covers multiple sectors in the area of quality. However, this organization, which was established in 2005, only has a limited mandate of five years. According to the present law, it will only continue activities until 2010. Nobody among related officials seems to have a clear idea about what will happen, however, some people think that it will

remain in operation until the end of the 11th five-year plan. Here, organization and setup will be examined based on this assumption.

The proposed contents are twofold concerning the setup and organization. There is the short and medium term setup, in which the existing UGPQ plays the core role in quality/productivity improvement, and then there is the organization in the medium to long term from 2012 onwards. The short to medium term proposal aims to improve quality/productivity based on linkage between the UGPQ and related organizations and exploitation of the strengths and characteristics of each, while the medium to long term proposal seeks to establish a permanent organization for promoting quality/productivity improvement in Tunisia (this does not necessarily imply the building of a new organization).

3.4.4.1 Short to Medium Term Proposal: Strengthening of Linkage for Promotion of Quality/Productivity Improvement Activities (2009~2011)

As was mentioned in Section 3-2-4, it is desirable for Tunisia to implement the following multifaceted activities in order to promote quality/productivity improvement from now on.

- 1) Training and education for quality/productivity improvement
- 2) Consulting activities geared to providing support services for quality/productivity improvement
- 3) Editing and issue of manuals and guidebooks
- 4) Implementation of award system and qualification system concerning quality/productivity improvement
- 5) Collection and provision of international information concerning quality/productivity improvement techniques and trends
- 6) Public information and publishing activities for quality/productivity improvement
- 7) Encouragement of participation in international activities, events and conferences concerning quality/productivity improvement

As was mentioned above, Tunisia does not currently have an agency for comprehensively implementing these activities for quality/productivity improvement in private sector enterprises. Agencies that can play a role in each area are as follows: 1) UGPQ, technical centers and universities (education contents are sometimes theoretical and lack practical applicability); 2) technical centers and private sector consultants; 3) UGPQ (under the JICA project) and some technical centers; 4) UGPQ (secretariat for the Quality Grand Prix), but nothing for qualification systems; 5) not clear what agency is systematically active; 6) technical centers and some industrial groups like UTICA issue newsletters, however, they don't actively carry commentaries or introduce case studies on quality and productivity

improvement; 7) there is participation in exhibitions and so on but hardly any cases of participation in conferences and events concerning quality/productivity improvement.

In order for Tunisia to extend quality/productivity improvement activities throughout the nation, it is desirable for existing related agencies to expand their scope of responsibility, take on new activities and collaborate with each other to promote overall quality/productivity improvement activities. However, in that case it will be necessary have a central agency that has sufficient authority to coordinate the overall situation.

First, it is proposed that a supervisory department be set up inside the MIEPME in order to coordinate the responsible agencies for the abovementioned activities.

Concerning the reasons for this, CETIME and CTAA acquired quality/productivity improvement techniques and thinking in the pilot project, and although it is desirable that these agencies offer guidance to the consultants of other technical centers, in reality it is difficult for them to directly instruct other centers because they are on the same organizational level within the MIEPME. The UGPQ is thought to be appropriately placed as a supervisory agency because it covers all industrial sectors, however, it possesses no organizational authority with respect to the technical centers. Considering this, it is desirable to establish a department to supervise collaboration (network) between the various agencies concerned with quality/productivity improvement within the MIEPME, which is in charge of the technical centers.

This department should be in charge of the specific promotion of short and medium term recommendations (2009~2011) corresponding to Issues 1~3; moreover, it should be responsible for preparing the organization for promoting the recommended quality/productivity improvement activities in the medium to long term (Issue 4).

3.4.4.2 Medium and Long Term Recommendation: Establishment of an Organization for Promoting Quality/Productivity Improvement Activities (2012~)

What will happen from 2012 onwards when the UGPQ mandate expires? (In the project, it is assumed that the UGPQ will continue until 2011 – the final year of the 11th five-year plan). The following three scenarios can be considered:

- Scenario 1 : The UGPQ ends with the expiration of its mandate. There is no organization to take its place.
- Scenario 2 : A department that expands the functions of UGPQ is installed within the MIEPME.
- Scenario 3 : It is installed as an independent public organization (like a TC), and later made financially independent.

First, Scenario 1 is out of the question. 2012 will be too soon to entrust quality/productivity improvement activities to the private sector, so the government will need to maintain some role. Moreover, the government itself does not possess the capability to conduct activities alone. It is thus essential to implement activities based on international cooperation, and an organization will be needed to supervise such efforts. Accordingly, either Scenario 2 or Scenario 3 should be considered as the shape of the organization from 2012 onwards. However, Scenario 2 may also be unrealistic. Concerning why, since the MIEPME is a government office responsible for policy and guidance, when it comes to promoting concrete activities, actual operation will proceed more smoothly if the said organization is a separate entity from the MIEPME. This leaves Scenario 3 as the only available option.

The new organization would need to be independent in terms of manpower and funding like the existing technical centers, and it would need to be in a position to promote activities across all sectors. Moreover, it should aim to become a core organization for the nationwide promotion of quality/productivity improvement activities in all areas of industry including manufacturing and service sectors.

In the event where an independent organization is established based on the above Scenario 3, what kind of organization is desirable? The following diagram gives a graphical representation of the new organization based on the following assumptions: 1) know-how including operating capability of dissemination activities and Kaizen technologies are steadily accumulated during execution of the action plan over the next three years (2009~2011), and 2) the organization is developed into an independent entity with human and financial autonomy.

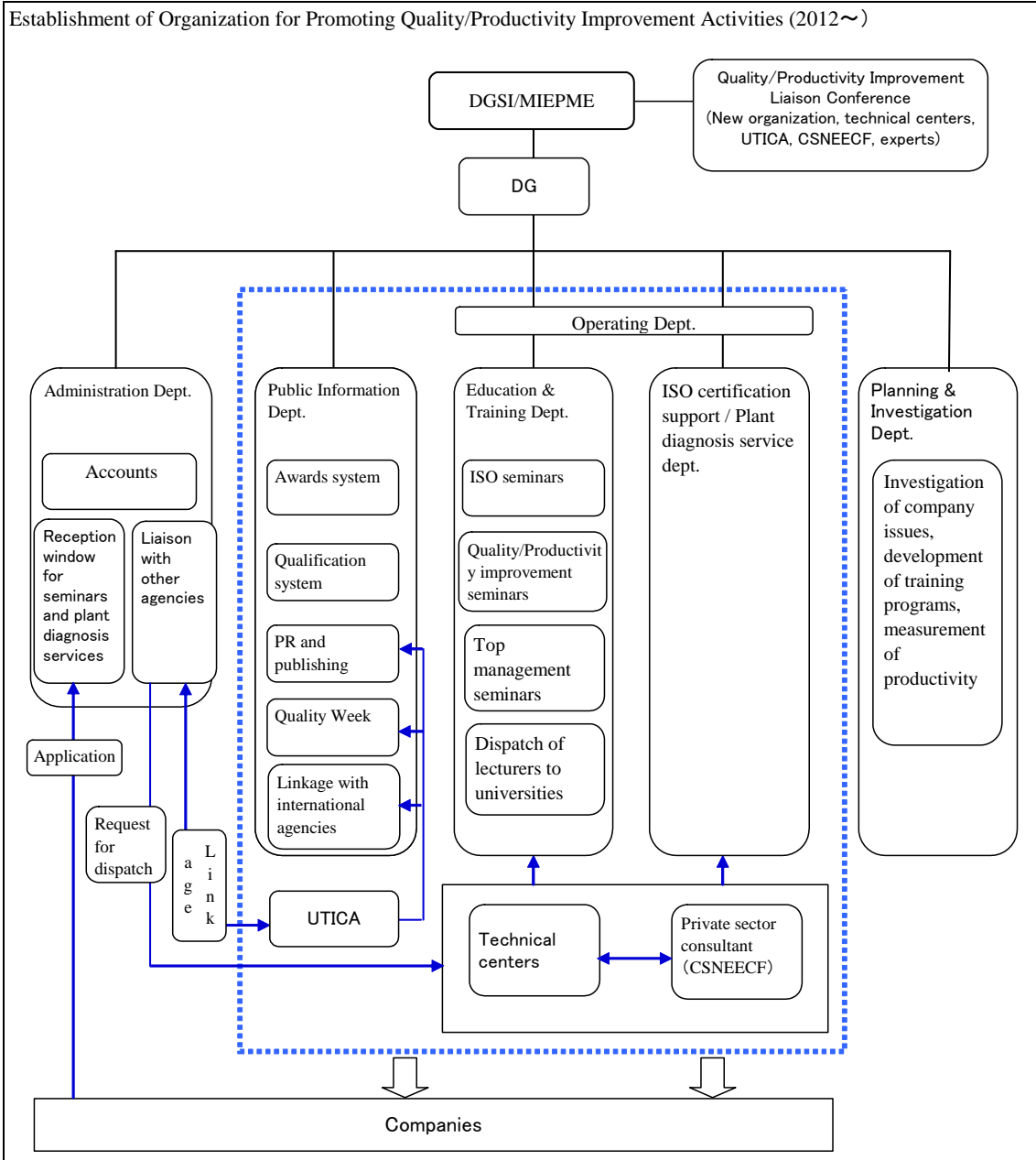


Figure 3-4 Establishment of Organization for Promoting Quality/Productivity Improvement Activities (2012-)

In specific terms, the organization should comprise the following departments: 1) Public information department (in charge of the awards system, qualifications system, public information and publishing, Quality Week, and collaboration with international agencies); 2) Training and education department (in charge of ISO seminars, quality/productivity improvement seminars, business owner seminars, and dispatches of lecturers to universities); 3) Technical support services department; 4) Planning and survey department (in charge of enterprise issue surveys, development of education and training programs, and productivity measurements, etc.); and 5) Clerical department (in charge of indirect

services such as accounting in the new organization, liaison with other agencies, reception for seminars and plant diagnosis services).

Moreover, it is desirable to establish a Quality/Productivity Improvement Conference consisting of related agencies (the new organization, technical centers, UTICA, CSNEECF) and academic experts within the Industrial Strategy Department (DGSI) in the MIEPME. The role of this conference would be to compile policy for revising manuals when it comes to developing education and training programs (for implementation in the planning and survey department), and to make policy recommendations to the government based on the enterprise issue surveys.

The new organization would combine the present UGPQ functions limited to support for ISO certification with the functions to be implemented in the action plan, and it would need to maintain close links with other agencies in order for it to function smoothly. Income for the new organization would come from the operation division. The training and education department and ISO certification support / plant diagnosis services department would need to work with the technical centers and private sector consultants, while the public information department would need to collaborate with UTICA.

Assuming that the new organization described above is established²⁵, the required personnel and equipment would be as indicated below.

Table 3-11 New Organization Setup for Promoting Quality/Productivity Improvement Activities

		Administration Dept.	Public Information Dept.	Planning & Survey Dept.	Operation Division
Personnel	Managers	1	1	2	
	Staff	2	2	16	
Equipment	Departments	- PCs (3)	- PCs (3)	- PCs (18) - Printer (1) - Seminar PCs, projectors (2 sets)	
	Shared	- Fax machines (2), copiers (3), printers (2)			

Concerning personnel, the two managers in the operation division will specialize on ISO-related affairs and Kaizen activities respectively, while the two business managers should concentrate on accounting affairs and other affairs respectively. As for the 16 staff members in the operation division, one member in charge of ISO certification support and one member in charge of Kaizen activities should be assigned from each of the eight technical centers²⁶.

25 Considering that the new organization will oversee quality and productivity and will hopefully link with international agencies, an easy to remember name such as the “Tunisian Quality and Productivity Center” (TQPC or TUQUPROC) is considered appropriate.

26 The personnel assigned from the technical centers to take charge of Kaizen activities shall be trainers who have completed trainers’ training.

For the immediate future (until the end of the 11th five-year plan in 2011), quality/productivity improvement should be sought through linking the existing related organizations, while it is desirable that establishment of an agency or organization for comprehensively supervising activities be examined from 2012 onwards. In other words, the following recommendation is made:

- (1) In the short to medium term, build linkage (networking) for the promotion of dissemination activities.
- (2) In the medium to long term, establish an independent organization for the promotion of dissemination activities.

The recommendations for the short to medium term (2009~2011) are described in detail as the action plan in the following chapter.

Table 3-12 Quality/Productivity Improvement Promotion Setup

	Short-Medium Term (2009~2011)	Medium-Long Term (2012~)
1) Establishment of a setup for promoting quality / productivity improvement	Expand the activities of existing related agencies for promoting quality / productivity improvement activities, and reinforce the linkage between related agencies The Quality/Productivity Improvement Conference in the MIEPME has coordination functions and the UGPQ supports the practice of linkage activities.	Establish an independent organization for promoting multifaceted quality / productivity improvement activities under the MIEPME, and at the same time establish a liaison conference linking industry, government and academia to act as a consultative body.
[Remarks]	The Quality/Productivity Improvement Conference in the MIEPME prepares for establishment of the independent organization in the future (from 2012 onwards).	The organization will receive government support at the start, but eventually it will be a totally independent organization in terms of finances and personnel.

4. Action Plan for Dissemination of Quality / Productivity Improvement Activities

In Chapter 3, the following proposals were made for the dissemination of quality/productivity improvement activities based on information, etc. obtained in the pilot project: 1) continuation of Kaizen activities and implementation of a trainers' training program, 2) implementation of a training program for business owners, and 3) building of a setup for promoting dissemination activities. Chapter 4 describes the action plan of activities for realizing these proposals in the short and medium terms (2009-2011).

In order for dissemination activities to be effective for improving the quality/productivity levels of Tunisian enterprises, they must be based on the characteristics of business management in that country. Section 4.1 describes the features of business management in Tunisia; 4.2 describes the contents of dissemination activities; 4.3 discusses human resources development (trainers' training) for promoting dissemination activities; 4.4 describes the draft execution plan for the action plan comprising the dissemination activities and trainers' training; and 4.5 describes network building for promoting dissemination activities.

4.1 Characteristics of Business Management in Tunisia

(1) Top-down decision making

Enterprises in Tunisia are managed largely on the discretion of owners and there is little delegation of authority. Against this background, many enterprises in Tunisia do not develop beyond family-run operations. For example, taking the case of a women's blouse maker in the outskirts of Tunis that sells its products to European corporations in France and the United Kingdom, etc., even though it has grown to possess a workforce of approximately 900, observation of communications between the president and employees reveals that the president controls everything.

In the pilot project, the best results were achieved in enterprises where the enterprise owner personally took part in line meetings and was actively engaged in the project, so in this respect the top-down approach is effective for promoting improvement of quality/productivity. However, in order to sustain activities into the long term, enterprises should also understand that it is important to 1) arouse awareness of management regarding the need for improving quality/productivity, and 2) promote the participation of all employees in activities so that they feel they are a part of them.

(2) Emphasis on short-term results

Rather than focusing on the long-term process of reforming enterprise production systems into solid profitable setups that can withstand environmental changes, enterprises in Tunisia are more concerned about pursuing short-term results for today and tomorrow. Even in the pilot project, enterprises wanted to know whether the 5S and Kaizen activities would immediately generate concrete returns.

In order to make Kaizen activities successful, the process of arriving at optimum solutions through repeating the PDCA cycle is important, and it is necessary to establish perpetual and ongoing activities.

(3) Kaizen activities are not practically utilized on production lines

Quality managers, plant managers and other production line managers understand the meaning of Kaizen techniques such as cause and effect diagrams and so on from lectures at university, however, they do not understand how such terms are applied to real operations.

Therefore, it is first necessary for managers to learn the actual usage of Kaizen techniques in production environments. At the same time, it is important to understand that Kaizen activities are not based on instructions from above but entail employees organized as QC circles, etc. in each group sustaining activities based on their own ideas and initiative.

Table 4-1 Features of Tunisian Business Management and Dissemination Activities

	Features	Proposed Dissemination Activities	Aim of Dissemination Activities
Decision making	Top-down. One-man. Business owners display strong leadership.	<ul style="list-style-type: none"> > Public information activities <ul style="list-style-type: none"> - Enterprise award schemes - PR activities - Study tours of successful enterprises - Quality / productivity improvement month > Education activities > Business courses > Plant diagnosis services 	<ul style="list-style-type: none"> > Arouse awareness of management regarding the need for improving quality/productivity. > Understand that it is important to promote the participation of all employees in activities so that they feel they are a part of them. <p>In the pilot project, the best results were achieved in enterprises where the CEO personally took part in line meetings and was actively engaged in the project</p>
Corporate strategy	Pursuit of short-term results. In line Kaizen activities too, priority is given to short-term and direct results.	<ul style="list-style-type: none"> > Plant diagnosis services > Education activities <ul style="list-style-type: none"> - Quality / productivity improvement seminars 	<ul style="list-style-type: none"> > More haste, less speed. In Kaizen guidance, establish process-oriented activities through arriving at optimum solutions through repeating the PDCA cycle.
Intermediate managers on production lines	<ul style="list-style-type: none"> > Managers understand the meaning of Kaizen techniques such as cause and effect diagram and so on from lectures at university, however, they do not understand how such terms are applied to real operations. > Waiting for instructions from above. Only acting in response to instructions. 	<ul style="list-style-type: none"> > Plant diagnosis service > Education activities <ul style="list-style-type: none"> - Quality / productivity improvement seminars - Dispatch of lecturers to education agencies 	<ul style="list-style-type: none"> > Acquire the capacity to apply Kaizen techniques, and understand the importance of quality/productivity improvement activities together with employees in QC circles, etc. in each workplace.
Personnel evaluation	<ul style="list-style-type: none"> > There are no reward and promotion systems based on individual ability. Salary and posts are determined according to academic record at the time of recruitment. > Workers switch jobs in search of better pay conditions. 	<ul style="list-style-type: none"> > Public information activities <ul style="list-style-type: none"> - Quality control certificate examinations > Education activities <ul style="list-style-type: none"> - Business courses 	<ul style="list-style-type: none"> > Appropriately evaluate and reward individual capacity and performance so that quality and production improvement activities involving full participation by managers and employees are possible.
Production and marketing	<ul style="list-style-type: none"> > High dependence on exports due to the small size of the domestic market. According to the questionnaire survey export dependence is 42% (mean value). > There is a strong subcontracting culture of being satisfied simply with making products. 	<ul style="list-style-type: none"> > Education activities <ul style="list-style-type: none"> - Business courses 	<ul style="list-style-type: none"> > Switch to product making (Tunisian brand) that gives consideration to the consumers, i.e. the end users, of products

(4) Pay and posts decided according to academic record

Employees are not recruited on a regular basis, rather they are brought in as the need arises. Moreover, there is a clear relationship between academic record and posts, for example, general workers and machine operators are recruited from training schools such as ATFP, quality managers are recruited from universities such as ISET, and plant managers are recruited from technical colleges. Moreover, because enterprises do not have systems whereby personnel can

attain higher posts based on performance, job hopping is regularly observed even among personnel on the level of quality managers.

Accordingly, in order to retain experience-based know-how concerning Kaizen activities within enterprises, it is necessary to adopt systems that appropriately evaluate and reward the ability and performance of individuals and utilize the capability of employees to the full.

(5) High dependence on exports and a strong subcontracting culture

Due to the small scale of the domestic market, enterprises are highly dependent on exports. According to the questionnaire survey in the project (see later), exports account for 42% (mean value) of sales. Moreover, since many enterprises procure materials from parent companies and either assemble these or conduct low-wage processing, there is a strong subcontracting culture whereby enterprises are happy to simply make products.

Accordingly, it is necessary to switch to product making (establishment of Tunisian brands geared to overseas markets) that gives consideration to the consumers, i.e. the end users, of products. In the final analysis, quality is determined by whether or not the consumers (markets) accept products.

Table 4-1 indicates the dissemination activities that are required in view of these points, and Section 4.2 describes them in more detail.

4.2 Dissemination Activities

Figure 4-2 classifies and organizes the dissemination activities that were proposed in Chapter 3.

4.2.1 Public Information Activities

4.2.1.1 Enterprise Award System

Since quality/productivity improvement activities are only significant when executed at the enterprise level, the purpose of this corporate award system is for the UGPQ to review enterprises in terms of each business establishment and to commend enterprises that produce noteworthy results²⁷. Moreover,

²⁷ In Tunisia, a decision was made on October 9, 2007 to designate the final week of March every year as Quality Week and to award the Tunisia Quality Award (Grand Prix Tunisien de la Qualite: GPTQ) during this period. Moreover, evaluation items in the quality award review process are modeled on the French award EFQM (Le Prix Européen de la Qualite et de la Performance). Specifically, these are, 1) business owner's leadership, 2) business policy and strategy, 3) personnel management, 4) management of business resources, 5) improvement system, 6) customer satisfaction, 7) employee satisfaction, 8) social responsibility, and 9) business performance.

since award-winning enterprises become models of excellence for their industries and areas, they can be expected to have a demonstration effect for enterprises following their example.

4.2.1.2 Quality Control Certificate Examination System

It is up to personnel involved in everyday operations, for example, plant managers and quality managers, to take the initiative in quality/productivity improvement activities on the enterprise level. Therefore, it is desirable to introduce a quality control certificate examination system for individuals in order to provide an incentive for these personnel to sustain activities.

It is desirable that this certificate examination be treated as an officially recognized qualification entailing presentation of a quality control instructor certificate to trainees who pass the final examination in the quality/productivity improvement seminars targeting plant managers and quality managers that were proposed in Section 4.2.2 (Education Activities)²⁸.

Incidentally, the Quality Control Certificate (QC Certificate) Examination in Japan is conducted as a national written test in order to objectively evaluate the level of knowledge of company employees engaged in quality control. This examination has been implemented under the auspices of the Union of Japanese Scientists and Engineers (UJSE) and the Japan Standards Association (JSA) since 2005. Its goal is to contribute to the improvement of product quality through raising awareness of quality control among enterprises overall. Moreover, in the QC Certificate, since the required knowledge differs between different levels from quality control department leaders to new recruits, examinations are conducted from grade 1 (for quality control department leaders) to grade 4 (for new recruits). Moreover, persons who pass the examination are awarded a certificate from the Japanese Society for Quality Control.

4.2.1.3 PR Activities in Printed and Electronic Media

In addition to distributing quality/productivity improvement manuals to enterprises, the UGPQ will disseminate awareness through introducing excellent enterprises and award winners for quality/productivity improvement and advertising the seminars and plant diagnosis services described later in its newsletter.

It is desirable that manuals and newsletters be distributed through UTICA²⁹, to which numerous enterprises belong.

28 Incidentally, CETIME conducts a national qualification course (around 7 days) for non-destructive inspections (Controle Non Destructif), and persons who pass a test on completion of this course are awarded with a certificate from the Tunisian Committee of Non-Destructive Testing (COTEND).

29 UTICA is said to have approximately 150,000 member enterprises (including individual enterprise owners)

Table 4-2 Proposals for Quality/Productivity Improvement Dissemination Activities

Dissemination Activities		Outline and Purpose of Activities	Dissemination Leaders	Dissemination Recipients
Public information activities	Enterprise award system	Through commending enterprises that display notable results in quality / productivity improvement activities, stimulate the awareness of improvement activities among business owners.	- UGPQ	- Enterprises
	Quality control certificate examination system	In the quality/productivity improvement seminars described below, award certificates to persons who pass final day examinations in order to provide an incentive for improvement activities on the enterprise level.	- Technical centers - UGPQ	- Enterprise plant managers and quality managers
	PR activities in printed and electronic media	Disseminate improvement activities through distributing the quality / productivity improvement manual and introducing excellent enterprises, etc.	- UGPQ - UTICA	- Enterprises
	Implementation of study tours to excellent enterprises	Reform the thinking of business owners through introducing award winning enterprises and studying pioneering cases from overseas.	- UGPQ	- Enterprises
	Introduction of the quality/productivity improvement month	It has been decided to designate the final week of March every year as Quality Week, however, make activities on the enterprise level fully participatory and ongoing through having business owners conduct plant diagnoses and stage company QC festivals, etc.	- UGPQ - UTICA	- Enterprises
Education activities	Staging of quality/productivity improvement seminars (in Tunis and the regions)	Through conducting seminars based on utilizing the quality / productivity improvement manual and incorporating the improvement technology deemed to be effective in the pilot project into curriculums, impart practical techniques to trainees.	- Technical centers - Private sector consultants	- Enterprise plant managers and quality managers
	Opening of business courses targeting business owners	Establish courses aimed at drawing out the capability of employees so that overall quality competitiveness is improved and participatory improvement activities are established, and heighten the awareness of business owners to improvement activities based on a wider perspective.	- Private sector consultants - Assistance by international experts	- Business owners
	Dispatch of lecturers to education agencies	Utilizing quality/productivity improvement manuals as teaching materials, impart practical know-how of improvement technology to young people being groomed as future plant managers or quality managers.	- Technical centers - Private sector consultants	- Technical colleges, TQM such as ISET, students attending production management courses
Implementation of plant diagnosis services		Through continuing the improvement activities that were implemented in the pilot project, disseminate quality/productivity improvement efforts stretching overall all sectors.	- Technical centers - Private sector consultants - Assistance by international experts	- Enterprises
Data building for measurement of productivity		Through building data concerning productivity according to each sector and sub-sector, provide indicators for the compilation of improvement measures on the level of enterprises.	- UGPQ - INS	- Enterprises - MIEPME
Links with overseas	Staging of seminars	Through accepting trainees from Arab and African countries in the field of quality/productivity improvement, reinforce the south-south cooperation that is currently being implemented in Tunisia.	- Technical centers	- Arab and African countries
	Information exchange with international agencies	Through conducting information exchange with international agencies such as PAPA and APO, etc., approach quality/productivity improvement activities based on a global perspective.	- UGPQ	- Tunisian government

throughout the country. Moreover, according to data of the National Statistics Agency (INS), there are 483,000 enterprises (including individual enterprise owners) in Tunisia as of December 2005.

4.2.1.4 Implementation of Study Tours to Successful Enterprises

Successful enterprises refer to enterprises that are commended under the award system as well as enterprises that strive to change their thinking through exchanging information on quality/productivity improvement with international agencies such as APO and learning progressive case studies from overseas enterprises.

4.2.1.5 Introduction of a Quality/Productivity Improvement Month³⁰

In order to make this activity continuous and effective, in addition to advertising the month-long campaign to enterprises through industrial federations and groups belonging to UTICA, it is necessary for enterprises to appoint quality/productivity improvement (Kaizen) leaders in the workplace in order to promote the activities.

Currently, 16 federations belong to UTICA (see Figure 4-1) and each federation comprises national trade associations (CSN: Chambres Syndicales Nationales). For example, the electric and electronic and electronics federation is composed of seven trade associations (four industrial divisions, i.e. electric and electronics, electronics, domestic electric products, cable and wire, and three commercial divisions, i.e. electric and electronics, electronics and domestic electric products).

In Japan, the quality month (November every year) was established in 1960, and specific activities that have so far been implemented within this include the following: on the industry-wide level, staging of seminars, forums, QC circle national conventions and Deming Prize award ceremonies, and on the enterprise level, soliciting of posters and slogans, in-house TMQ diagnoses by enterprise owners, in-house QC festivals, and implementation of employee awards for year-round results and performance. Through these activities, all enterprise employees and owners assess the results of their activities over the past year and set new goals for the coming year, and through this they practice the PDCA cycle and strengthen the momentum of activities.

³⁰ As was mentioned earlier, it has been decided to make the last week of March every year the Quality Week, and it is scheduled to stage seminars and presentations and so on for successful enterprises during this period.

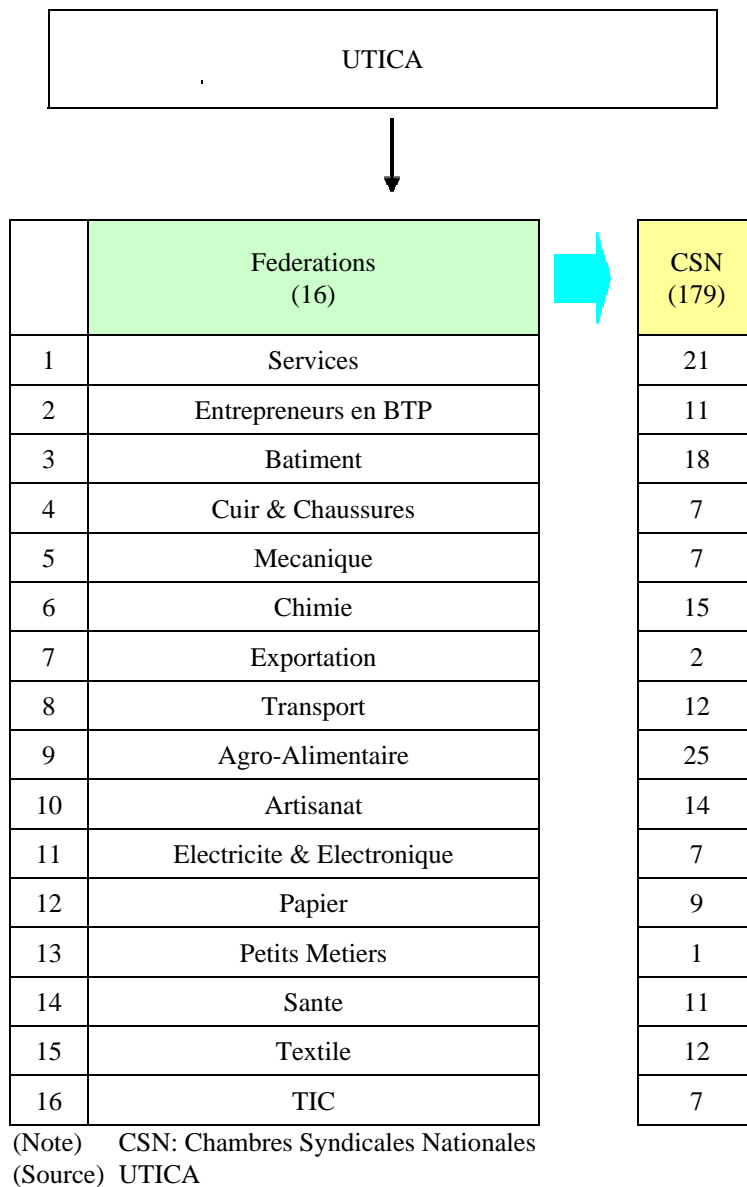


Figure 4-1 Structure of UTICA

4.2.2 Education Activities

4.2.2.1 Staging of Quality/Productivity Improvement Seminars in Tunis and Regional Sites Based on Collaboration between Technical Centers and Private Consultants

The public information activities described above are intended to disseminate quality/productivity improvement activities on the level of enterprises, however, in order for activities to be effective on this level, it is necessary to train quality/productivity improvement leaders. For this reason, it is

desirable to stage seminars targeting plant managers and quality managers who will become the leaders of quality/productivity improvement.

Figure 4-2 shows a graph of responses to a questionnaire survey³¹ asking what kinds of activities, knowledge and information are required in order to reinforce the competitiveness of enterprises. Responses are given separately according to Tunis and regions. Regions here refer to prefectures outside of Tunis.

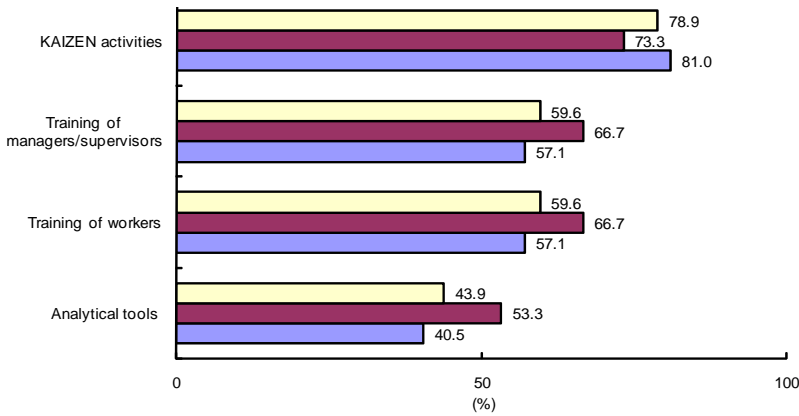
According to this, the following items were the most popular responses:

“Implementing quality/productivity improvement measures on continuous basis such as TQC/TQM, TPM and 5S” (Kaizen activities): 78.9%

“Sending middle managers/supervisors to outside seminars and training to get an expertise in quality/productivity improvement” (Training of managers/supervisors): 59.6%

“Training workers to be skillful in making products without defects” (Training of workers): 59.6%

It can thus be seen that, in order to reinforce competitiveness, there are strong needs for improvement activities such as 5S and TQM on production lines as well as education of middle managers/supervisors such as plant managers and quality managers who will implement the actual quality/productivity improvement activities.



Data: Questionnaire survey (July 2007)

Figure 4-2 Actions, Expertise and Information needed to Reinforce Competitiveness

31 In order to gauge the needs of enterprises regarding quality/productivity improvement, a questionnaire survey was implemented in cooperation with the MIEPME in the third field investigation (May~July 2007). Questionnaire forms were sent to 92 enterprises at the start of June, and responses were obtained from 57 by July 19. See the appendices for the questionnaire forms and overview of the survey.

Incidentally, the ratio of enterprises expressing a need for education of middle managers and supervisors is 66.7% in Tunis and 57.1% in the regions, however, a higher percentage (81.0%) of regional enterprises expressed a need for Kaizen activities. In view of these figures, seminars should also be implemented in regional sites in order to support activities on production lines.

As was previously mentioned (see Annex 6 Review of Quality/Productivity Improvement Measures in Tunisia), CETIME implements a training program targeting enterprise managers, etc. In addition to practical training for welding and non-destructive inspections, etc., this includes two courses, i.e. GPAO (computer-aided production control) and MSP (statistical process control), in the field of production control. Accordingly, the training is focused on learning about production control software but it does not teach specific tools for improving routine operations on production lines such as 5S, QCC, waste elimination and SMED, etc.

For this reason, it is proposed that the manuals compiled in the pilot project be utilized and that seminars based on curriculums including improvement technologies deemed to be effective for quality/productivity improvement be incorporated into the CETIME training program and staged regularly every year.

Table 4-3 Curriculum of the Quality/Productivity Improvement Seminar

Course Objective	Required Curriculum Contents	Training Period	Trainers	Target Trainees
To enhance practical understanding and application to work places of improvement technology found to be effective in the pilot project	1. 5S (concept and method of advancement) 2. Usage of QCC and QC7 tools 3. SMED 4. Layout improvement 5. Improvement of the man-hours balance in work (6. TPM (Total Productive Maintenance)) (7. JIT (Just-in-Time))	(Curriculums 1~5) x 2 days = 10 days	- Technical center consultants and private consultants	Middle managers and supervisors such as plant managers and quality control managers. (Target around 20 trainees per course)

However, because CETIME only has training facilities in Tunis, concerning the seminars in regional locations such as Sousse and Sfax, it will be necessary to implement seminars targeting entrepreneurs in incubation facilities in regional API centers. Moreover, concerning the curriculums, in addition to the improvement technologies found to be effective in the pilot project (1~5 in the above table), it is also desirable to acquire and disseminate TPM (Total Productive Maintenance) and JIT (Just-in-Time) production systems, which are considered to be effective for further enhancing quality/productivity in Tunisian enterprises. Therefore, these contents should be gradually phased into curriculums while carefully monitoring the level of understanding and acquisition of the trainers who sit the trainers' training described later.

Moreover, concerning seminar lecturers, it is desirable to utilize consultants from technical centers and the private sector who have received trainers' training.

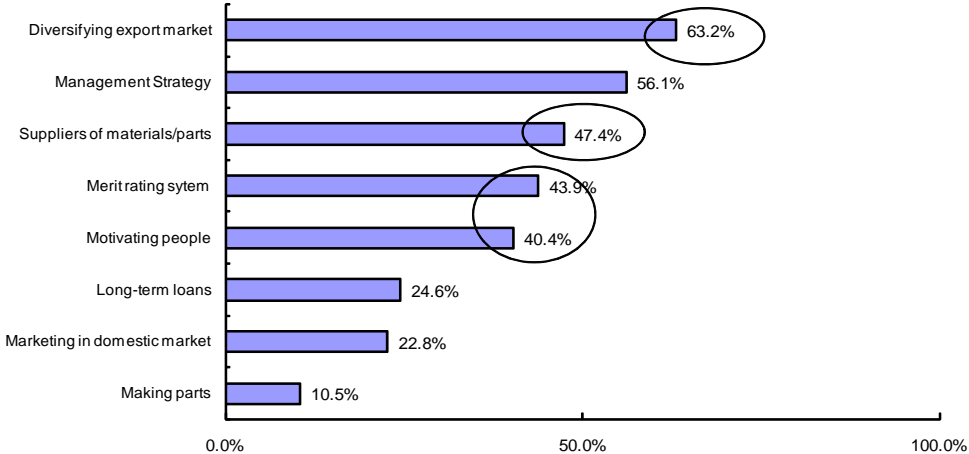
4.2.2.2 Opening of Business Courses by Private Consultants

According to the questionnaire survey, as was seen regarding activities directly linked to quality/productivity improvement on production lines (see Figure 4-3), response rates were high for the following items:

“Information on access to foreign market other than EU to diversify the export market”
(Diversifying export market): 63.2%

“Information on suppliers of materials/parts to procure good quality ones at lower price”
(Suppliers of materials/parts): 47.4%

“Incentives such as merit rating system and wage structure to reward employees to encourage people to positively participate in quality/productivity improvement” (Merit rating system): 43.9%



Data: Questionnaire survey (July 2007)

Figure 4-3 Actions, Expertise and Information needed to Reinforce Competitiveness

Moreover, at the pilot project report seminar that was staged in Tunis on November 2, 2007 (Thursday), in the questions and answers that were held after the presentations of successful companies, numerous participants (enterprise owners and consultants) expressed the desire to see the pilot project activities disseminated to other sectors. They also stated that while people are the core element for the growth of enterprises, motivation systems and staff education for enhancing the satisfaction of employees are also important.

Accordingly, in order to surely execute measures for reinforcing competitiveness, in addition to improving “manufacturing quality” on production lines, it is necessary to also work on 1) strengthening total quality bridging upstream design quality and component quality to downstream market quality, and 2) extracting the capacity of human resources so that Kaizen activities involving

all personnel from enterprise owners to employees are possible. For this reason, it is desirable to launch business courses for raising the awareness of top management regarding such measures³².

Possible curriculum headings include the following: 1) (General theory) Unique features of Tunisian enterprises and quality/productivity improvement measures (how to enhance the general capability of quality), 2) Techniques and thinking on effective quality/productivity improvement in Tunisia, 3) Strengthening of component processing capacity, 4) Diversification of industry, 5) Diversification of export markets and procurement markets. Moreover, in order to stimulate the capability and motivation of employees with a view to establishing total participation-based Kaizen activities, the following curriculums can be considered: 1) Personnel evaluation and reward systems according to ability and performance, 2) Team building and motivation, and 3) In-house personnel training (development of human resources capability).

As for the trainers, it is desirable to recruit private sector consultants who have experience of management. However, since the objective of these curriculums is to give business owners understanding of the current condition of quality/productivity in Tunisian enterprises and to raise their awareness of future efforts for improvement, it is desirable that international experts dispatched under international cooperation provide assistance.

Table 4-4 Business Course Curriculums

Course Objective	Required Curriculum Contents	Training Period	Trainers	Target Trainees
To enhance understanding and awareness of business owners regarding measures for quality / productivity improvement based on the long-term view and Kaizen activities in unison with employees.	<ol style="list-style-type: none"> 1. Unique features of Tunisian enterprises and quality/productivity improvement measures (how to enhance the general capability of quality) 2. Techniques and thinking on effective quality/productivity improvement in Tunisia 3. Strengthening of component processing capacity 4. Diversification of industry 5. Diversification of export markets and procurement markets 6. Personnel evaluation and reward systems according to ability and performance 7. Team building and motivation, 8. Occupational health and safety programs 9. In-house personnel training 	9 subjects x 1 day = 9 days	<ul style="list-style-type: none"> - Private consultants - International experts 	Business owners (Target around 20 trainees per course)

This business course targets enterprise owners and managers in charge of marketing and personnel affairs, i.e. people who fulfill management functions.

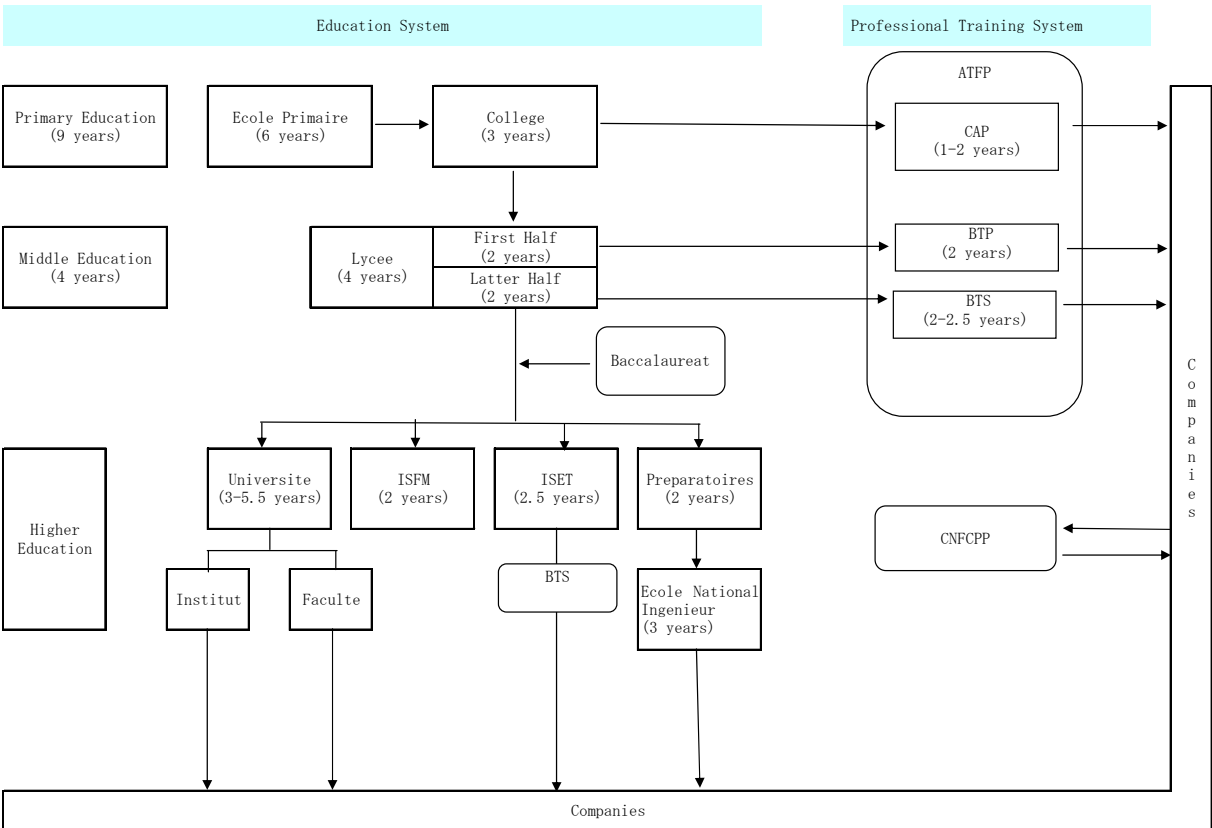
³² Tunisia has no agencies for teaching practical skills of marketing and personnel management (according to the director in charge of the training program at CETIME/CSNEECF).

Incidentally, the CSNEECF (Chambre Syndicale Nationale des Entreprises D'études de Conseil et de Formation) (consultant training association), which comprises private sector consultant companies, was established in 1990 and is one of the 21 associations that belong to the Federation of Services, which is a member of UTICA (see Figure 4-1). According to a questionnaire survey implemented by CSNEECF in 2006, there are approximately 330 consultant companies in Tunisia and many of these were established after 1996 when the Programme Mise a Niveau was launched. Approximately 130 of these consultant companies are members of associations.

It can thus be seen that private sector consulting activities in Tunisia only have a short history, and the field of quality/productivity especially is a new discipline that only appeared at the start of the 1990s. GTZ provided support for the organizational and operational reinforcement of CSNEECF until November 2007, however, if private consultants are utilized in dissemination activities, this will also aid the organizational strengthening.

4.2.2.3 Dispatch of Lecturers to Education Agencies

Figure 4-4 shows an overview of the education and professional training system in Tunisia.



Note: ATFP:Agence Tunisienne de la Formation Professionnelle, CAP:Certificat d'Aptitude Professionnelle, BTP:Brevet de Technicien Professionnelle, BTS:Brevet de Technicien Superieur, CNFCPP:Centre National de Formation Continue et de Promotion Professionnelle

Figure 4-4 Education System and Professional Training System in Tunisia

According to interviews with targets of the questionnaire, the following trends are common in terms of the relationship between academic record and post: 1) people who have finished the first two years of secondary education (4 years) and have obtained a BTP (technician's certificate) after studying for two years at an ATFP (Occupational Training Agency) school³³ are recruited as workers; 2) people who have completed four years of secondary education and have obtained a BTS (senior technician's certificate) after studying for between two and two and a half years at an occupational training school are recruited as machine operators; 3) graduates of ISET (Institut Supérieur des Etudes Technologiques: technical college) or an Institut (institute) are recruited as quality managers, etc., and 4) graduates of Ecole National Ingenieur (ENI, technical college) are recruited as senior officers such as plants managers, etc.

Furthermore, the CNFCPP (Ongoing Training and Employment Promotion Center) shown in Figure 4-4 conducts the clerical procedure for subsidizing training costs to enterprises when their employees receive training at private training agencies.

The president of one of the visited enterprises (a paint resin maker in Tunis) said the following: "I learned about Professor Kaoru Ishikawa and Kaizen tool terms such as JIT, KANBAN, 5S and 4M in university textbooks, and engineers have a degree of knowledge about these things. However, these people do not understand how such tools are used in actual workplace settings and no examples of application in production environments can be seen.

Accordingly, in order for quality/productivity improvement activities to be disseminated on the workplace level, it will be necessary to teach practical know-how including case studies to the future leaders of industry. An enterprise owner in the electric and electronic sector said the following: "Young people understand theory, however, what we need are not theorists but people who have gained experience through real work. In order to work in an organization, workers need to maintain discipline by following the orders of superiors and so on, however, we need to teach people how to behave in enterprises. Human resources should be trained to meet the needs of enterprises." For this reason, technical centers such as CETIME and so on should collaborate with private consultants to dispatch lecturers to senior education institutions such as technical colleges and ISET, etc. and the BTS courses of the ATFP³⁴, and they should be put in charge of lectures on quality/productivity improvement using the manuals compiled in the pilot project.

33 In addition to the state-run ATFP, there are some 400 private sector occupational training schools. Each school specializes in fields such as textiles, apparel, computers, hotels, telecommunications and the restaurant trade, and each offers three qualification courses, i.e. CAP, BTP and BTS.

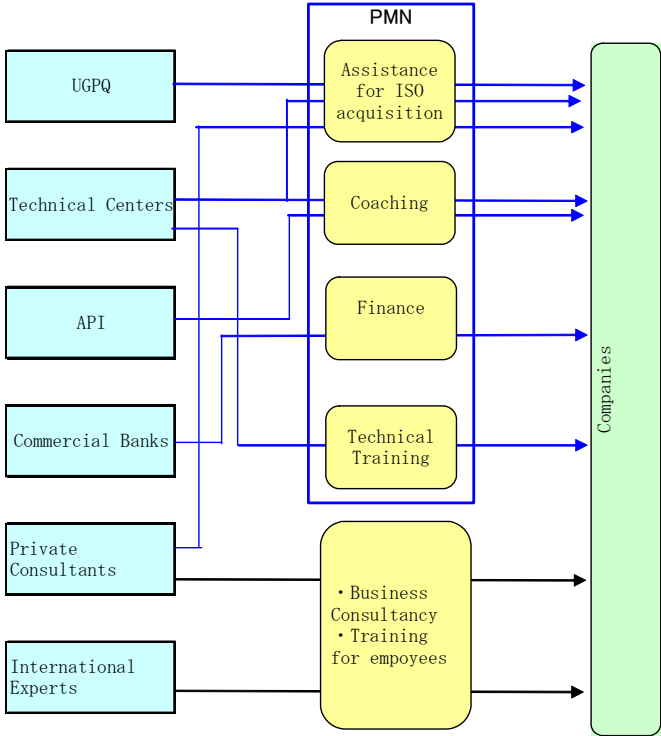
34 ATFP curriculums until now focused on technical fields such as machine operation and so on, however, in future it is hoped to incorporate skills and knowledge on quality/productivity improvement on production lines.

Education for students geared to supporting their employment is carried out in the 21-21 program by the government, however, it is necessary to respond to enterprise needs and widen employment opportunities through teaching practical knowledge.

4.2.3 Implementation of Technical Support Services

In order to stabilize quality/productivity improvement activities on production lines, it is necessary to implement plant diagnosis services based on the quality/productivity improvement manual compiled in this project.

Figure 4-5 gives an overview of the main types and providers of business development services (BDS) provided to enterprises. Currently, under the PMN (Programme Mise a Niveau), the following services are provided: support for acquisition of ISO, management guidance (coaching) for reinforcing competitiveness of existing enterprises, partial subsidization of equipment introduction, and fundraising by commercial banks. Moreover, in addition to training for the acquisition of business skills by private consultant companies (many of which also conduct training), experts are sometimes invited from overseas in order to provide guidance. For example, according to a women’s shoes maker, “In order to make high quality products, we have invited Italian technicians to our plant to train our employees over one to two years. The reason for the long term is because it is necessary to check the thinking of employees to ensure that the technology has been absorbed.”



Note: Services in blue rectangular are provided under Programme Mise a Niveau.

Figure 4-5 Business Development Services provided to Companies

However, the above proposals do not include any of the practical solutions directly connected to line quality/productivity improvement, for example, 5S, layout improvement and QC circles, etc. that were conducted for the model enterprises in the project³⁵. F Co., which is one of the model enterprises in the electric and electronic sector and produces current stabilizers (ballasts) for fluorescent lamps on Kerkennah Island, previously had corridors barely wide enough for even one operator to pass, however, as a result of conducting 5S and layout improvements in the project under guidance from the project experts, it freed up enough space to install an additional two spooling machines and employ four more operators and its productivity increased dramatically. According to measurements made at the model enterprises at the end of the pilot project (October 2007), productivity per unit area of plants increased by 20~25% as a result of the layout improvement and 5S activities. Accordingly, in order to build up more such examples, it is highly desirable to firmly entrench plant diagnoses based on improvement tools that have a proven record in Japan.

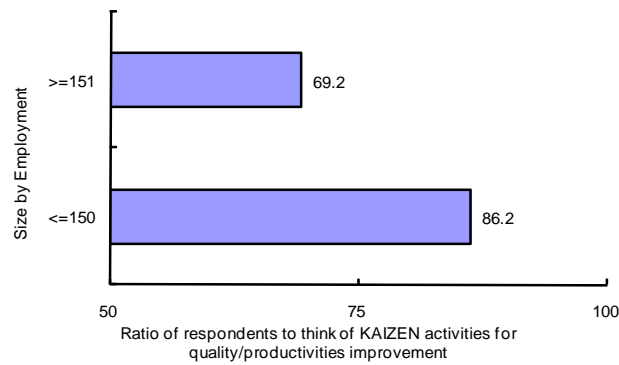
In addition to responding to the needs of enterprises that want to implement the improvement activities shown in Figure 4-2, the following effects can be anticipated through implementing plant diagnoses: 1) since enterprise owners and quality/productivity improvement leaders can confirm the know-how they have acquired in seminars (see the education activities described in Section 4-2) on production lines, it becomes easier for enterprises to plan ongoing and effective improvements after that, and 2) technical centers and private consultants that implement the plant diagnosis services can build up their stock of knowledge through accumulating diagnostic experience based on the quality/productivity improvement manual.

Furthermore, according to the questionnaire survey, 86.2% of enterprises with a workforce of 150 or less³⁶ wish to implement Kaizen activities such as 5S and TQM in order to realize quality/productivity improvement, and this is a higher percentage than among enterprises on a larger scale (see Figure 4-6). Therefore, when implementing plant diagnosis services, it is desirable to focus on small and medium enterprises³⁷.

35 According to the CSNEECF (private consulting and training association), "Many enterprises in Tunisia equate quality with acquisition of ISO and they have the wrong idea about quality improvement. In order to develop them into competitive enterprises, they must realize that quality improvement and ISO acquisition are different things. Moreover, techniques such as TQM are only taught for a few hours in theory at universities, however, there are no consultants who can use such tools to provide guidance to enterprises."

36 Since the average (median) number of employees in the 57 enterprises sampled in the questionnaire is 150, enterprises were divided into the groups of 150 or less and 151 or more.

37 In Tunisia, legislation prescribing a definition of small and medium enterprises was promulgated in December 2007. SMEs are regarded as having 1) fixed assets of no more than 4,000,000 TD or 2) workforce of between 10~199 (according to the MIEPME). Moreover, according to internal data from the National Statistics Agency, there are 57,203 enterprises including individual concerns in the manufacturing industry (as of the end of 2005), and of these 91.0% (52,052) are micro enterprises employing no more than 9 people, 8.3% (4,732) are small and medium enterprises employing between 10~199, and 0.7% (419) are large enterprises employing 200 or more. Also, out of small and medium enterprises, there are 1,456 that have a

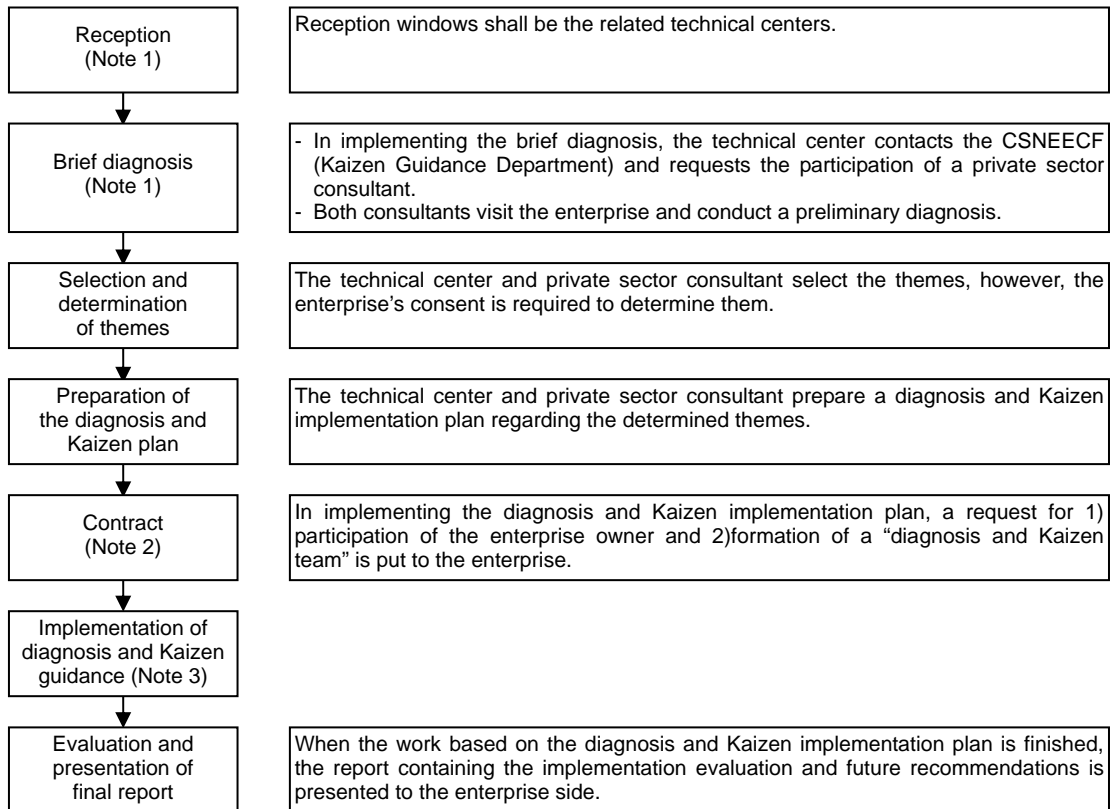


Data: Questionnaire survey (July 2007)

Figure 4-6 Comparison According to Number of Employees

The trainers who will implement these plant diagnosis services will be teams of personnel from the technical centers and private consultants, however, international experts in the production control field should provide support. In the pilot project, although enterprises have acquired individual improvement technologies such as the 7 tools of QC, 5S, layout improvement, man-hours balancing, QCC and SMED, support from the international experts is required because 1) further diagnostic experience is required in order to be able to select issues that need resolving in plant diagnoses, and 2) it is necessary to acquire the ability to apply Kaizen technologies such as QCC and SMED, etc., which are effective for further quality/productivity improvement.

workforce of between 50~199.



- (Note 1) Desirable criteria for selecting the enterprise are as follows: 1) top management is enthusiastic about implementing Kaizen activities, 2) the enterprise belongs to the assembly sector or conducts processing that is based on assembly, and 3) the enterprise is a small and medium enterprise rather than a large corporation. (See the outputs gained from the pilot project).
- (Note 2) The guidance fee depends on the number of man-hours. Incidentally, 1) in support for acquisition of ISO in the PMN, the cost is 9,000 TD for 40 man-days, while 2) the guidance fee for private sector consultants is 400 TD per man-day.
- (Note 3) Man-days depend on the issue being tackled, however, 1 model enterprise is assumed in the pilot project.

Figure 4-7 Flow of Plant Diagnosis Services

The flow of plant diagnosis services is as indicated in the above diagram, however, care should be taken to target enterprises that are most susceptible to benefiting from the Kaizen effect. According to the experience of the pilot project, a larger Kaizen effect can be expected when 1) top management is enthusiastic about implementing Kaizen activities, 2) the enterprise belongs to the assembly sector or conducts processing that is based on assembly, and 3) the enterprise is a small and medium enterprise rather than a large corporation. Therefore, it is necessary to select enterprises that fill such conditions at the reception or simple diagnosis stage. Moreover, one means of ascertaining the approach of top management would be to seek the participation of business owners in the contract.

As for another caution point, the support of international experts is absolutely required in the stage of selecting and determining improvement issues (themes). As was mentioned earlier, consultants in the technical centers (the counterparts) have received transfer of technology regarding the theory and application of individual Kaizen technologies such as the 7 tools of QC, 5S and layout improvement,

etc., however, they need to accumulate further diagnosis experience in order to acquire the ability to discover and select issues that require resolution. For this reason, support should be obtained from international experts in selecting the issues that entail the largest Kaizen effect for the enterprises being diagnosed.

Incidentally, numerous enterprises need to introduce production equipment in order to realize quality/productivity improvement, however, because 1) long-term funds are difficult to obtain and interest rates are high, and 2) the domestic market is too limited to absorb the additional production capacity that would be enabled by new equipment, enterprises are forced to seek overseas markets, in which it takes time to find customers, and they are faced with the problem of operating equipment at low rates.

Accordingly, when conducting plant diagnoses, it is desirable to provide services that make use of medium to long-term financing schemes based on JBIC Two Step Loans (TSL) for enterprises that possess or require equipment investment plans and the JICA SV that enables guidance to be provided according to the industrial sector concerned and the issues faced by the enterprise.

Currently, in the Programme Mise a Niveau (PMN), 10~20% of production equipment acquisition costs are subsidized out of the FODEC (Fund for Economic Development), which is the PMN promotion fund, however, enterprises must depend on commercial banks for almost all of their fundraising. However, according to BFPME, the government's small and medium enterprise bank that was established in March 2005, lending reviews are based on the assessment of collateral and it is difficult to borrow funds. Moreover, for enterprises utilizing the Programme Mise a Niveau, "Because interest rates on bank loans are low and it takes time to get production into gear, loans with a long term of deferment are needed" (according to a TV Air commentator). Moreover, since Tunisian enterprises largely depend on overseas markets³⁸, they need to enhance the profitability of new production equipment through developing and making products that will be acceptable to overseas users and consumers. Accordingly, within such circumstances, it should be possible to provide more effective plant diagnosis services through 1) offering financial support based on JBIC TSL medium and long-term loans or 2) supporting the manufacture of products that will be acceptable to markets based on guidance by JICA SV assigned to CEPEX (Export Promotion Agency) and PACKTEC (Packaging Technology Center) and so on.

Moreover, Figure 4-8 shows the flow of work that can be considered for the plant diagnosis services.

38 In the questionnaire survey conducted in the third field study, the average (median) ratio of exports to sales is 40%.

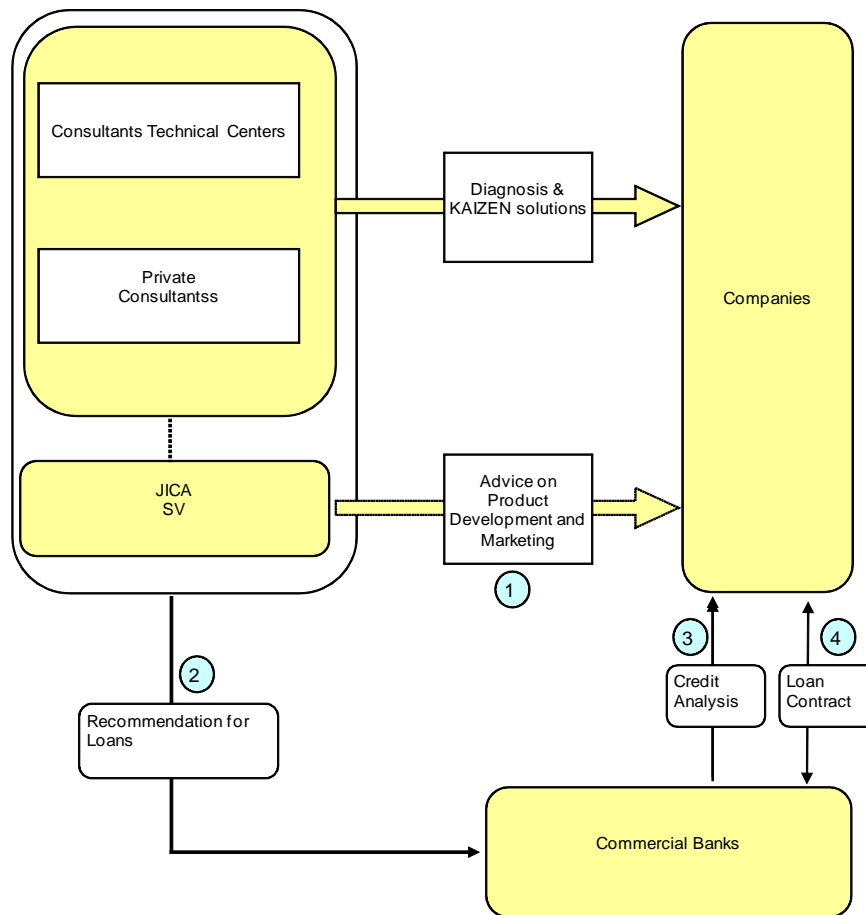


Figure 4-8 Providing Diagnosis and Kaizen Solutions along with Long-term Credit of JBIC Loans

- 1) In the case where an enterprise receiving plant diagnosis services plans equipment investment, an SV (for example, at CEPEX, there is 1 export promotion SV and 2 farm product development SVs, while at PACKTEC, there are 2 food packaging SVs) participates in the diagnosis service and offers advice and guidance on the target field. In some cases, the SV can work alone or form a team with other SVs and commute to the target enterprise during the period of plant diagnosis services³⁹.
- 2) In the case where the activities in 1) produce an improvement effect during the guidance and monitoring stage of the plant diagnosis, recommend the enterprise to a commercial bank with a view to obtaining JBIC TSL funding.
- 3) On receiving the application from the enterprise, the commercial bank conducts a review. The loan review at this time is based not on assessment of collateral but on the potential for growth.

³⁹ In the exchange of opinions held between the study team and JICA SVs at the JICA Tunisia Office on November 2, 2007, the SV side stated that in some cases it would want to be permanently assigned to enterprises to conduct guidance over the long term and thereby increase effectiveness.

- 4) Binding of the loan contract. Moreover, since the enterprise in question is thought to entail high risk, it is required to submit a performance report to the commercial bank once every 6 months.

4.2.4 Database Building for Productivity Measurement

It is necessary to build a database to facilitate the quantitative gauging of the results of productivity improvement activities (see Figure 4-9).

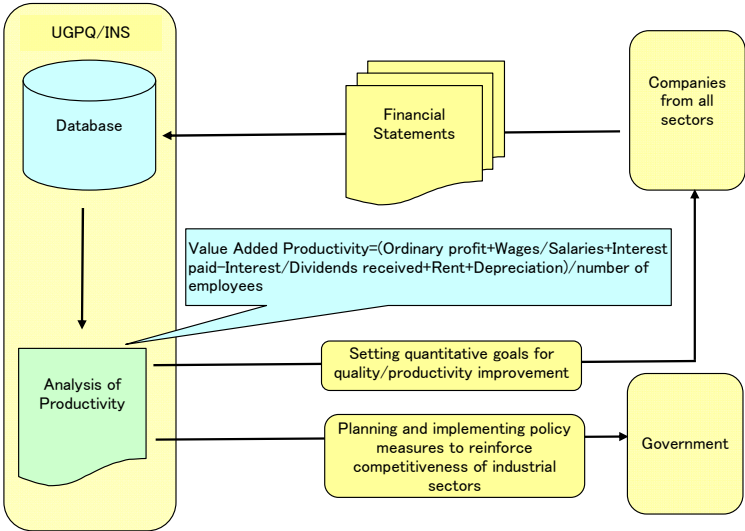


Figure 4-9 Quantitative Analysis of Productivity Improvement

On the level of enterprises, productivity per employee (value added productivity⁴⁰) is computed on the final statement every year and it is possible to gauge yearly changes in this. However, it is necessary 1) to measure comparative competitiveness through comparing mean values between sectors and sub-sectors and to establish a standard that enables enterprises to launch productivity improvement measures, and 2) to acquire macro numerical data to provide the basis for the government to compile competitiveness reinforcement measures in each sector and sub-sector. Currently available databases pertaining to enterprises consist of data on approximately 5,500 enterprises with 10 or more employees compiled by the API Centre de Documentation et d'information Industrielle (CDII, Industrial Information Agency), and data on approximately 17,000 enterprises with 6 or more employees compiled by the INS (Centre de Statistiques d'Entreprises (Enterprise Statistics Agency). The API data comprises qualitative information such as company name, address, name of representative, sector and existence of exports, etc., whereas the INS data comprises quantitative items such as production value, number of employees and accounting items from the balance sheet and profit and loss statement, etc. Therefore, it is better to use the INS data for the purpose of measuring productivity.

⁴⁰ Added value productivity: (Current profit + wages & salaries + paid interest – received interest & dividends + depreciation cost) / Number of employees

Moreover, in the INS survey, approximately 6,000 out of the above population of 17,000 enterprises are selected for sample surveying whereby inspectors make annual visits to each company over a period of three months every year. From the inputted quantitative information, the aggregate added value of all enterprises in Tunisia is computed and published, however, it is still necessary to process the data because added value productivity per employee and so on is not calculated.

4.2.5 Collaboration with Overseas

4.2.5.1 Staging of a Seminar Targeting Arab and African Countries

Currently, the ATCT (Agence for Tunisienne de Cooperation Technique: Tunisia Technical Cooperation Agency) conducts activities geared to sharing technology and experience primarily with Arab nations. In addition, CETIME and CETTEX (Center Technique du Textile), etc. invite trainees from Arab and African nations to provide technical guidance. In this way, Tunisia is a donor nation in so-called south-south cooperation.

Since Tunisia has a “good reputation among recipient nations” (ATCT) concerning this technical cooperation, in the field of quality/productivity improvement too, it will be significant if Tunisia can pass on its experience to other countries when activities become established and sufficient know-how is accumulated.

4.2.5.2 Promotion of Information Exchange with International Agencies

Currently, the PAPA (Pan African Productivity Association) operates as an international organization for the promotion of productivity improvement in Africa, and the NPI (National Productivity Institute), which is the productivity center of South Africa, serves as the secretariat for this. PAPA has seven member nations, i.e. South Africa, Kenya, Nigeria, Mauritius, Botswana, Zambia and Tanzania, and information exchange with these countries should prove beneficial.

Also, information exchange with the APO (Asian Productivity Organization), which has 20 member nations at various stages of economic development, will prove extremely useful when promoting quality/productivity improvement activities in Tunisia in future.

4.3 Trainers’ Training for Dissemination of Quality/Productivity Improvement Activities

Out of the dissemination activities described so far, the quality/productivity improvement seminars and lecturer dispatches to education agencies described in Section 4.2.2 (Education Activities) are essential, while, in order to promote the plant diagnosis services described in Section 4.2.3, it is also

absolutely necessary to train technical dissemination leaders, i.e. human resources that belong to related agencies. This section outlines the training program required for this (see Table 4-5).

4.3.1 Objectives and Targets of Training

The objective of training is to nurture trainers for disseminating quality/productivity improvement activities to all sectors. This entails mastering the practical know-how utilized in this project on production lines for quality/productivity improvement.

The targets of training are consultants from the technical centers and private companies, and the trained trainers will utilize their training for the following purposes: 1) In plant diagnosis services, to continue the Kaizen activities that were implemented in the pilot project target sectors of electric and electronics, electronics and food processing (vertical extension), and 2) To disseminate activities to other sectors (horizontal extension) and to serve as lecturers in quality/productivity improvement seminars and at universities and other education agencies (education activities).

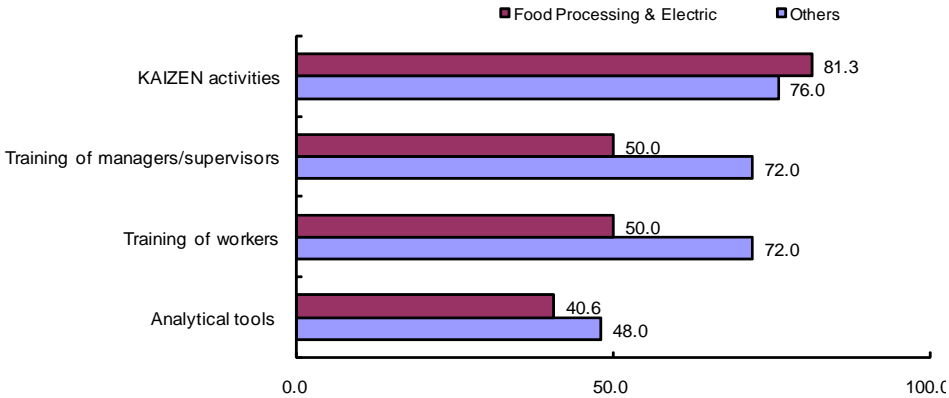
Table 4-5 Plan of Trainers’ Training for Dissemination of Quality/Productivity Improvement

Training Objective	Training Contents	Required Curriculum Contents	Training Term	Trainers		Training Targets
Development of trainers to spread quality / productivity improvement activities to all sectors throughout the country	Learning of Kaizen technology and instruction method concerning quality / productivity improvement	<ol style="list-style-type: none"> 5S (concept and method of advancement) Usage of QCC and QC7 tools SMED Layout improvement Improvement of the man-hours balance in work TPM (Total Productive Maintenance) JIT (Just-in-Time) Plant diagnosis study (diagnosis, analysis, improvement proposal) 	(Curriculums 1~7) x 2 days + (Curriculum 8) x 4 days = 18 days	STEP 1 (1 st year)	CETIME/CTAA consultants (Sub) International experts	- CETIME, CTAA - Private sector consultants
				STEP 2 (2 nd year)	CETIME/CTAA Private sector consultants (Sub) International experts	- 6 other sectors - Private sector consultants
				STEP 3 (3 rd year)	6 other sectors Private sector consultants (Sub) International experts	

4.3.2 Curriculums

As was shown in Figure 4-2, the highest ratio of enterprises (78.9%) responded that Kaizen activities such as TQM, TPM and 5S were needed in order to reinforce competitiveness. However, because this questionnaire included the electric and electronic and food processing sectors that were targeted in the pilot project, there is a possibility that the totaled results of the questionnaire survey are affected by the responses from these two sectors. Accordingly, Figure 4-10 indicates the results totaled separately

according to the pilot project sectors and other sectors comprising leather products, building materials and ceramics, chemicals and textiles, etc.



Data: Questionnaire survey (July 2007)

Figure 4-10 Actions, Expertise and Information needed to Reinforce Competitiveness

According to this, as in the pilot project sectors, most enterprises in the other sectors (76.0%) responded that Kaizen activities such as TQM, TPM and 5S are needed in order to reinforce competitiveness⁴¹. The next most common responses were “Training of managers/supervisors for acquiring knowledge of quality/productivity improvement” (72.0%) and “Training of workers in order to eliminate defects” (72.0%).

Here, it was possible to conduct interviews with enterprises in leather products, ceramics, textiles and other sectors and, although many enterprise owners revealed knowledge of TQM, 5S, 4M, JIT and other terms acquired from university textbooks, no examples could be found of these tools being actually practiced in everyday Kaizen activities.

Accordingly, the following Kaizen technologies, which have proven to be effective for quality/productivity improvement in the Tunisian manufacturing industry during the pilot project, should be incorporated into curriculums: 1) 5S, 2) QCC, 3) SMED, 4) layout improvement, and 5) improvement of the man-hours balance in work. Moreover, as was indicated in Chapter 3, in addition to these Kaizen technologies, since other techniques such as TPM (total productive maintenance) and

⁴¹ Responses according to each sector are as follows. Incidentally, χ^2 verification of this distribution reveals a χ^2 probability of 0.036446 and the null hypothesis is rejected with a risk factor of 5%.

	KAIZEZN activities	Training of managers	Training of workers	Analytical tools	Total
2 Sectors	26	16	16	13	138
Others	19	18	18	12	205
Total	45	34	34	25	343

JIT (just-in-time) production systems will be effective for realizing even greater quality/productivity improvement in Tunisian enterprises in future, it is desirable that these also be included in curriculums. Also, it is recommended that practical training of plant diagnosis at a number of enterprises be included so that trainees can learn actual guidance method⁴².

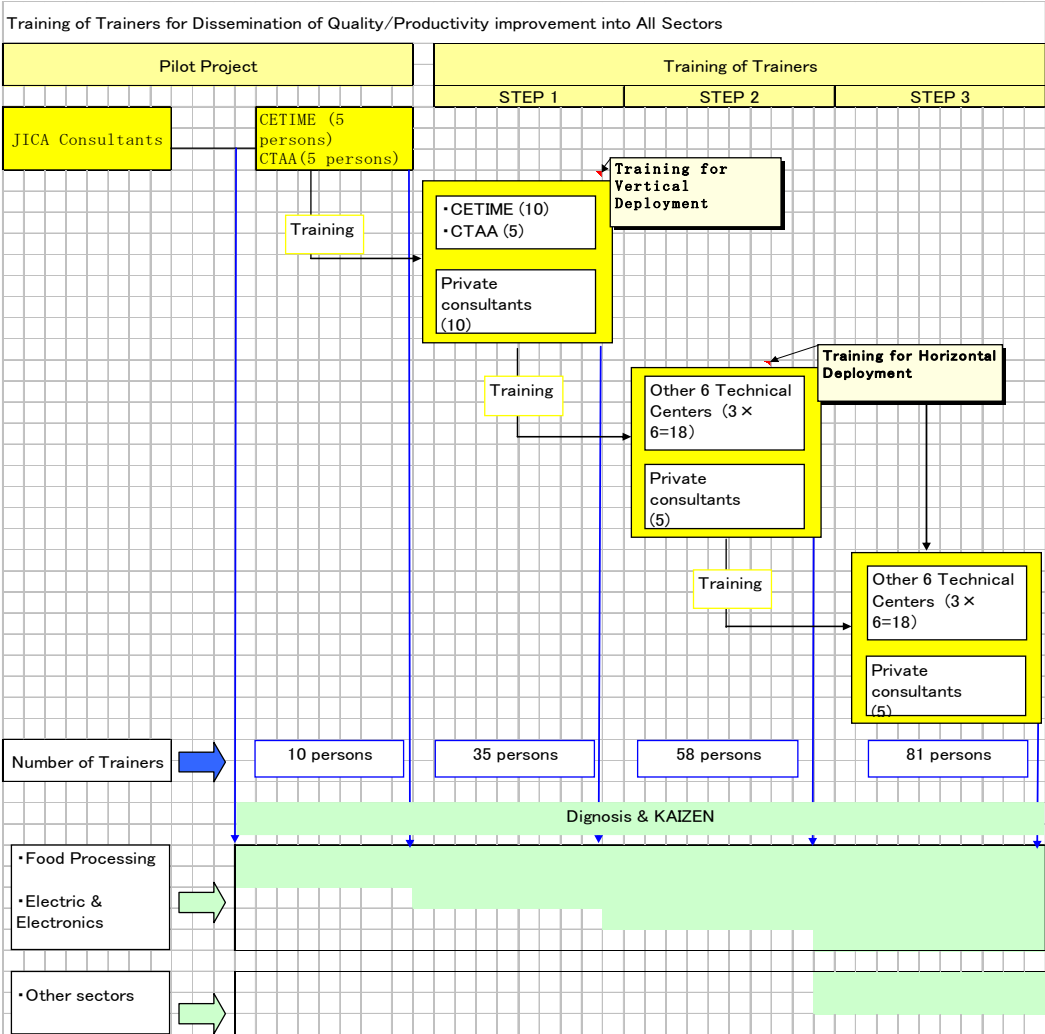


Figure 4-11 Training of Trainers for Dissemination of Quality / Productivity Improvement into All Sectors

Furthermore, in order to develop trainers who can handle vertical and horizontal expansion in plant diagnosis services, it is necessary to implement training over three distinct phases (see Figure 4-11). Specifically, since it is desirable to first work on vertical expansion geared to accelerating Kaizen

42 The CSNEECF (Private Consultant Training Association) voiced its wish to see the following kind of training program compiled.

- 1) First, selecting a theme such as TQM, conduct 2~3 days of classrooms training for private sector and government consultants.
- 2) Then, visit enterprises and, with the Tunisian consultants receiving support from the Japanese experts, offer guidance to corporations on the TQM implementation method.

activities in the electric and electronic and food processing sectors and then expand to other sectors, the following steps are proposed. In Step 1 (first year), CETIME consultants, who were the counterparts in the pilot project, train other CETIME and private sector consultants, while CTAA consultants train the other CTAA consultants. After that, in Steps 2 (second year) and 3 (third year), consultants of the training centers and private sector enterprises that received training in the previous steps serve as trainers.

Moreover, for the reasons described earlier, it is desirable that an international expert (1 member) provides assistance for trainers up to Step 3. However, in Steps 2 and 3, it will be necessary to increase the number of experts to 2~3 since it is calculated the number of enterprises receiving Kaizen guidance will increase as shown below⁴³.

By the end of Step 3, a total of 81 trainers (61 from technical centers and 20 from the private sector) will have received training. Moreover, the number of enterprises that will benefit from Kaizen guidance in vertical and horizontal expansion efforts in plant diagnosis services during the trainers' training period will be as shown below. Also, although the training will finish after Step 3, 122 enterprises per year will receive Kaizen guidance after that.

Table 4-6 Enterprises Receiving Kaizen Guidance during the Trainers' Training Period (Estimate)

		STEP1	STEP2	STEP3
Electric and electronics and electronics	P/P	5 members x 2 companies = 10 companies	5 members x 2 companies = 10 companies	5 members x 2 companies = 10 companies
	STEP1		10 members x 2 companies = 20 companies	10 members x 2 companies = 20 companies
	STEP2			
Food processing	P/P	5 members x 2 companies = 10 companies	5 members x 2 companies = 10 companies	5 members x 2 companies = 10 companies
	STEP1		5 members x 2 companies = 10 companies	5 members x 2 companies = 10 companies
	STEP2			
Other sectors	P/P			
	STEP1			
	STEP2			18 members x 2 companies = 36 companies
Total		20 companies	50 companies	86 companies

- (Note) 1. In plant diagnosis services, since it is basically assumed that 2 consultants, 1 from a technical center and 1 from the private sector, will conduct guidance, estimation was performed based on the number of trainers that are free to move in the technical centers.
2. In the pilot project, 1 consultant generally conducted guidance at 3 enterprises per year, however, here the general workload is assumed to be 2 enterprises per consultant.

43 Estimation of the required international expert man-hours in the trainers' training (18 days) and plant diagnosis services (6 days per plant) reveal 138 man-days in Step 1 (1st year), 318 man-days in Step 2 (2nd year) and 534 man-days in Step 3 (3rd year). Accordingly, 2 experts and 3 experts will be required in Steps 2 and 3 respectively.

Moreover, in Tunisia, since there is high turnover of manpower in pursuit of higher wages from public agencies such as CETIME to private sector enterprises and also between private enterprises, it is possible that technical center personnel who receive the above trainers' training will use their acquired skills to switch to the private sector in the future. Accordingly, in order to ensure that these human resources can be utilized over the long term, human resources completing the trainers' training courses should be registered in a human resources bank set up in CETIME.

4.4 Action Plan Execution Schedule

Figure 4-12 shows the execution schedule of the action plan for the dissemination activities and trainers' training described so far.

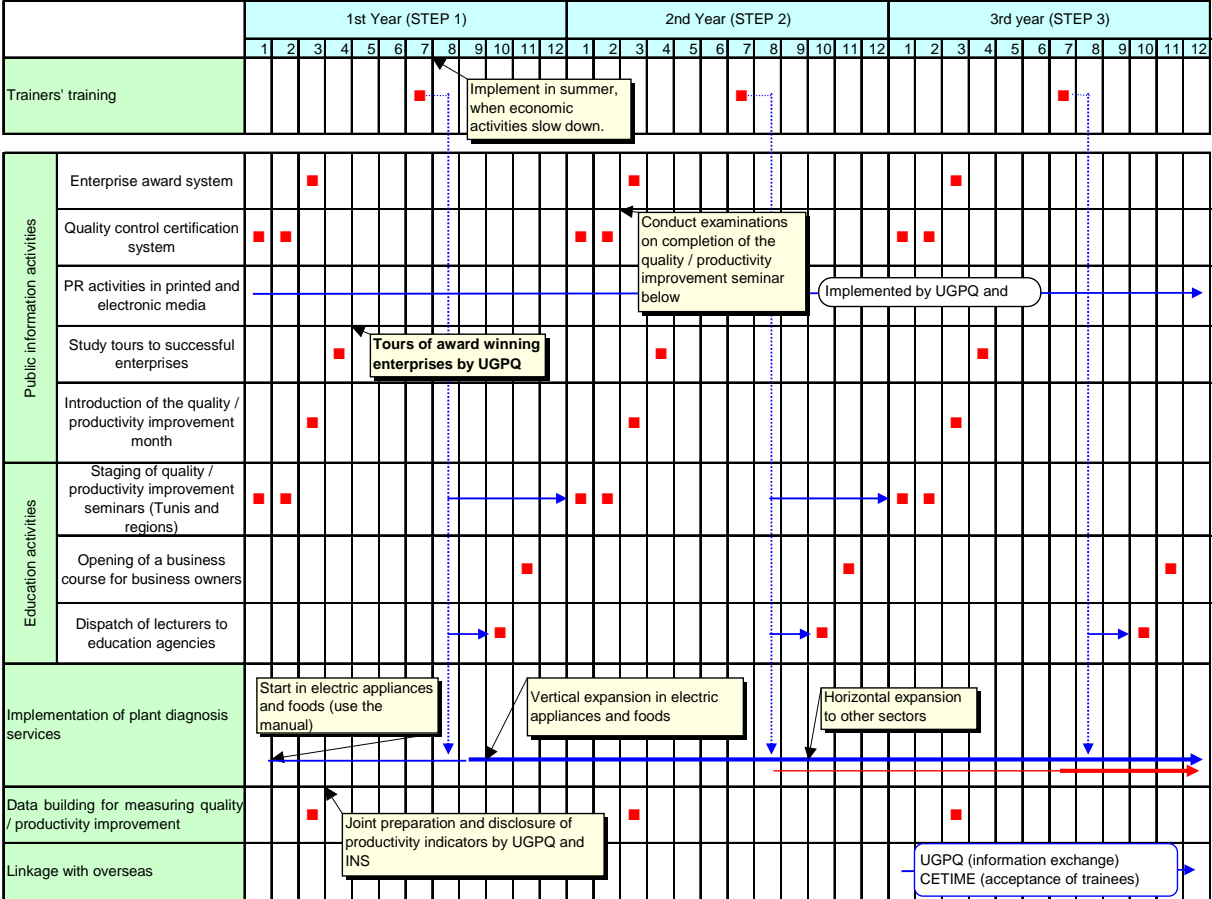


Figure 4-12 Action Plan Execution Schedule for Quality/Productivity Improvement Dissemination Activities

Moreover, in Step 1 before the trainers' training starts, vertical expansion in the shape of plant diagnosis services by consultants of CETIME and CTAA (counterparts in the pilot project) should be started, while the quality/productivity improvement seminars (in Tunis and the regions) should be started by the CETIME consultants.

4.5 Network Building for Promoting the Action Plan

4.5.1 Network Building

In order to promote the activities of the action plan for dissemination of quality/productivity improvement activities described previously, it will be necessary to have close collaboration between 1) the organizations coordinating the overall action plan and 2) the agencies responsible for implementing the activities. Figure 4-1-12 gives an outline of the network required for this purpose.

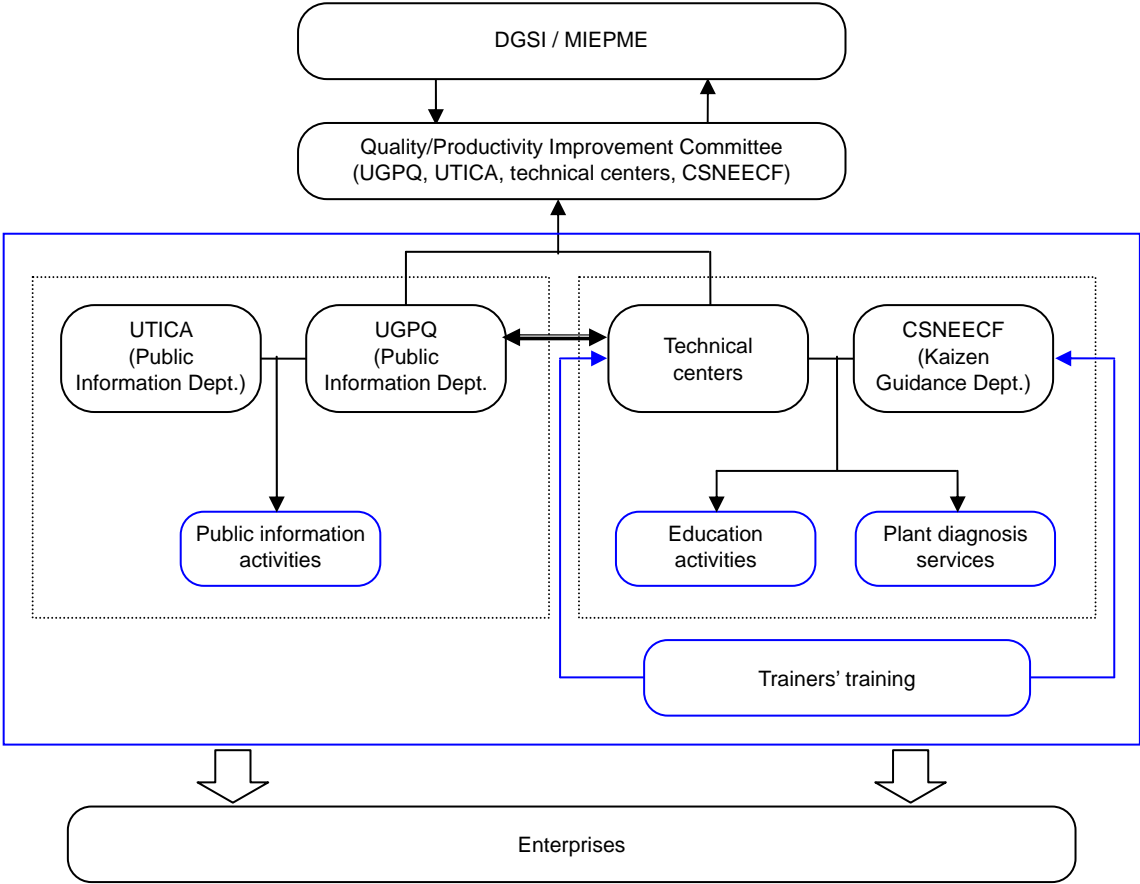


Figure 4-13 Network for Promotion of Quality/Productivity Improvement Dissemination Activities

As the organization for coordinating the overall plan of activities, a “Quality/Productivity Improvement Committee,” composed of personnel from the UGPQ, UTICA, 8 technical centers and representatives of CSNEECF, should be formed, and its secretariat should be installed in the Industrial Strategy Department (DGSI) of the MIEPME.

Since CETIME and CTAA will provide trainers for consultants from the 6 other technical centers and private sector companies in the Step 1 trainers’ training, active involvement is essential to realize the horizontal expansion of improvement activities. However for the reasons stated in Chapter 3, in order to smoothly implement trainers’ training that involves the technical centers in all sectors, since CETIME and CTAA cannot perform this work alone, establishment of the said Quality/Productivity Improvement Committee is proposed. The committee, comprising members from the public sector (UGPQ and technical centers) and private sector (UTICA, CSNEECF), will aim to secure close collaboration between the related agencies stated later.

The roles of this committee will be as follows: 1) compilation of the implementation schedule for the overall action plan (dissemination activities and trainers’ training), 2) supervision and coordination of related agencies, and 3) preparations for realization of a permanent quality/productivity improvement promotion agency (or organization) scheduled for establishment after 2012 (as proposed in Chapter 3 under medium to long-term issues). Concerning the compilation of the overall action plan, after concrete implementation schedules are received from the UGPQ concerning public information activities and the technical centers (with CETIME acting as the general coordinator) concerning trainers’ training, education activities and plant diagnosis services (technical support), approval will be obtained from the Quality/Productivity Improvement Committee.

In the three years between 2009 and 2011, the related agencies and organizations will first need to get their responsible dissemination activities moving on an independent and permanent basis, and from 2012 onwards hand off these activities and functions to independent agencies and organizations scheduled for establishment (see Chapter 3). For this reason, it will be necessary to accumulate operating capacity and know-how regarding the dissemination activities for quality/productivity improvement.

Concerning public information activities, UGPQ will play the central role in collaboration with UTICA⁴⁴. Accordingly, public information departments will be established in each agency in order to

44 When the UGPQ conducts public information activities, it should closely exchange information and cooperate with the NGO Tunisia Quality & Excellence Association (TQEA). TQEA consists of members from the private sector (industry, tourism, transportation, etc.) and government agencies such as TUNAC. It was officially established on December 13, 2007 and its activities, implemented in collaboration with enterprises and quality agencies such as the UGPQ, include the dissemination of quality culture and international standards..

conduct the respective public relations activities and liaise with each other. In particular, since the UGPQ will have jurisdiction over the Tunisia Quality Awards scheduled to start in March 2008, it should assign one permanent staff member to its public information department in order to implement the public information activities that were described in Section 4.2.1. Moreover, since UTICA has never had a department for promoting quality/productivity improvement until now, it is hoped that the new public information department will encourage member enterprises to implement Kaizen activities and so on.

Concerning education activities and plant diagnosis services, collaboration will be required with the CSNEECF, which is the association of consultants from the technical centers and private sector firms. Accordingly, a Kaizen Guidance Department should be established within CSNEECF in order to act as a liaison with the technical centers in the education activities and plant diagnosis services. For example, in the plant diagnosis services, in the event where enterprises throughout the country request Kaizen guidance in response to the PR activities conducted by the UTICA public information department, information will be relayed from the UTICA local branches to the public information department at UTICA headquarters as well as the relevant technical centers (see Figure 4-14), and this will lead on to the plant diagnosis services described in Section 4.2.3.

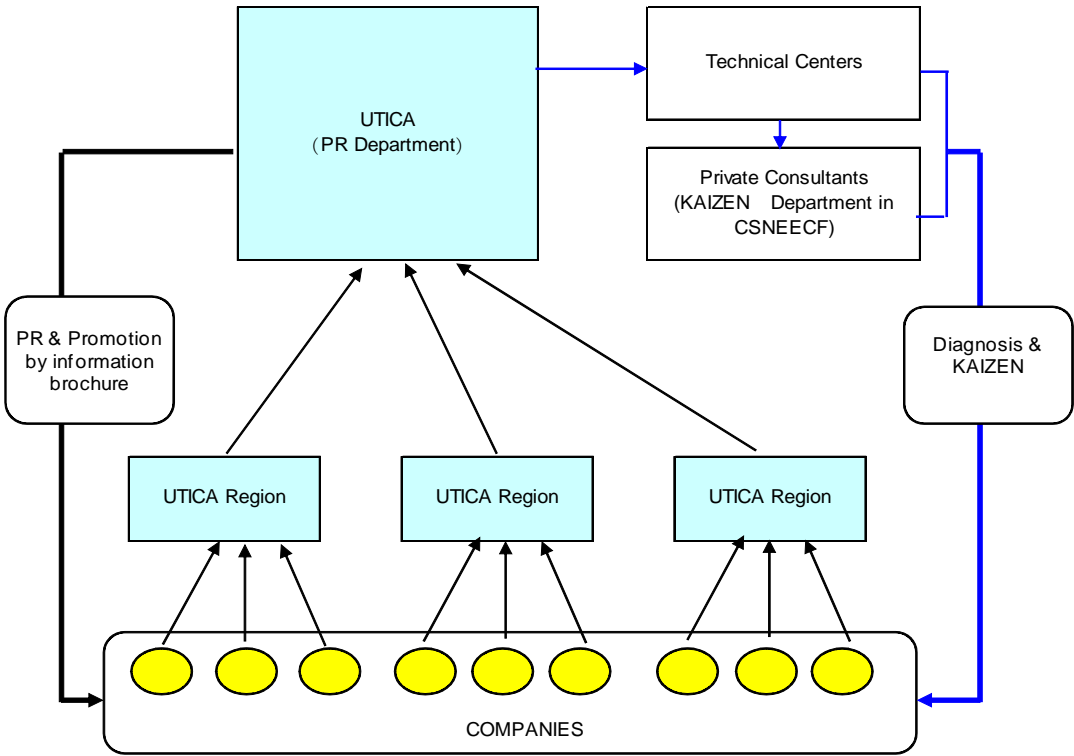


Figure 4-14 Diffusion of Quality/Productivity Improvement to Companies

4.5.2 Incentive Schemes for Sustaining Activities

The goal of this action plan is to further permeate the Kaizen technologies that were proven to be effective in the pilot project to enterprises in the electric and electronic and food processing sectors and, in order to disseminate to enterprises in other sectors, to 1) offer direct Kaizen guidance to production lines and 2) encourage a more positive approach to quality/productivity improvement and a reform in thinking towards manufacturing through education of business owners and middle managers and supervisors, etc. Accordingly, after the collaboration setup for implementing this action plan is established, it is important that activities are made autonomous and permanent.

When it comes to sustaining the action plan in future, the technical centers, private consultants and enterprises based around CETIME will have a vital role to play. The following section investigates the incentives that will be required for these agencies to sustain their roles and activities and describes the profits to be gained from dissemination activities (trial calculation).

4.5.2.1 Incentive Schemes (see Table 4-7)

(1) Technical Centers

Each technical center has clients that it provides technical support and business guidance to (for example, CETIME has 890 enterprises). In order to stimulate inquiries about Kaizen activities from enterprises, the centers should conduct the following activities:

- 1) Register clients that seek plant diagnosis services as members and offer them guidance on Kaizen activities at priority rates;
- 2) In a joint scheme between the eight technical centers, award “Kaizen Certificates” to enterprises recognized for producing excellent Kaizen results in the designated Quality Week at the end of March every year. Also, have enterprises give presentations on their Kaizen activities at this time.

Meanwhile, incentives are required to encourage technical center consultants to actively contribute to plant diagnosis services. Consultant salaries are not based on performance and results but rather academic record and length of service. Accordingly, in order to ensure that consultants disseminate the Kaizen activities instigated in the pilot project, it is necessary to:

- 1) Recognize persons who complete trainers’ training as “Kaizen Consultants;” and
- 2) Give Kaizen qualification allowances to Kaizen consultants.

(2) Private Sector Consultants

The CSNEECF (Chambre Syndicale Nationale des Entreprises D'études de Conseil et de Formation), which is the association of private sector consultants, has approximately 130 private consultant company members, of which roughly 20 are specialists in the quality field. These consultants will receive trainers' training and then work on plant diagnosis services. Irrespective of this, private consultants have expressed a strong interest in the pilot project and are willing to receive transfer of technology from Japanese experts so that they can widen the scope of their own consulting activities. This willingness is underpinned by the fact that 1) they can expand their business opportunities through broadening their scope, and 2) they want to understand how techniques they learned at university such as 5S, SMED, 7 tools of QC and cause and effect diagrams are used in production settings. Other possible incentives for private sector consultants are as follows:

- 1) Recognize persons who complete trainers' training as "Kaizen Consultants;" and
- 2) Establish a "Kaizen Guidance Department" in the CSNEECF and register Kaizen consultants.

Table 4-7 Incentive Schemes for Sustaining the Roles and Activities of Agencies Promoting the Dissemination Activities

	Government			Private Sector		
	DGSI/MIEPME	UGPQ	Technical Centers	UTICA	Private Consultants	Enterprises
Role	Planning and approval of quality / productivity improvement activities	<ul style="list-style-type: none"> - Compilation of annual public information plan - Implementation of public information activities 	<ul style="list-style-type: none"> - Implementation of plant diagnosis services (technical support) 	<ul style="list-style-type: none"> - Implementation of public information activities 	<ul style="list-style-type: none"> - Implementation of education activities and plant diagnosis services 	Quality / productivity improvement activities
Benefits of participation	Reinforcement of international competitiveness among Tunisian enterprises		Increase in the BDS menu and reinforcement of the financial revenue base	<ul style="list-style-type: none"> - Growth of member enterprises - Strengthening of activities of the CSNEECF (subordinate association) 	<ul style="list-style-type: none"> - Improvement in corporate diagnosis capacity and increase in business opportunities - Strengthening of CSNEECF activities 	Improvement in business performance
Incentive schemes need to sustain dissemination activities	<ul style="list-style-type: none"> - Budget allocation for UGPQ (newsletter issue) 		<ul style="list-style-type: none"> - Registration of enterprises seeking plant diagnosis as members - Recognition of persons who complete trainers' training as "Kaizen Consultants" - Payment of Kaizen qualification allowances to Kaizen consultants - In a joint scheme between the 8 technical centers, award "Kaizen Certificates" to enterprises recognized for producing excellent Kaizen results in the designated Quality Week at the end of March every year. Also, have enterprises give presentations on their Kaizen activities at this time. 	<ul style="list-style-type: none"> - Establishment of a public information department for promoting Kaizen activities - Advertise plant diagnosis services and seminars in the newsletter and link applying enterprises to each technical center. 	<ul style="list-style-type: none"> - Recognition of persons who complete trainers' training as "Kaizen Consultants" - Establish a "Kaizen Guidance Department" in the CSNEECF and register Kaizen consultants. 	<ul style="list-style-type: none"> - Appointment of Kaizen managers - Introduction of proposal systems - Payment of qualification allowances to persons who pass the quality control certificate examination. - Stimulation of Kaizen activities through introduction of ability-based grade systems

(3) Enterprises

In order to continue the Kaizen activities, in addition to changing the thinking of business owners regarding quality/productivity improvement, it will be necessary to raise the motivation and secure the total participation of middle managers and general employees who conduct Kaizen activities on production lines. For this purpose, the following measures will be required:

- 1) Appoint selected middle managers comprising plant managers and quality managers as “Kaizen managers” and confer them with authority and responsibility regarding Kaizen activities.
- 2) Give qualification allowances to persons who pass quality control certification examinations (final examinations of the quality/productivity improvement seminars proposed in the dissemination activities).
- 3) According to the experience of the pilot project, since the evaluation of general employees is deemed to be founded on X theory⁴⁵, which aims to satisfy low level desires through for example reflecting only work output in pay, introduce ability-based grade systems in order to appropriately evaluate and reward individual capability and performance. For example, in the event where an employee proposes an excellent layout improvement suggestion in the proposal system, pay him/her a corresponding reward and enhance motivation through posting his/her photograph and suggested contents on notice boards in workplaces.

Also, as was mentioned in the section on technical centers, other effective measures are the awarding of Kaizen certificates to excellent Kaizen enterprises and the staging of presentation meetings for enterprises to introduce their activities.

4.5.2.2 Profitability of Dissemination Activities (see Table 4-8)

The following preconditions are assumed when conducting the trial calculation:

- 1) Assign veteran staff (around 10 years after college graduation) to the public information department newly established in UGPQ.
- 2) When technical center consultants engage in education activities, pay the instructional rate (400 TD per man-day) they would otherwise earn in coaching services.

⁴⁵ XY theory of human observation proposed by the American business scholar Douglas Murray McGregor (1906.4-1964.10). X theory is based on the negative view that people are averse to work, whereas Y theory is based on the positive view that people actively work towards set goals.

- 3) Quality/productivity improvement seminars and business courses can be implemented by UGPQ, however, the technical center training facilities, hotel seminar rooms and API facilities will be used as the venues.

Figure 5-3 shows the results of calculating profitability based on the above preconditions. In Step 1 (first year), total cost is 109,000 STD and total revenue (excluding financial assistance from the UGPQ) is 103,000 STD, while in Step 2 and Step 3, the balance switches to a surplus of 6,000 TD as the education activities take root. In order to make this a reality, it will be important to secure participants for the business courses.

Table 4-8 Profitability of Dissemination Activities (Trial Calculation)

(Unit: TD)

		STEP1 (1 st year)		STEP2 (2 nd year)		STEP3 (3 rd year)	
		Income	Expenditure (Cost)	Income	Expenditure (Cost)	Income	Expenditure (Cost)
Public information activities (UGPQ)		0 (Financial assistance)	- Personnel expense of 1 public information department member: 700TD x 12 months = 8,400 - Printing cost: 1,000 copies x 10 pages x 0.05TD x 4 times per year = 2,000	0 (Financial assistance)	- Personnel expense of 1 public information department member: 700TD x 12 months = 8,400 - Printing cost: 1,000 copies x 10 pages x 0.05TD x 4 times per year = 2,000	0 (Financial assistance)	- Personnel expense of 1 public information department member: 700TD x 12 months = 8,400 - Printing cost: 1,000 copies x 10 pages x 0.05TD x 4 times per year = 2,000
Education Activities	Quality / Productivity improvement seminars	10 days x 100 TD x 20 students x 2 times x 80% = 32,000	- CETIME consultants: 20days x 400TD = 8,000 - Venue costs (including hotel, drinks, etc.): 1,000 x 10 days x 2 times = 20,000 - Text expense: 100 pages x 0.05TD x 20 copies x 2 times = 200	10 days x 100TD x 20 students x 2 times = 40,000	- CETIME consultants: 10days x 400TD = 4,000 - Private consultants: 10 days x 400TD = 4,000 - Venue costs (including hotel, drinks, etc.): 1,000 x 10 days x 2 times = 20,000 - Text expense: 100 pages x 0.05TD x 20 copies x 2 times = 200	10 days x 100TD x 20 students x 2 times = 40,000	Same as Step 2 (28,200)
	Business courses	9 days x 100 TD x 20 students x 1 time x 80% = 14,400	- Private consultants: 9 days x 400TD = 3,600 - Venue costs (including hotel, drinks, etc.): 1,000 x 9 days = 9,000 - Text expense: 100 pages x 0.05TD x 20 copies = 100	9 days x 100 TD x 20 students x 1 time = 18,000	Same as Step 1 (12,700)	9 days x 100 TD x 20 students x 1 time = 18,000	Same as Step 1 (12,700)
	Dispatch of lecturers to education agencies	10 days x 300TD = 3,000	- CETIME consultants: 10days x 400TD = 4,000	10 days x 300TD = 3,000	- CETIME consultants: 5days x 400TD = 2,000 - Private consultants: 5 days x 400TD = 4,000	10 days x 300TD = 3,000	Same as Step 2 (4,000)
Plant diagnosis services		20 companies x 6 days x 2 people x 225 D = 54,000	TC consultants: 20 companies x 6 days x 2 people x 225 TD = 54,000	50 companies x 6 days x 2 people x 225 TD = 135,000	- TC consultants: 50 companies x 6 days x 225 TD = 67,500 - Private consultants: 50 companies x 6 days x 225TD = 67,500	86 companies x 6 days x 2 people x 225 TD = 232,200	- TC consultants: 86 companies x 6 days x 225 TD = 116,100 - Private consultants: 86 companies x 6 days x 225TD = 116,100
Total		103,400	109,300	196,000	190,300	293,200	287,500

(Note) Preconditions for trial calculation:

1. The daily course fee for seminars and business courses was set slightly lower than the fee for regular seminars of CETIME.
2. The overseas lecturer invitation fee of ESTI (Tunis Technology and Information University) was adopted for the cost of dispatching lecturers to education agencies.
3. The instruction fee per man-day in plant diagnosis services was set around the same level as fees for present ISO acquisition support services (40 man-days, 9,000 TD).
4. The fee (cost) for education activities was set at 400TD per day, which is the standard rate in the sector.

[Reference Materials: Contents]

[Reference Material 1]	Overview of the Pilot Project
[Reference Material 2-1]	Trends of Other Donors in the Industrial Field
[Reference Material 2-2]	Comparison of JICA Projects and EU Projects
[Reference Material 3]	List of PP Implementation Contents and Outputs
[Reference Material 4]	Manual Composition (Electric and Electronic Sector Edition / Food Processing Sector Edition)
[Reference Material 5]	Recommendations for Quality/Productivity Improvement (Summary Sheet)
[Reference Material 6]	Review of Measures for Quality/Productivity Improvement in Tunisia
[Reference Material 7]	Japanese Experience and Examples in Quality/Productivity Improvement

[Reference Material 1] Overview of the Pilot Project

The pilot project was launched at the kick-off meeting on January 16, 2007 and completed at the closing ceremony on October 25. Whereas the number of targeted enterprises was 15 in the electric and electronic sector and 14 in the food processing sector, this fell to 14 and 13 enterprises respectively (total of 27 enterprises) over the nine months or so of PP implementation⁴⁶. Through implementing the pilot project with these enterprises, it was possible to ascertain numerous important items when compiling the master plan and action plan.

1-1 Objective of the Pilot Project

The objectives of the pilot project are as follows:

- 1) To offer guidance on techniques, approaches and thinking on quality/productivity improvement to participating enterprises in the problem solving stage on production lines;
- 2) To transfer to the counterparts (C/P) the methodology and thinking needed to provide guidance to enterprises in future; and
- 3) Based on the experiences gained through the above activities, to compile the master plan and action plan for the Tunisian side to deploy quality/productivity improvement activities across all industrial sectors in the future.

1-2 Selection of the Pilot Project Target Enterprises

A fact-finding survey of 84 enterprises, comprising 34 in the electric and electronic sector, 30 in the food processing sector and 20 in other sectors, was implemented over two months in September and October 2006. The objectives of this were to gauge the actual state and features of Tunisian enterprises and to select the target enterprises for the pilot project in the electric and electronic sector and the food processing sector.

Selection criteria were established when selecting the enterprises. The draft criteria were proposed in the Inception Report and were discussed and decided in the Coordination Committee (CC) held on September 4~5, 2006. The criteria contents were set upon giving consideration to the scale of enterprises, operating capacity of enterprises, product ranges, existence of foreign capital, approach to ISO certification, etc., and so as to ensure that diverse survey findings could be obtained following completion of the pilot project. Table 1 shows the criteria used for selecting the pilot project target enterprises.

46 There were 15 enterprises in the electric and electronic sector and 14 in the food processing sector at the time of the kick-off meeting, however, one of the enterprises in the electric and electronic sector was unable to spare personnel because it was preparing to acquire ISO certification, and one of the food processing enterprises withdrew from the project because it was purchased by a foreign corporation.

Table 1 Selection Criteria for Model Companies for the Pilot Project

Selection Criteria		1 Point	3 Points	5 Points	Points Scored
1	Number of companies in the sub-sector	Low	Medium	High	
2	Exporting company, company with potential for import substitution or company which is likely to be threatened by competition from imported products	Low	Medium	High	
3	Company with room for quality and productivity improvement and with a real prospect of a positive outcome	Low	Medium	High	
4	Strong desire to achieve quality and productivity improvement and to cooperate with the pilot project on the part of the company owner	Low	Medium	High	
5	Situation of acquisition of ISO certification or HACCP	None	In Progress	Already Acquired	
Total Score		-	-	-	/25

A fact-finding survey of 84 Tunisian enterprises was implemented in September and October 2006. The targeted enterprises comprised 34 in the electric and electronic sector, 30 in the food processing sector and 20 in other sectors. Although the pilot project only targeted the electric and electronic and food processing sectors, the reason why enterprises in other sectors were targeted was because it was considered essential to gauge general conditions in preparation for the ultimate goal of compiling a master plan covering all sectors.

As a result of the fact-finding survey, 15 enterprises each were selected in the electric and electronic sector and the food processing sector. Of these, one enterprise in the food processing sector was omitted because it didn't express the desire to participate. As a result, a total of 29 enterprises, comprising 15 in the electric and electronic sector and 14 in the food processing sector, were selected as pilot project target enterprises. Table 2 shows the enterprise names, their sub-sectors, principal products and locations.

Table 2 List of Selected Model Companies for Pilot Project

[Electric and Electronic Sector]

No.	Name of Company	Name of Sub-Sector	Principal Products	Location
1	ABS Electronic	Electricity and Electronic Products	TV, Air-conditioner	Mateur
2	ARELEC	Electricity and Electronic parts	Connector for Power	Tunis
3	Bisma Cable	Electricity and Electronic parts	Wire-harness, Cable, etc.	Tunis
4	COLDEQ	Electricity and Electronic Products	Refrigerator for truck	Ben Arous
5	GAN (Mont Blanc)	Household Electrical Goods	Refrigerator, Freezer	Ben Arous
6	GIE	Electricity and Electronic Products	Lighting, Socket	Tunis
7	KACEM	Electricity and Electronic parts	Ballast, Transformer	SFAX
8	NOUR	Electricity and Electronic Products	Battery	Ben Arous
9	SEL	Electricity and Electronic Products	Lighting, Box	Sfax
10	SIAME	Electricity and Electronic parts	Electric meter, Relay, etc.	Nabeul
11	SOFTEN	Electricity and Electronic Products	Solar water heater	Nabeul
12	SOMEF	Electricity and Electronic parts	Switches Socket, Breaker	Tunis
13	TILC	Electricity and Electronic Products	Lighting, Socket	Tunis
14	TTI	Electricity and Electronic parts	Breaker, Box	Nabeul
15	Vossloh Schwabe	Electricity and Electronic parts	Ballast, Connector	Ben Arous

[Food Processing Sector]

No.	Name of Company	Name of Sub-Sector	Principal Products	Location
1	Huilerier Loued	Oil	Olive oil	Chibika
2	L'Appetissante	Confectionary	Biscuit, wafer	Tunis
3	La Générale Alimentaire JOUDA	Vegetable processing	Tomato paste, harissa	El Baten
4	Confiserie Triki-Le Moulin	Confectionary	Candy, gum, shamia	Gabés
5	S.C.A.P.C.B.	Vegetable processing	Tomato paste, harissa, pickled kidney bean, pickled olive, garlic patty	Grombalia
6	SNBG	Drink	Fruit juice, carbonated beverage	Grombalia
7	VACPA	Preserve	Dates	Ben Khalled
8	El Mazraa	Meat	Turkey meat, chicken meat, sausage, catering (delicatessen)	Nabeul
9	ABCO	Fish processing	Canned tuna, canned sardine	Sidi Daoud
10	Medina	Vegetable processing	Artichoke, dried tomato, grilled salad	Zl de Jedeida
11	Sipa	Conditioning agent	Conditioning agent for bread and cake	Bizerte
12	CVBA	Winery	Wine	Bouargoub
13	Med Agro Ruspina	Oil	Olive oil	Moknine
14	Mouna Food	Vegetable processing	Salad in bottle	Mhemdia

1-3 Determination of Issues for Quality/Productivity Improvement

Following the kick-off meeting on January 16, 2007, company diagnoses were carried out on the 29 target enterprises. First the enterprises aired their issues concerning quality/productivity improvement, and then they decided the issues to target for resolution during the pilot project in discussion with the counterparts and JICA consultant team.

Table 3 shows the issues (themes) that were decided on by each enterprise.

Table 3 Issues (Themes) Tackled by the Pilot Project Enterprises

<Electric and Electronic Sector>

No.	Company	Product(s)	Quality/Productivity Improvement Theme(s)
1	ABS Electronic	TVs Air-conditioners	1. Improvement of the plant layout 2. 5S
2	ARELEC	Connectors for power cables	1. Improvement of the assembly line layout 2. QC circle + 5S
3	BismaCable	Harnesses for forklifts	1. Improvement of the plant layout 2. QC circle + 5S
4	COLDEQ	Refrigerator vans	1. Improvement of the plant layout 2. 5S
5	GAN (MontBlanc)	Refrigerators	1. Improvement of the injection molding process 2. Improvement of the assembly line layout
6	GIE	Lighting equipment	1. Improvement of the assembly productivity 2. Improvement of the injection molding process
7	KACEM	Ballast transformers	1. Improvement of the assembly line layout 2. 5S
8	NOUR	Batteries	1. Qualitative improvement of the assembly process 2. Shortening of the set-up time
9	SEL	Lighting equipment	1. Improvement of the welding productivity 2. Improvement of the plant layout
10	SIAME	Relays, watt-hour meters	1. Improvement of the injection molding process
11	SOFTEN	Solar water heaters	1. Improvement of the plant layout 2. 5S
12	SOMEF	Switches, sockets	1. Improvement of the injection molding process 2. Improvement of the assembly process
13	TILC	Lighting equipment	1. 5S + waste elimination activities 2. Improvement of the plant layout
14	TTI	Circuit breakers	1. QC circle + waste elimination activities
15	Vossloh Schawabe	Ballast Transformers	1. Improvement of productivity on the Q66 line

<Food Processing Sector>

No.	Company	Product(s)	Quality/Productivity Improvement Theme(s)
1	Huilerier Loued	Olive oil	1. Strict enforcement of the hygiene basics
2	L'Appétissante	Biscuit	1. Reduction of losses due to defective quality 2. Prevention of the incursion of foreign matters
3	La Générale Alimentaire JOUDA	Tomato paste, harrisa	1. Improvement of the energy use efficiency 2. Strict enforcement of the hygiene basics
4	Confiserie Triki-Le Moulin	Candy, chewing gum, Tunisian cake	1. Reduction of defective products in the manufacturing process 2. Shortening of the set-up time 3. Strict enforcement of the hygiene basics
5	S.C.A.P.C.B.	Tomato paste, harrisa	1. Improvement of the machine operating rate 2. Prevention of rust on cans 3. Improvement of the organizational productivity
6	SNBG	Juice	1. Improvement of the picking work 2. Strict enforcement of the basics of hygiene management
7	VACPA	Dates	1. Improvement of the long storage performance of the raw materials 2. Improvement of the human productivity
8	El Mazraa	Chicken, turkey meat	1. Improvement of the human productivity
9	ABCO	Canned tuna, oil sardine	1. Improvement of the human as well as equipment productivity.
10	Medina	Grilled salad, canned artichoke	1. Improvement of the human productivity
11	Sipa	Conditioning agent	1. Strict enforcement of the basics of hygiene management
12	CVBA	Wine	1. Strict enforcement of the basics of hygiene management 2. Shortening of the set-up time
13	Med Agro Ruspina	Olive oil	1. Improvement of the human and equipment productivity
14	Mouna Food	Grilled salad	1. Improvement of the productivity 2. Prevention of the incursion of foreign matters

1-4 Pilot Project Implementation

Following determination of the issues to be tackled, techniques to be employed and personnel in charge on the enterprise side, a pilot project implementation plan was prepared for each target enterprise. Based on these implementation plans, the UGPQ consultants (in reality consultants from CETIME and CTAA, with different consultants assigned to each enterprise) and JICA consultants (2 for each sector) visited the enterprises. In resolving the issues in each enterprise, the JICA consultants strived not to simply present solutions but to let the enterprises think of the solution as much as possible. The enterprises were then given assignments to complete by the time of the next visit. On average each enterprise was visited an average of seven times over approximately nine months between January and October.

1-5 Evaluation of Implementation Results

Concerning the implementation results of the pilot project, final evaluations were conducted by the officials in the targeted enterprises, the counterparts and the JICA consultant. Table 4 shows the contents targeted in the final evaluation⁴⁷.

Table 4 Interim Evaluation Sheet

Evaluation Items	Evaluation	Remarks (Request)
1. Overall Evaluation of the PP Implementation Plan		
① Appropriateness of the selected problems (themes)	1 2 3 4 5	
② Appropriateness of the selected approach	1 2 3 4 5	
③ Degree of achievement of the expected goals/outcomes	1 2 3 4 5	
④ Composition of the team	1 2 3 4 5	
2. Transfer of Skills (Techniques) to the C/Ps		
① Transfer of basic and practical skills for quality and productivity improvement to the C/Ps	1 2 3 4 5	
② Transfer of guidance and extension methods for quality and productivity improvement to the C/Ps	1 2 3 4 5	
3. Transfer of Skills (Techniques) to the Model Companies		
① Evidence of concrete “quality improvement” and/or “productivity improvement”	1 2 3 4 5	
② Establishment of a system or basis for “quality improvement” and/or “productivity improvement” to suggest a positive outcome in the near future	1 2 3 4 5	
③ Learning of the self-diagnosis/improvement techniques for “quality improvement” and/or “productivity improvement”	1 2 3 4 5	
4. Degree of Satisfaction of the Model Company Owner		
① Degree of satisfaction with the PP results	1 2 3 4 5	

⁴⁷ An interim evaluation was implemented in July 2007 according to the same procedure. The results are stated in the Interim Report.

[Reference Material 2-1] Trends of Other Donors in the Industrial Field

During the first field survey (September 6 ~ November 3, 2006) and the second field survey (January 6 ~ February 28, 2007) of the Quality/Productivity Improvement Master Plan Study, visits were made and conditions were surveyed mainly concerning the aid policies and priority sectors of other donors in Tunisia, aid to the industry sector, and relations with the above JICA project (competing relationship or complementary relationship). The contents are summarized below.

1. Target donors:

1-1 Target countries : United Kingdom, France, Germany, Italy, Spain, United States, Canada (7 countries)

1-2 International agencies : EU, UNDP, UNIDO, AfDB (4 agencies)

2. Aid policies and priority sectors:

2-1 Some countries, for example, the United States, United Kingdom and France, have terminated aid to Tunisia because it no longer qualifies as an aid recipient. France now only provides funding support.

2-2 Some EU nations let support be channeled through the EU. For example, the United Kingdom conducts no bilateral aid at all, and relies solely on aid through the EU. Moreover, France provides funding support but relies on EU channels to provide technical support.

2-3 The following sectors are frequently regarded as important: environment, energy, tourism, private sector, and governance (especially by the UNDP and UNIDO). As for new fields, the UNDP has also turned attention to the youth employment issue. (Tunisia is faced with a high rate of unemployment among young people, and the lack of job opportunities for highly educated youth especially is critical. In the area of quality/productivity improvement too, effort is directed to proposing recommendations that consider the utilization of highly educated graduates.

3. Aid to the Industrial Sector

3-1 Much of the aid to the industrial sector is related to Program Mise a Niveau (PMN), which is Tunisia's industrial promotion program. In this respect, the largest donor is the EU.

3-2 Support for industry in Tunisia is largely divided into direct support (or guidance) for enterprises or indirect support (one-cushion or two-cushion).

3-3 Direct support (in the sense that it directly targets specific enterprises) consists of support targeting overall management systems of enterprises, for example, support for acquisition of ISO and HACCP certification (EU quality improvement), and support that places emphasis

on production lines (this also affects all aspects of management systems, for example, the quality/productivity improvement in this JICA project).

3-4 Indirect support refers to technical support and funding support. The former includes support for building the business environment including establishment of legislation and systems, support for training activities in each industrial sector, and industrial support via the strengthening of industrial groups (for example, strengthening of chambers of commerce and industry by the GTZ). Much of the technical support for developing and strengthening the industrial field belongs to this area. Another type of indirect support is funding support. Examples of this are industrial promotion through the provision of yen loans to government agencies, and the lending of plant and operating funds to enterprises through government-operated or private sector financial institutions. This is usually referred to as "two-step loans." JBIC is scheduled to provide funding cooperation for the promotion of small and medium enterprises in Tunisia.

3-5 According to the above classifications, donors providing support to specific enterprises in the case of Tunisia are the EU and JICA.

4. Relationship with the JICA Project:

4-1 As was described in 3-2 to 3-4, there are no donors conducting aid that competes or overlaps with this JICA project. Rather, the activities of other donors are in a complementary relationship (many of the donors that were visited view the situation in this way).

5. Future Relations with Other Donors

The impression gathered from talks with numerous donors is that the development of industries and enterprises largely depends on the willingness or spirit of business owners towards improvement and growth, and that the effects of industrial support take time to become apparent. Moreover, since it seems that many donors providing support to the industrial sector are still exploring which methods and approaches are the most effective, it will be important to promote appropriate information exchange based on mutual experience. In particular, since the EU is the largest donor in the industrial sector, activities will need to be closely monitored in future.

Aid Agency / Country	Priority Support Items regarding Tunisia	Support to the Industrial Sector/Private Sector (Contents and Features)	Information Source (interviewed person and date)	Remarks (relation with this JICA development study, etc.)
EU	<p>The industrial sector is one of the priority support areas of the EU. The EU supports the Program Mise a Niveau (PMN) industrial upgrading plan, which is Tunisia's plan to strengthen industrial competition. This is divided into two: the Plan for Modernization of Industry (PMI) and FODEC. Support for the PMN will be continued until the middle of 2008. It is undecided whether this will be continued after that (as of October 2, 2006).</p> <p>For the EU, future areas of interest will be macro economic support, development of laws, building of the business environment, and financial support, etc.</p>	<p>The contents of PMI support are: support for entrepreneurship, improvement of quality, and coaching. The amount of aid is 50,000,000 Euros over three years (until the middle of 2008). Support for entrepreneurship is implemented via the API, improvement of quality through the UGPQ and coaching via the eight technical centers.</p> <p>See below concerning the PMI.</p>	<p>Mr. Odoardo Como, Economic Unit, EU Representative (October 2, 2006)</p>	<p>EU support for quality improvement is based on ISO and the techniques involved are standardized. In contrast, JICA techniques are kaizen methods for improving product quality and production, and the techniques differ according to company and problem. EU support may be said to be readymade, whereas JICA support is tailor-made.</p>
EU-PMI Secretariat	<p>Specialization on industrial modernization = PMN</p>	<p>Support areas are : support of formation of corporations, support for existing companies, quality improvement, protection of industrial ownership rights, and financing for small and medium companies. Supplementary support fields are : technical innovation of existing companies and development of marketing capacity (future issues for examination are : 'from sub-contracting to co-contracting,' 'from semi-finished products to finished products' and 'towards development of unique designs,' etc.)</p>	<p>Mr.Slaheddine Hamdi (Responsible National)他 (September 6, 2006) Mr. Jean Francois Philippon, (Expert Financement, Chef d'equipe, Programme de Modernisation Industrielle (October 10, 2006)</p>	<p>International consultants and Tunisian personnel experts are dispatched to the UGPQ to support the improvement of quality, and support is provided for the acquisition of ISO and HACCP certification (amount of support is 7,000,000 Euros, and the target number of companies is 600).</p>
France	<p>France provides assistance via the EU as well as bilateral assistance. Bilateral aid is provided in loans from the government through commercial banks, and the main areas of support are energy, environment, tourism and infrastructure. He amount of aid in 2005 was 1,500,000 Euros. (There is no technical assistance).</p>	<p>France supports the PMN, however, this is done through banks and it does not directly work with companies. Incidentally, there are some 1,100 French affiliated companies (employing 100,000 people) in Tunisia.</p>	<p>Mr.Bruno Caron, Conseiller Economique et Commercial, Chef de la Mission Economique, Mission Economique de Tunis (January 23, 2007)</p>	<p>France provides financial support to companies via the government-bank route, so there is no overlapping of UGPQ/JICA projects. Persons interviewed have stated that the support is complementary rather than overlapping.</p>
UK	<p>The UK provides no bilateral aid to Tunisia, so it has no DFID office either. However, it does work through the EU. Tunisia has a developed infrastructure as well as water and food supply and adequate hygiene. The UK allocates its budget to poorer nations in Africa. Incidentally, the British Museum dispatches experts on cultural assets to Tunisia.</p>	<p>The UK government provides no direct support to the industrial sector. (There are only around 30 UK affiliated companies, however, the UK is the largest overseas investor in Tunisia. Total investment is US\$1.2 billion, and this is mostly directed to the petroleum and natural gas fields).</p>	<p>Ms.Marie-Claire Joyce, Directrice, Affaires commerciales & Presse, Ambassade de Grande-Bretagne Tunis (January 23, 2007)</p>	<p>Concerning support for industry, the UK seems to be relying on PMN support via the EU.</p>
German (GTZ)	<p>Germany provides financial assistance through the KfW and technical support via the GTZ. Priority areas of the GTZ are the environment and the private sector.</p>	<p>Germany provides support to education and chambers of industry and commerce through utilizing local consultants. (It provides no direct support to private companies).</p>	<p>Mr.Deltev Jahan, Coorditeur de Programme (September 6, 2006)</p>	<p>GTZ does not provides direct support to the private sector.</p>
Italy	<p>For Italy, Tunisia is a high priority nation in terms of geography, history and economy (there are currently some 600 Italian affiliated companies in the country). Priority areas are the environment and small and medium company development.</p>	<p>Concerning Mise a Niveau, Italy provides support in terms of marketing and accounting systems in the areas of textiles, farm products processing and shoes and leather products via UNIDO. (From 2007 it plans to offer support in packing, machines and timber processing).</p>	<p>Mr.Giovanni Semeraro, Charge de Programme, Programme de Soutien au Secteur Prive, Bureau de Cooperation, Ambassade d'Italie (October 20, 2006)</p>	<p>Italy supports the acquisition of ISO and HACCP certification, working through the PMI supported by the EU.</p>

Spain (Office Technique de Cooperation, Espagne)	The Magrev region is a priority areas for Spain. Spain provides support to this area in the priority areas of environment, gender and the private sector. Priority areas regarding Tunisia are gender, environment and Mise a Niveau.	Concerning Mise a Niveau, Spain dispatches short-term experts to the technical centers, conducts training in Spain and stages seminars for the API, etc.	Mr.Benito Alvarez, Directeur de la Cooperation, and others (September 22, 2006)	Spain has a short history of assistance activities. It started in Latin America in 1980 and later extended activities to Africa.
USA	Since the per capita GDP of Tunisia exceeds the US criteria for support, Tunisia 'graduated' USAID in 1994. There were numerous programs before, but none anymore.	In the past, the USA conducted cooperation in marketing, business counseling and training including improvement of quality and productivity, however, it currently conducts no bilateral aid.	Mme Beth Mitchell, Chargee des Affaires vEconomiques et Coomerciales, Ambassade des Estats-Unis D'Amérique, and others (ctober 18, 2006)	There is no bilateral aid.
Canada	Canada has completed bilateral aid and is now shifting to the promotion of partnership (until 2008). Canada commenced its aid plan in the 1960s and has so far implemented eight programs, providing 330 million Canadian \$.	The Partnership Program is a plan for promoting the transfer of know-how and technology on the private sector level. (For example, the heads of SME banks go to Canada to receive training from similar bank managers in that country. Next, Canadian consultants go to Tunisia to train local managers. Alternatively, support is provided for development of curriculums in technical colleges (target fields are textiles, shoes and leather products).	Mr.Amir Guindi, Counselor (Commercial & Cooperation) and Consul, Embassy of Canada (January 18, 2007)	There is no bilateral aid, however, Canada does promote private sector cooperation and collaboration with Tunisia.
UNDP	Priority support areas to Tunisia are: governance and environment and energy. Important themes of the country program that will run from 2007 to 2011 are: globalization, public administration reform and the youth employment issue.	The UNDP provided support to the industrial sector in the past, but not anymore. (There is no specific support to the industrial sector, however, efforts regarding the youth employment issue, in particular creation of jobs for highly education human resources, can be linked to support for entrepreneurs).	Dr.Heba El Kholy, Coordonnatrice des Nations Unies en Tunisie, Representante Residente du PNUD (October 25, 2006)	The UNDP does not conduct industrial support but leaves this work to UNIDO.
UNIDO	Private sector, environment, governance	Priority fields are: (until now) textiles, leather products, agricultural products processing, (in future) machinery, timber processing, chemical products (plastics) Quality improvement support comprises support for acquisition of ISO and HACCP acquisition and laboratory support. Recent trends are, 1) support for improvement of quality in service sectors, 2) support for access to overseas markets through formation of export consortiums, and 3) support for construction of environmental management in the textile industry.	Mr.Claudio Scritti, Representant en Tunisie (September 14, 2006) (January 22, 2007)	Support for improvement of quality, like that of the EU, comprises support for the acquisition of ISO and HACCP certification. This support does not overlap with JICA/UGPQ projects ; rather it is complementary in nature. Support for quality improvement is shifting from products to service sectors, indicating diversification in quality improvement.
AfDB	The AfDB targets four priority areas for support: Economic reform (financial support for strengthening of economic competitiveness, small and medium companies, and tourism) / Infrastructure (roads, bridges, railways, regional electrification, etc.) / Agriculture (irrigation, etc.) / Social sector (public health, education, etc.)	The AfDB provides support concerning environmental standards related to development of phosphorous ore.	Mme Baumont Cathaerine, Country Economist, AfDB (October 11, 2006)	Apart from the industrial support indicated on the left, the AfDB currently provides no support in the area of improving quality and productivity.

[Reference Material 2-2] Comparison of the JICA Project and EU Project

Item	JICA Project	EU Project
Related national plan	Industrial level plan: Programme de Mise á Niveau (PMN) (1995~)	Industrial level plan: Programme de Mise á Niveau (PMN) (1995~)
Ultimate objective	Support for reinforcement of international competitiveness of industry	Support for reinforcement of international competitiveness of industry
Project goal	Preparation of a quality / productivity improvement (Q/PI) master plan	Implementation of the industrial modernization plan (PMI)
Principal activities	<ol style="list-style-type: none"> 1) Implementation of the quality / productivity improvement (Q/PI)(Q/PI guidance to model enterprises) 2) Preparation of a Q/PI dissemination manual 3) Preparation of a master plan (including action plan and building of the dissemination setup) 	<ol style="list-style-type: none"> 1) Support for business creation (création) 2) Quality improvement (qualité) 3) Top management guidance (coaching) <p>(Below , 2) is focused on)</p>
Quality improvement support contents	Q/PI guidance on model enterprise production lines (with simultaneous training of C/Ps)	Support for the acquisition of certification from ISO and other international standards
Features of quality improvement support	<ol style="list-style-type: none"> 1) Differing approaches between enterprises 2) Order made (clothes made to order) 3) Instructors have experience of line work. 4) The JICA project offers no guidance or support for acquisition of ISO certification, however, it facilitates the establishment of conditions for acquiring ISO, and it contributes to quality / productivity improvement after ISO has been acquired. 5) Since comprehensive recommendations (master plan) are offered based on the pilot project outputs on production lines, the basic approach is bottom-up. 	<ol style="list-style-type: none"> 1) All enterprises adopt a common approach (application of international standards) 2) Preta porte (readymade) 3) Instructors don't have to have experience of production lines 4) Even if quality management systems and document control systems are established through acquiring ISO certification, this does not automatically mean that improvement will occur on the production control level or production technology level.

[Reference Material 3] List of PP Implementation Contents and Outputs

(Electric and Electronic Industry)

No.	Company	Products	Quality/Productivity Improvement Theme	Total Visits in PP	Enthusiasm for PP Activities	KAIZEN		Main KAIZEN TOOLS	KAIZEN Outputs, Comments
						Field	Achievement		
1	ABS Electronic	TVs Air conditioners	1. Plant layout improvement 2. 5S	7 times	B	P	A	Time analysis Travel distance analysis	<ul style="list-style-type: none"> 29in TV PCB productivity was increased by 50% Per capita productivity improved by 30% through reducing AC assembly line personnel (39 to 30)
2	ARELEC	Connectors for power lines	1. Assembly layout improvement 2. 5S	6 times	A	P	A	Time analysis Operation analysis	<ul style="list-style-type: none"> Personnel reduced by 2 through changing the assembly line flow from vertical to horizontal. Production capacity was also improved by 20-25%.
3	BismaCable	Forklift harnesses	1. Plant layout improvement 2. 5S	6 times	B	P	A	Travel distance analysis	<ul style="list-style-type: none"> Responding to higher production, productivity per unit area was increased by 100% through altering layout and increasing assembly boards. Per capita productivity increased by 11%.
4	COLDEQ	Freezer trucks	1. Plant layout improvement 2. 5S	7 times	C	P/Q	C	Travel distance analysis	<ul style="list-style-type: none"> It was decided to implement layout improvement. A visual control board was made.
5	GAN(MontBlanc)	Refrigerators	1. Improvement of injection molding process 2. Assembly layout improvement	5 times	B	P	A	SMED Distance analysis Operation analysis	<ul style="list-style-type: none"> Injection molding set-up time was shortened by 60%. (Before improvement: 100 minutes→After: 40 minutes) Refrigerator assembly production capacity increased by 20-25%.
6	GIE	Lighting fixtures	1. Assembly productivity improvement 2. Improvement of injection molding process	7 times	A	P/Q	A	Travel distance analysis SMED	<ul style="list-style-type: none"> An assembly process layout improvement plan was prepared. Injection molding set-up time was shortened by 36%. (Before improvement: 110 minutes→After: 70 minutes)
7	KACEM	Ballasts, transformers	1. Assembly layout improvement 2. 5S	7 times	A	P	A	Travel distance analysis 5S	<ul style="list-style-type: none"> Productivity per unit area was increased by 20-25% through changing layout. At the same time, 5S were implemented and the plant was made much cleaner and tidier.
8	NOUR	Batteries	1. Assembly process quality improvement 2. Set-up time shortening	6 times	B	Q	C	7 tools of QC	<ul style="list-style-type: none"> Analysis of quality nonconformity data for batteries revealed major causes.
9	SEL	Lighting fixtures	1. Welding productivity improvement	6 times	A	P	B	Travel distance analysis	<ul style="list-style-type: none"> The plant was extended and is now undergoing major layout improvement.
10	SIAME	Relays Watt meters	1. Improvement of injection molding process	7 times	B	P/Q	B	SMED 7 tools of QC	<ul style="list-style-type: none"> Injection molding set-up time analysis, examination of countermeasures and preparation of an action plan were completed.
11	SOFTEN	Solar water heaters	1. Plant layout improvement 2. 5S	7 times	A	P	A	Travel distance analysis 5S	<ul style="list-style-type: none"> Responding to higher production, productivity per unit area was increased by 40% through altering layout. At the same time, 5S were implemented and the plant was made much cleaner and tidier.
12	SOMEF	Switches Sockets	1. Improvement of injection molding process 2. Assembly process improvement	7 times	A	Q	A	7 tools of QC	<ul style="list-style-type: none"> Nonconformity rate for important injection molding parts was reduced from 20% to 0%.
13	TILC	Lighting fixtures	1. 5S + MUDA (waste) elimination activities 2. Plant layout improvement	3 times					<ul style="list-style-type: none"> Dropped from the PP in the 3rd FS
14	TTI	Electromagnetic switches (MCB)	1. QC circle + MUDA (waste) elimination activities	6 times	A	P	A	Time analysis Operation analysis	<ul style="list-style-type: none"> Riveting personnel for PLS (the mainstay product) were cut from 6 to 3.
15	Vossloh Schwabe	Ballasts, transformers	Q66 processing line productivity improvement	7 times	B	P	B	7 tools of QC	<ul style="list-style-type: none"> Data on operating rate during the PP implementation period revealed a trend of increase in the Q66 line.

A : Active participation by top management
B : Participation by PP personnel and related staff
C : Almost participation by the PP personnel only

P : Productivity
Q : Quality
P/Q : Productivity/Quality

A : Concrete KAIZEN outputs are recognized.
B : Concrete KAIZEN outputs can be expected in future.
C : KAIZEN techniques were acquired.

(Food Processing)

No.	Company	Products	Quality/Productivity Improvement Theme	Total Visits in PP	Enthusiasm for PP Activities	KAIZEN		Main KAIZEN TOOLS	KAIZEN Outputs and Comments
						Field	Achievement		
1	Huilerier Loued	Huile d'olive	1.Thorough enforcement of hygiene control fundamentals	6	B	Q	B	·5S(3S)	·The company aims to acquire ISO next year and regards the introduction of 3S as preparation for this, under instructions from the company owner.
2	L'Appétissante	Biscuits	1.Reduction of losses caused by quality defects 2.Prevention of infiltration of foreign objects	5					·Dropped out at the request of the company
3	La Générale Alimentaire JOUDA	Pureé de tomates, harissa	1.Improvement of efficiency of energy use 2.Thorough enforcement of hygiene control fundamentals	7	C	P/Q	C	·7 tools of QC ·5S(3S)	·Although a plan for reducing tomato washing water was presented, discussion failed to advance because the company was busy with plant repairs.
4	Confiserie Triki-Le Moulin	Confiserie chewing gum, gateaux tunisiens	1.Reduction of nonconformities in manufacturing 2.Shortening of retooling time 3.Thorough enforcement of hygiene control fundamentals	7	B	P/Q	C+	·7 tools of QC	·Since this is an integrated device plant with diverse processing conditions, it is difficult to directly gauge nonconformities and their causes. ·Meanwhile, analysis techniques and data collection awareness on the company side increased via the PP.
5	S.C.A.P.C.B.	Pureé de tomates, harissa	1.Improvement of machine operating rates 2.Rust prevention of cans 3.Improvement of organized productivity	7	B+	P	B	·Maintenance of main machinery ·Improvement of in-house communications	·The company is satisfied with its acquisition of techniques, e.g. self-diagnosis capacity. ·Causes of the rust problem in cans lie not only in the company's manufacturing line but also the can making company. In future, can measures will need to be discussed with input from a doctor.
6	SNBG	jus	1.Improvement of machine operating rates 2.Thorough enforcement of hygiene control fundamentals	8	A	P	A	·PQ analysis ·5S	·Following layout improvement, product travel distances (by forklift) were greatly reduced. Also, it appears that picking work, replacing trolley work, will be greatly improved ·It is planned to implement a series of improvement in October, when product stores go down. Work in the three other product stores will be improved upon viewing the results.
7	VACPA	Dattes	1.Improvement in long-term storage of raw materials 2.Improvement of human productivity	8	A	P/Q	A	·Work time analysis ·Operation analysis	·In the packaging process, through introducing small groups, productivity was improved by reducing idle time and overload losses arising from fluctuations in net task times. ·In October, the roller conveyor required for this was introduced and 4 small groups were formed. (Productivity improvement of 25-30% can be anticipated).
8	El Mazraa	Viande de pouket et de dinde	1.Improvement of human productivity	6	C	P	C	·Operation analysis ·Improvement of packaging process	·Packaging machines for resolving bottleneck processes are under investigation. ·Active involvement and research into productivity improvement by top management is commendable.
9	ABCO	Ihon et daardines a l'huile eb boite	1.Improvement of human and equipment productivity rates	7	B	P	B	·Operation analysis	·The responsible manager is very enthusiastic and conducts avid research, and certain results were realized in terms of transfer of technology of self-diagnosis techniques. ·Based on this side's proposals, improvement of line design is underway.
10	Medina	Salade grillée	1.Improvement of human productivity	6	B	P	C	·PQ analysis ·Operation analysis	·It was decided to introduce trolleys for moving work in progress between processes. Currently, the structure of existing trolleys is under examination.
11	Sipa	Agents de conditionnement	1.Thorough enforcement of hygiene control fundamentals	7	B+	P/Q	A	·FIFO ·5S(3S)	·Active implementation of 5S (3S) in spite of having a plant relocation plan is commendable. The company plans to introduce the same 5S (3S) at the new plant.
12	CVBA	Vin	1.Thorough enforcement of hygiene control fundamentals 2.Shortening of retooling time	7	B	P	C	·7 tools of QC	·The company owner tends to persist with his own ideas regarding problems and issues, however, he is impressed with the transfer of issue analysis methods via the PP. ·However, 5S (3S) implementation has failed to progress beyond application of red tags, and the lack of enthusiasm is unfortunate.
13	Med Agro Ruspina	Huile d'olive	1.Improvement of human and equipment productivity rates	7	B+	P/Q	A	·5S(3S)	·3S have been introduced on manufacturing lines and materials and products stores, and the plant has reached a level that can satisfy even visits by overseas buyers.
14	Mouna Food	Salade grillée	1.Improvement of productivity 2.Prevention of infiltration of foreign objects	7	C	P/Q	C	·Operation analysis	·The company is considering introduction of an automatic baking machine on the green pepper baking process, where production is rising.

A : Participation des propriétaires et / ou des PDG des entreprises
B : Participation des responsables des départements et homologues coté entreprise du PP
C : Participation des homologues coté entreprise du PP uniquement.

P : Productivite
Q : Qualite
P/Q : Productivite / Qualite

A : Constatation concrète d'une « amélioration de la Qualité et/ou Productivité »
B : Existence de perspectives de résultats concrets dans un proche avenir
C : Acquisition des méthodes d'autodiagnostic / amélioration pour

[Reference Material 4] Manual Composition

Configuration of the Manual for the Electrical and Electronic Sector

I. Basic Knowledge

Chapter 1 Quality

- 1.1 What is Quality?
 - 1.1.1 Definition of Quality
 - 1.1.2 QM and QC
 - 1.1.3 ISO-9000 Series
- 1.2 Quality Management Techniques
 - 1.2.1 7 Tools of QC
 - 1.2.2 QC Process Chart
 - 1.2.3 Work Standards
 - 1.2.4 Error-Proofing
- 1.3 Quality Improvement Activities
 - 1.3.1 QC Circle
 - 1.3.2 TQM
 - 1.3.3 6 σ (six sigma)

Chapter 2 Productivity

- 2.1 What is Productivity?
- 2.2 Productivity Management Techniques
 - 2.2.1 Elimination of 7 Muda
 - 2.2.2 Shortening of the Set-Up Time
- 2.3 Productivity Improvement Activities
 - 2.3.1 5S Activities
 - 2.3.2 TPM

Chapter 3 Company Diagnosis and Improvement Activities

- 3.1 Purposes and Effects of Company Diagnosis
- 3.2 Company Diagnosis Method and Diagnosis Item
- 3.3 Implementation of Company Diagnosis
- 3.4 Analysis and Evaluation of Company Diagnosis Results
- 3.5 From Planning to Implementation of Improvement Activities

II. Plant Diagnosis

Chapter 4 Plant Diagnosis

- 4.1 Flow of Quality/Productivity Diagnosis and Improvement Activities
- 4.2 Quality/ Productivity Diagnosis and Improvement Methods

Chapter 5 Check Items for Quality/Productivity Diagnosis and Improvement Points

- 5.1 Workplace Management
 - 5.1.1 Situation of 5S
 - 5.1.2 Visible Management
 - 5.1.3 Workplace Safety and Environment
- 5.2 Quality Improvement
 - 5.2.1 Initial Quality Management
 - 5.2.2 QC Process Chart and Work Standards Documents
 - 5.2.3 7 Tools of QC
- 5.3 Production Management
 - 5.3.1 Production Management System
 - 5.3.2 Inventory Management (FIFO)
 - 5.3.3 Equipment and Production Tool Maintenance
- 5.4 Productivity Management
 - 5.4.1 Elimination of 7 Muda

5.4.2 Efficiency Management

5.4.3 Equipment Layout

III. Individual Improvement Techniques

- 5S
- Layout
- SMED
- Balanced Work Man-Hours
- QC Circle

The following composition of the contents equally applies to each of the above items.

1. Introduction
2. Definition
3. Objectives
4. Implementation Sequence
5. Preconditions for Success
6. Conclusions
7. Annex

IV. Actual Examples of Improvement

1. Example of Layout Improvement
2. Example of Improvement Using SMED Method
3. Example of Improvement Based on Balanced Work Man-Hours

Configuration of the Manual for the Food Processing Sector

1. Purpose of Improvement in quality and productivity
 - 1-1. Definition of the quality in the food industry
 - 1-2. Definition of the productivity in the food industry
 - 1-3. Purpose of the improvement in quality and productivity
2. Steps to improve quality and productivity
 - 2-1. Management cycle
 - 2-2. "Plan" for the improvement in quality and productivity
 - 2-3. "Do" for the improvement in quality and productivity
 - 2-4. "Verify" for the improvement in quality and productivity
 - 2-5. "Action" for the improvement in quality and productivity
3. Method to improve quality
 - 3-1. Quality of food processing
 - 3-2. Control points of the quality
 - 3-3. Factory and the partition of working space
 - 3-4. Facilities annexed
 - 3-5. Product specification and material specification
 - 3-6. 7S as the prerequisites of ISO 9001 and ISO 22000
 - 3-6-1. Importance of 7S
 - 3-6-2. General outline of 7S
 - 3-6-3. How to implement "sorting"
 - 3-6-4. How to implement "systematic arrangement"
 - 3-6-5. How to implement "sweep"
 - 3-6-6. How to implement "scrub"
 - 3-6-7. How to implement "sterilize"
 - 3-6-8. How to implement "self-discipline"
 - 3-6-9. How to implement "sanitation"
 - 3-6-10. Check list for 7S
 - 3-7. Improvement in the quality except food hygiene
 - 3-8. How to use seven tools of quality control

- 3-9. Control on the beginning of the new production
- 3-10. Analysis on consumer complaint and its action
- 4. Assurance of traceability
 - 4-1. Purpose of traceability
 - 4-2. Basic points to introduce the traceability
 - 4-3. How to introduce the traceability
 - 4-3-1. First step to the introduction of the traceability
 - 4-3-2. Second step to the introduction of the traceability
 - 4-3-3. Points to consider after the introduction of the traceability
 - 4-3-4. Method of distributing information on the traceability
- 5. Method to improve the productivity
 - 5-1. Formulation of the manufacturing specification
 - 5-1-1. Meanings of the manufacturing specification
 - 5-1-2. Basic recipe
 - 5-1-3. Production flow chart
 - 5-1-4. Work standard
 - 5-1-5. Allocation standard of workers
 - 5-1-6. Process management table
 - 5-2. Control points of the productivity
 - 5-3. Reduction in seven kinds of waste
 - 5-3-1. Improvement in the waste in motion
 - 5-3-2. Improvement in the waste in operation
 - 5-3-3. Improvement in the waste in setup change
 - 5-3-4. Improvement in the waste in conveyance
 - 5-3-5. Improvement in the waste in correction
 - 5-3-6. Improvement in the waste in waiting
 - 5-3-7. Improvement in the waste in stock
 - 5-4. How to save work
 - 5-5. How to improve the process yield
- 6. Method for TPM (total productive maintenance)
 - 6-1. Meanings of TPM
 - 6-2. Corrective maintenance
 - 6-3. Preventive maintenance
 - 6-4. Productive maintenance
 - 6-5. Total productive maintenance
 - 6-6. Predictive maintenance

[Reference Material 5] Recommendations for Quality / Productivity Improvement (Summary Sheet)

1. Recommendations for Reinforcement of Total Quality capacity (Efforts on the Industry and Enterprise Level and Efforts on the Government Level)

	Short – Medium Term (2009~2011)	Medium – Long Term (2012~)
Efforts on the industry and enterprise level	Priority policy: Build setups that can immediately respond to component quality on the level of industries and enterprises.	Priority policy: Build a design quality improvement setup that can immediately respond to market quality on the industrial or enterprise level.
1) Component quality steps	- Support for upgrading component quality control (training, inspection equipment, information provision) - Building of setups that can immediately respond to component quality	- Promotion of component industry upgrading (technology, management, equipment, information, funding) - Building of setups that can immediately respond to design quality and market quality.
2) Design quality steps	- Promotion of the localization of component design (training, inspection equipment, information provision)	- Local model development design support (technology, equipment, information, funding)
3) Market quality steps	- Support for the strengthening of quality assurance setups (training, inspection equipment, information provision)	- Support for customer satisfaction improvement activities (management, information, funding)
4) Government level efforts	Promotion of support for industry and enterprise efforts based on the new setup (network), and environment building for internationalization	Promotion of support for industry and enterprise efforts based on the new setup (independent organization), and environment building for internationalization
[Remarks]	Acceptance of experts with extensive international experience based on international cooperation The above industry and enterprise themes should be incorporated into training programs for business owners.	Acceptance of international experts based on invitations from industrial groups or international cooperation. The above industry and enterprise themes should be incorporated into training programs for business owners.

2. Quality/Productivity Improvement Dissemination Activities (Efforts on the Government Level)

	Short – Medium Term (2009~2011)	Medium – Long Term (2012~)
1) Continuation of Kaizen activities (vertical expansion)	By the counterparts (C/P) who acquired technology via the pilot project (PP)	Promotion of Kaizen activities with the Tunisian C/Ps playing the central role
2) Implementation of the Trainers' Training (TT) program	Transfer of technology to technical center consultants with C/Ps who received training in the PP playing the central role	Promotion of training activities with the training center consultants who have become trainers playing the central role
3) Utilization of manual	Utilize in Kaizen activities, TT and universities, etc. Establish an editing committee to conduct periodic review, supplementation and revision.	Improvement of contents with the Tunisian C/Ps playing the central role (acceptance of international experts)
4) Expansion of quality / productivity improvement technologies (techniques) targeted for dissemination	In addition to the technologies transferred to the C/Ps during the PP, acquire and disseminate further technologies.	Promotion of dissemination activities with the Tunisian C/Ps playing the central role (acceptance of international experts)
[Remarks]	Through the above, accept internationally experienced expert teams under international cooperation	Promotion of dissemination activities with the Tunisian C/Ps playing the central role (with partial acceptance of international experts)

3. Implementation of Training Programs for Top Management (from Government Level Efforts to Industrial Level Efforts)

	Short – Medium Term (2009~2011)	Medium – Long Term (2012~)
1) Targeting top management	Training based on industry and enterprise approach themes for strengthening international competitiveness (corresponding to the themes raised in 3-4-3 and Table 6).	Training based on industry and enterprise approach themes for strengthening international competitiveness (corresponding to the themes raised in 3-4-3 and Table 6).
2) Targeting middle management	Practical training in production control and quality control, etc. (In part, the same as the themes for top management)	Practical training in production control and quality control, etc. (In part, the same as the themes for top management)
[Remarks]	Regarding the above training activities, acceptance of internationally experienced expert teams under international cooperation	Acceptance of international experts at the invitation of industrial groups or based on international cooperation.

4. Quality/Productivity Improvement Promotion Setup (Efforts on the Government Level)

	Short – Medium Term (2009~2011)	Medium – Long Term (2012~)
1) Establishment of a setup for promoting quality / productivity improvement	Expand the activities of existing related agencies for promoting quality / productivity improvement activities, and reinforce the linkage between related agencies The Quality/Productivity Improvement Committee has coordination functions with related departments in the MIEPME and the UGPQ supports the practice of linkage activities.	Establish an independent organization for promoting multifaceted quality / productivity improvement activities under the MIEPME, and at the same time establish a liaison conference linking industry, government and academia to act as a consultative body.
[Remarks]	The Quality/Productivity Improvement Committee prepares for establishment of the independent organization in the future (from 2012 onwards).	The organization will receive government support at the start, but eventually it will be a totally independent organization in terms of finances and personnel.

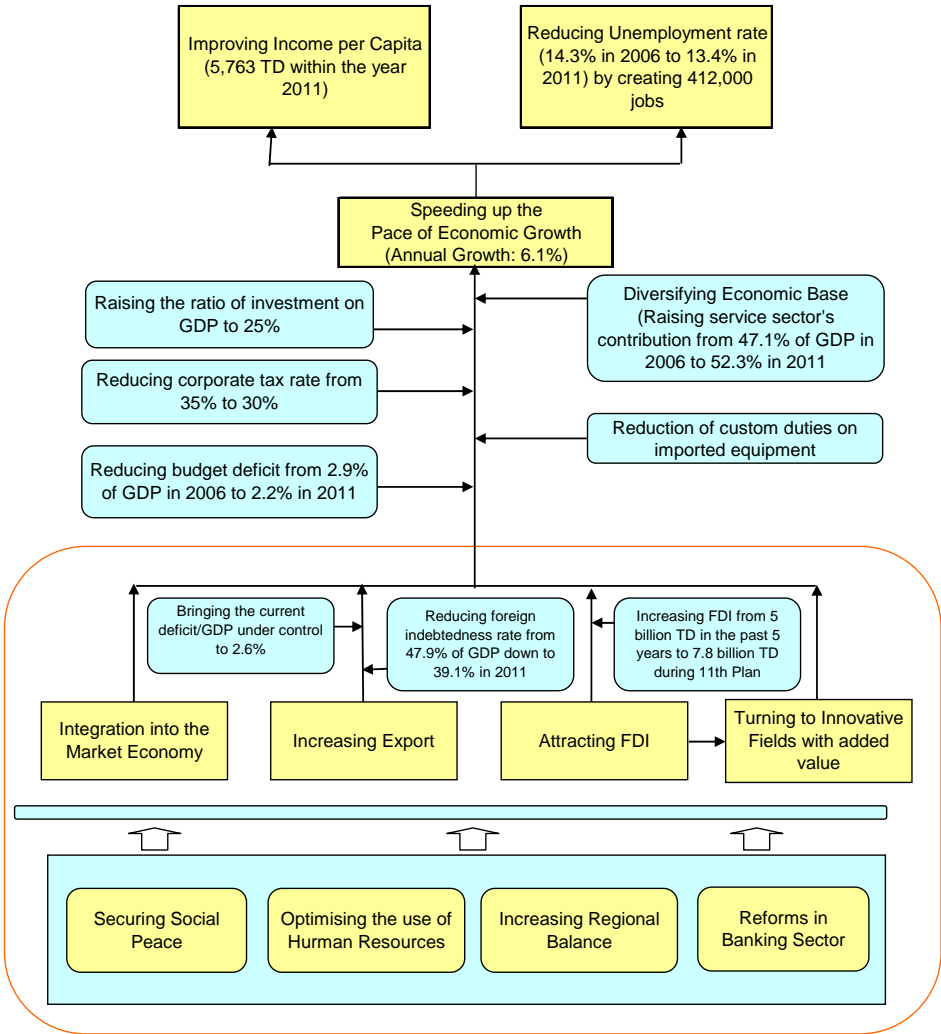
[Reference Material 6] Review of Measures for Quality / Productivity Improvement in Tunisia

Review of Measures by the Government

1. Outline of the 11th Five-Year Plan

The 11th Five-Year Plan due to start in 2007 (2007~2011) was approved by the diet in July 2007.

Figure 1-1 gives an outline of the plan.



Source: “Economic and Social Development in Tunisia 2007-2011” June 2007 Ministry of Development and International Cooperation

Figure 1-1 Outline of the Plan

The plan aims to raise the actual GDP growth rate from 4.5% (the mean value over the past 5 years) to 6.1% while realizing the following goals: 1) increasing per capita income from 4,064 TD in 2006 to 5,763 TD by 2011, and 2) creating employment for 412,000 people and reducing the employment rate from 14.3% in 2006 to 13.4% in 2011.

As the means towards realizing these goals, priority is placed on promoting integration to a market economy, promoting exports, attracting FDI and shifting to high added-value areas, and specific numerical values have been set for each target and means. For example, one of the targets is to reduce the ratio of foreign debt to GDP from 48.2% at the end of 2006 to 39.1% in 2011, and for this purpose, it is intended to reduce the current account balance deficit to GDP to no more than 2.6% through the promotion of exports. Furthermore, in order to reduce the unemployment rate to 13.4% by 2011, with respect to the 440,000 new job seekers predicted over the five years of the plan⁴⁸, it is necessary to create employment for 412,000 people⁴⁹.

In order to realize these objectives, various measures will be implemented. Figure 1-2 gives an overview of the implementing agencies and the main programs provided. The following section looks at industrial policy focusing on the activities of the MIEPME.

2. Industrial Policy

According to the MIEPME General Directorate of Industrial Strategies, industrial policy in Tunisia comprises the three pillars of 1) Programme Mise a Niveau (PMN: industry level program), 2) development of the business environment, and 3) promotion of business startups.

2-1 PMN

PMN originally started in 1995 as a plan to reinforce the international competitiveness of existing manufacturing enterprises in preparation for the total abolition of tariffs in 2008 based on the free trade agreement that Tunisia signed with the EU in July 1995. PMN specifically aims to reinforce competitiveness through modernizing machine equipment, introducing new technologies, improving production, and supporting human resources development.

Specific contents of support with respect to manufacturing enterprises that have been in operation for three years or more are: 1) 10~20% subsidization of machine equipment purchase funds⁵⁰, 2)

48 In the five-year plan, it is estimated there will be 300,000 new college graduates (60,000 per year), and the securing of employment for these young people is an issue. During the 10th five-year plan (2002-2006), 45,000 new graduates joined the workforce every year.

49 Incidentally, during the 10th five-year plan, the working population rose from 2,633,000 in 2001 to 3,005,000 in 2006, while employment increased by 372,000 (the unemployment rate fell from 15.1% to 14.2%). The target of job creation for 380,000 people was largely achieved.

50 There is also the ITP (Investissements Materiels Technologiques a caractere Prioritaire: priority technical equipment investment) program. When purchasing CAD or GPAO (Gestion de Production Assistee par

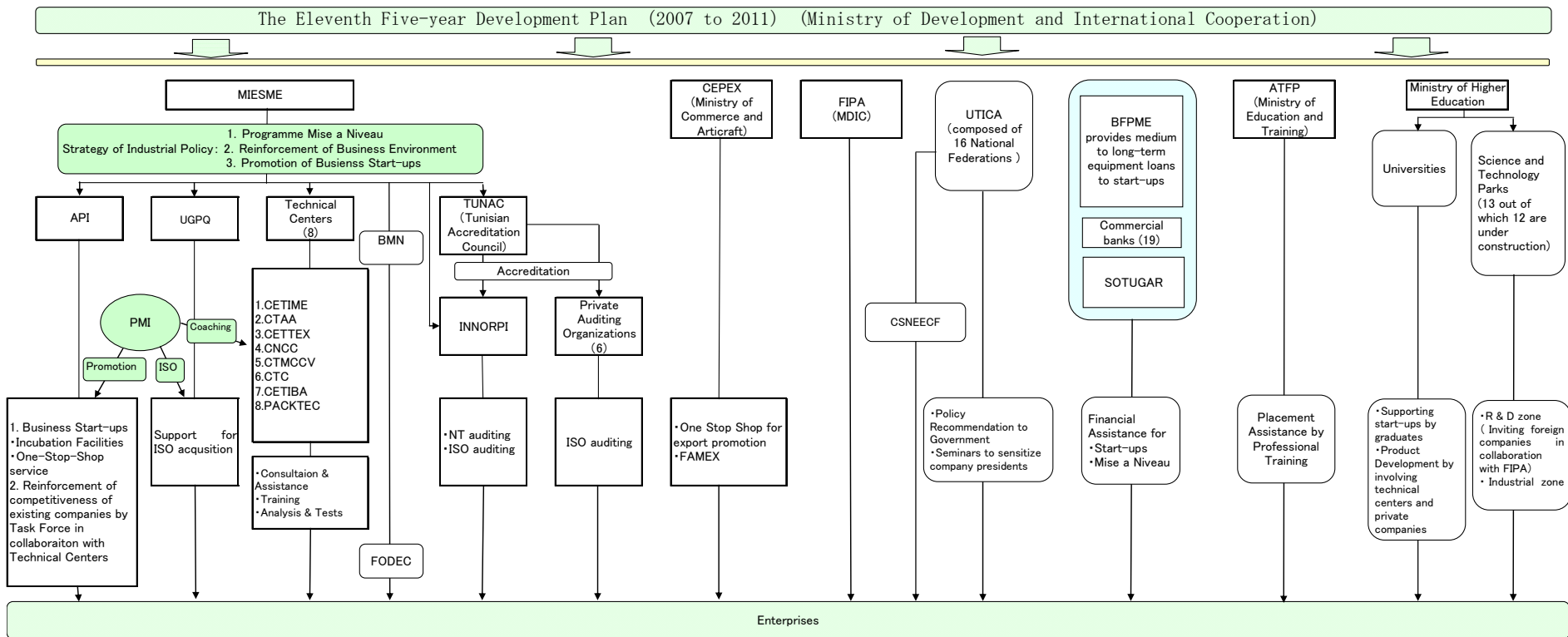
support for ISO certification acquisition and guidance in productivity improvement, and 3) regarding the required costs of 2), subsidization up to 70% or no more than 30,000 TD per enterprise. These subsidies are issued from the FODEC (Fonds de Development de la Competitivite Industrielle)⁵¹ of the Bureau de Mise a Niveau (BMN) in the MIEPME.

Ordinateur: computer aided production control) work stations or equipment for research, development and testing, subsidization of up to 100,000 TD or 50% the cost is provided per enterprise.

51 As the source of funds, 1% of sales turnover is collected from enterprises.

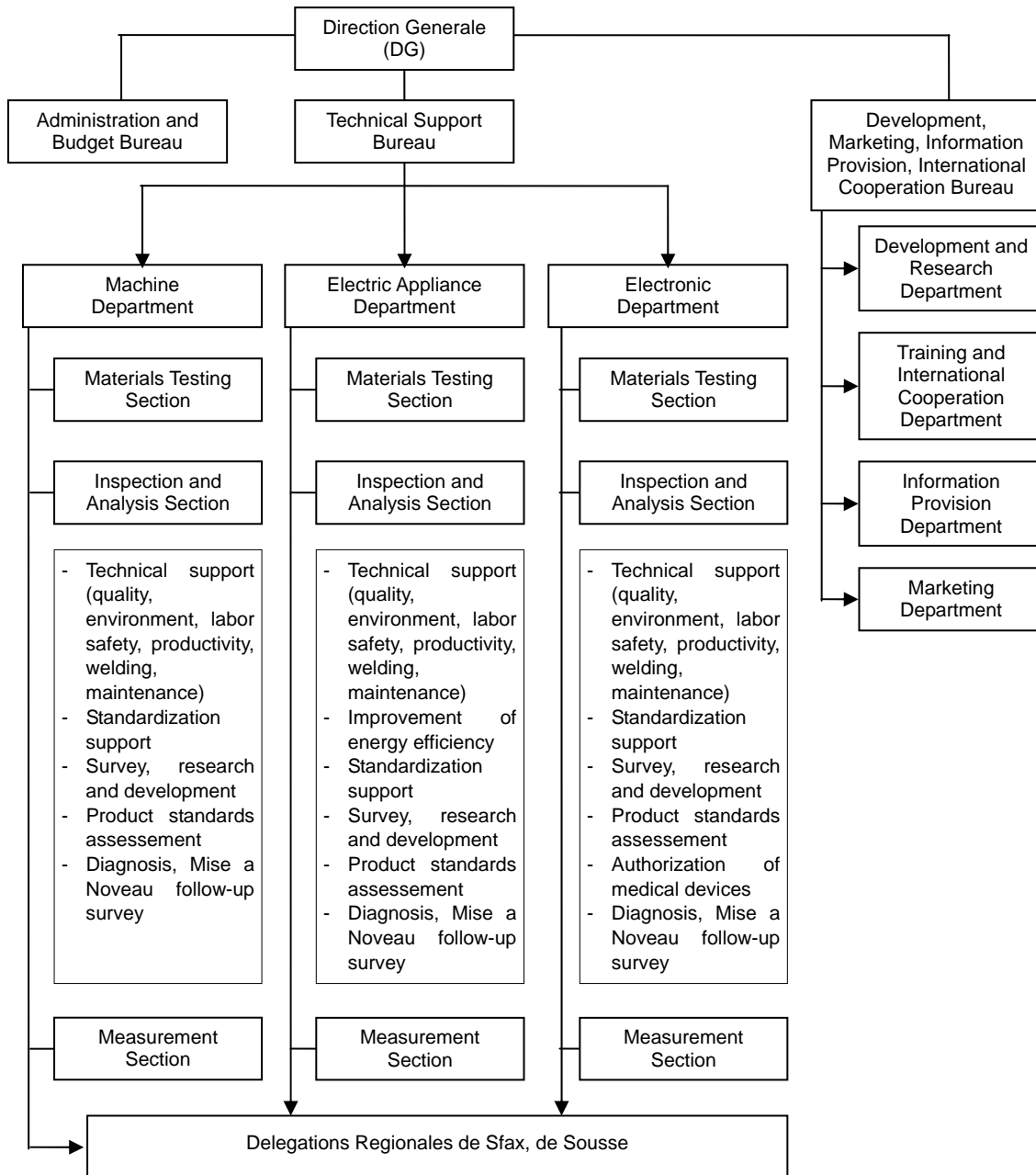
Figure 1-2: Organizations related to Enterprise Promotion

As of 19 July 2007



Source: Study Team

Participants in the PMN are the technical centers under the MIEPME, the API, UGPQ, private sector consultants and commercial banks, and the BMN acts as the coordinating agency. In cases where enterprises wish to utilize the PMN to modernize their businesses, they submit a proposal to the BMN, where the COPIL (Comite de Pilotage) conducts review. This committee is composed of 18 members, comprising one each from seven government agencies including the MIEPME, Ministry of Finance, Ministry of Development and International Cooperation and so on, one from the UGTT (Union Generale Tunisienne du Travail), which is an association of labor unions, and five members each from the UTICA and commercial banks respectively.



Data: CETIME

Figure 1-3 CETIME Organization Chart

A was stated above, public and private sector agencies such as the API, UGPQ, private sector consultants and commercial banks, etc. participate in the PMN, however, since the technical centers play the biggest role, the following paragraphs give an outline of these facilities. Also, an outline description of the UGPQ, which operates as an ISO certification acquisition agency under the PMN, is given.

As is shown in Figure 1-2, there are eight technical centers corresponding to each industrial sector, however, this report focuses on the CETIME (see Figure 1-3), which was the counterpart in the project.

The main activities of CETIME (Center Technique des Industries Mécaniques et Électriques) are, 1) provision of technical support and management guidance to enterprises, 2) implementation of training for enterprise employees, etc., and 3) provision of product test and inspection services. These activities are indicated in Figure 1-4. CETIME has 118 personnel, of which 45 are consultants providing technical support and management guidance. CETIME has two regional offices in Sfax and Sousse.

Figure 1-4 Activities of CETIME

(Unit: number of cases)

	2004	2005	2006
Technical support and management guidance	247	320	288
Training (targeted number of company employees)	1,063	1,100	900
Training (21-21 Program, number of people)	121	94	155
Test and inspection services	797	725	785
Survey / Mise a Niveau follow-up	118	107	91
CETIME clients (companies)	820	870	890

Data: CETIME

The technical support and management guidance provided to companies consist of company diagnoses aimed at strengthening competitiveness, and themes are selected upon taking the needs of enterprise owners into account. The selected themes are said to be ‘diverse and covering organizational approach, plant layout, machine maintenance and cost control’ (according to CETIME), however, cases of support for the acquisition of ISO9001, ISO14001 and OSAS18001 are common.

In providing support for the acquisition of ISO certification, technical center consultants need to have expert knowledge in the field concerned, and consultants who have taken part in training conducted under EU aid⁵² are the ones who provide such support. However, because these

52 Over five days (6 hours per day) from October 115 (Monday) to 19 (Friday) 2007, training on ISO14001 and

consultants are not qualified ISO reviewers, they are accompanied by international consultants under the EU support program PMI (described later) when making visits to enterprises.

The features of training provided for enterprise employees are as follows : 1) practical skill training for obtaining welding and nondestructive inspection qualifications, 2) implementation of the 21-21 education program conducted by the government to support youth employment, and 3) staging of seminars concerning quality/productivity improvement. These are described in more detail below.

- 1) Currently in Tunisia, CETIME is the only agency that offers qualifications courses in welding and non-destructive inspections (Controle Non Destructif). In the welding course, which lasts three days, trainees who pass a theoretical and practical skill examination receive a certificate. However, in order to retain this qualification, it is necessary to go to CETIME for further training every two years. Welding is also taught at the job training agency (ATFP) under the Ministry of Education and Training, however, the purpose of this is to obtain technology basics, whereas the CETIME training is geared to providing qualifications to enterprise employees via short-term seminars.

As for the non-destructive inspections examination, this is a state qualification required in order to become an operator, and persons who pass a test on completion of this course are awarded with a certificate from the Tunisian Committee of Non-Destructive Testing (COTEND).

CETIME also conducted practical skill training in machine processing, extrusion molding and plastic injection molding, however, these courses were transferred to the Ministry of Training and Education five years ago.

- 2) The 21-21 Program was launched in 2004 with the aim of supporting youth employment. Under this, because university education alone is not useful, courses in welding, machine maintenance and CAD have been established for young people and training is carried out over a period of six months in the following order: CETIME training → practical training in enterprises → CETIME training. The number of graduates in 2007 was 94 and although the employment rate among welding trainees was 100%, that for trainees in the other courses was between 30~40%.
- 3) Concerning quality/productivity improvement, there are two courses, i.e. production control and ISO quality management system (see the following table). Production is divided into the

OHSAS18001 was conducted by French consultants for consultants from the UGPQ and technical centers at the Belvedere Hotel in Tunis.

two courses of GPAO (computer-assisted production control) and MSP (statistical process control). Accordingly, the training focuses on the acquisition of production control soft elements, however, it does not teach concrete tools such as 5S, QCC, waste (muda) elimination and SMED, etc. for improving routine work on production lines.

CETIME Training Programs in the Quality/Productivity Improvement Sector (2007)

Theme		Course Fee (TD)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	GPAO functions	400			2 day									
	MSP functions	400												2 day
2	ISO9001 (2000)	500		3 day										
	hazardous objects handling control	350			3 day									
	Schedule control	500					3 day							
	Environmental management system	500						3 day						
	OHSAS18001	500									3 day			
	Quality, environment and safety integrated system	500										3 day		
	Environmental risk assessment	500											3 day	
	Industrial waste management	500												3 day

1 Production management

2 Quality, environment, labor safety management

Note: GPAO: Gestion de Production Assistee par Ordinateur (computer-aided production management), MSP: Maitrise Statistique des procedes (statistical process control) Source: CETIME

These courses comprise between 5~20 trainees per class. The targets vary depending on the theme, however, production controllers are most common. Courses last for between two and three days with lessons taught for six hours every day (09:00~12:00 and 14:00~17:00).

Out of around 50 consultants comprising engineers and technicians in CETIME, around 15 are able to teach courses as trainers. Also, seven private sector consultants from outside of CETIME assist in the teaching.



Training is carried out in five classrooms in CETIME or at hotels in Tunis (selected in consideration of accessibility for participants). Accordingly because CETIME has no training facilities in regional areas, trainees must stay overnight in Tunis during the training.

The UGPQ was established by the MIEPME in July 2005 as the agency to promote the PNQ (le Programme National de la Qualite), which was commenced in April 2005⁵³. It has a total staff of 18 consisting of the director general, deputy director, two department managers, eight local consultants from the technical centers, and four international consultants temporarily assigned under the PMI⁵⁴ (Industrial Modernization Program) secretariat (see Figure 1-5). Accordingly, since the salaries of staff members are paid by each dispatching agency and clerical expenses are paid by the MIEPME, the UGPQ does not have an independent budget.

The activities of the UGPQ comprise 1) support for enterprise efforts to acquire certification under ISO, etc., and 2) implementation of training geared to the promotion of ISO certification support activities.

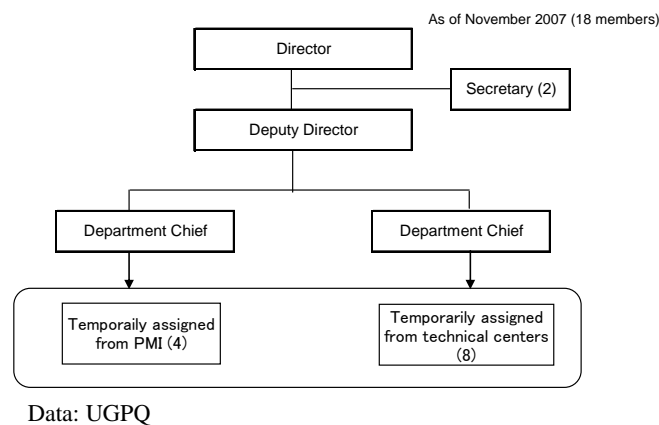


Figure 1-5 UGPQ Organization Chart

53 The UGPQ is under the jurisdiction of the Quality Coaching Committee in the Ministerial Secretariat (Cabinet) of the MIEPME. This is the decision making agency for quality and coaching and is composed of the Minister, DGSJ Secretary General, API Secretary General, UGPQ Secretary General, PMI Secretary General and technical center directors.

54 PMI is a program based on EU support. It has three components: 1) support for business start-ups, 2) quality improvement, and 3) coaching (business management guidance). Of these, 2) is PNG support promoted by the UGPQ.

Looking at the area of support for ISO certification acquisition, a total of 391 enterprises⁵⁵ applied for ISO certification in the two years up to July 2007. Viewed in terms of the type of standard applied for, these consisted of 129 enterprises applying for ISO9001, 75 enterprises applying for ISO22000 (food safety), 22 enterprises applying for ISO17025 (test facility accreditation), 15 enterprises applying for ISO14001 (environment), and 11 enterprises applying for OHSAS18001 (labor safety and hygiene), etc. In terms of industrial sector, 93 of the applying enterprises were in the textile sector, 82 were in food processing, 49 were in electric and electronics and machines, and 31 were in wood products and furniture, etc.

When enterprises apply to acquire such certification, local consultants from the UGPQ and technical centers form teams of pairs with EU international consultants and offer guidance to the enterprises. In the case of UGPQ local consultants, new recruits are in charge of between 2~4 enterprises, while veteran consultants look after around 12 enterprises, and the busiest consultants visit up to 10 enterprises per month. When making such visits, the local consultants are always accompanied by the PMI international consultants.

Contracts for the ISO certification acquisition service are concluded at the technical centers. Regarding the instruction fee of 9,000 TD (40 man-days), the enterprise pays 30% or 2,700 TD, while FODEC pays the remaining 70% or 6,300 TD to the technical center.

The training described later comprises the following : 1) Staging of seminars for imparting ISO review capability targeting local consultants from technical centers and the private sector, and 2) Staging of practical seminars for certification acquisition targeting production and quality managers in enterprises seeking ISO certification. Concerning 1), three-day seminars targeting technical center consultants were implemented six times (44 participants in total) over the year up to July 2007, while three-day seminars targeting private sector consultants were implemented four times (34 participants). Concerning 2), 17 seminars were staged and were attended by 336 quality managers.

Moreover, the trainers in this training are international consultants from the EU, while the costs of hotel venues and so on are fully covered under PMI (EU) support.

2-2 Development of the Business Environment

Specific measures for developing the business environment are as follows: 1) modernization of the technical centers such as CETIME and CETTEX, etc., 2) reinforcement of API functions, and 3) modernization of industrial infrastructure (development of industrial estates by the private

55 Of these 391 companies, 84 have actually acquired certification.

sector, construction of techno parks for reinforcing competitiveness, and environmental development for improving quality through reinforcement of TUNAC and INNORPI).

In Tunisia, “quality improvement” is automatically assumed to mean “ISO certification acquisition” as if certification is the ultimate goal⁵⁶. The agencies concerned with acquisition of ISO certification are indicated below.

TUNAC (Tunisian Accreditation Council), which was established in 1994, is the ISO compliance accreditation agency and is the equivalent of the JAB (Japan Accreditation Board for Conformity Assessment, established in 1993) in Japan. It conducts review and accreditation of the Tunisian ISO Auditing Organization⁵⁷ and has a staff of 10 members.

INNORPI (National Institute for Standardization and Industrial Property) was established under the Ministry of Industry in 1982 with the following duties: 1) standardization of industrial products, 2) certification of ISO management systems for quality, environment and HACCP, 3) staging of seminars, and 4) protection of industrial property rights. It has a staff of approximately 120.

Concerning standardization of industrial products in Tunisia, the NT (Tunisian Standard) mark system was established in 1985, and as of September 2006 it contained 7,394 standards. Concerning the export of NT mark products, reciprocating standards with Libya were recognized in 2007, while negotiations are currently ongoing with Egypt, Algeria and Morocco. Concerning EU nations, the Ministry of Industry is currently working towards the binding of a mutual recognition arrangement (MRA) under the aforementioned PMI.

Regarding ISO management systems, INNORPI has a good reputation as the only official certification agency, and it conducts review work through 12 registered reviewers and 5 subcontracted consultants.

2-3 Promotion of Business Startups

The principal measures for promoting business startups are as follows: 1) support of entrepreneurship by university/college graduates, 2) support of entrepreneurs under the ESSAIMAGE Program, and 3) establishment of API one-stop shops, which enable procedures for starting businesses to be conducted in one place, in all 24 prefectures (there are currently only eight).

56 At the quality seminar that was staged jointly by PNQ, PMI and UTICA in Tunis on June 26, 2007, many business owners and public and private consultants confessed “Once ISO certification is obtained it becomes a mere decoration and does not lead to ongoing quality improvement activities, which should be the real goal.”

57 In Tunisia, there are four private accreditation agencies as well as two foreign affiliated accreditation agencies (AFAC of France and TUV of Germany) (According to TUNAC).

Concerning support of entrepreneurship by university/college graduates, two programs, i.e. business plan presentation meetings and the 21-21 Program, are provided. Business plan presentation meetings are held by the MIEPME and API on the third Wednesday of each month at universities and chambers of industry and commerce throughout the country. At such meetings, university/college graduates, financial institution representatives and enterprise owners gather and listen to presentations of business plans given by the said graduates. If the financial institutions deem the business plans to be feasible, they agree to provide financial support for starting the business. As for the 21-21 Program, this aims to provide re-education geared to supporting employment for young people currently out of work. Various education agencies stage training courses⁵⁸ according to discipline headings such as production skills and business management, etc.

The ESSAIMAGE (signifying dispersion of groups) Program was launched by the MIEPME in 2006. This aims to increase the number of small and medium enterprises and vitalize industry through providing support for people who aim to start businesses independently of major corporations irrespective of the public or private sector. TUNAC cited the example of the plant maintenance department of a gas company going independent and starting operations by itself. Prospective entrepreneurs obtain funding for initial investment from the Industrial Promotion and Decentralization Fund (FOPRODI: Le Fonds de Promotion et de Décentralisation Industrielle), which is financed by major corporations, the Small and Medium Enterprise Bank (BFPME: Banque de Financement des Petites et Moyennes Entreprises) and the Social Insurance Corporation (SOTUGAR: Societe Tunisienne de Garantie).

As for the agencies that support business startup activities, the API provides management guidance, information and administrative services, while the BFPME is mainly concerned with providing financial support. The following paragraphs give an outline description of these two agencies.

The API was established in 1972 with the objective of promoting business startups. In terms of staff, it has approximately 150 members in its headquarters and another 150 members in 24 regional offices through the country (prefectures). Its activities are classified into five headings (see Figure 1-6).

- 1) Simplification of business startup procedures and issue of investment incentives: In order to simplify the administrative procedures required for starting businesses, one-stop shops

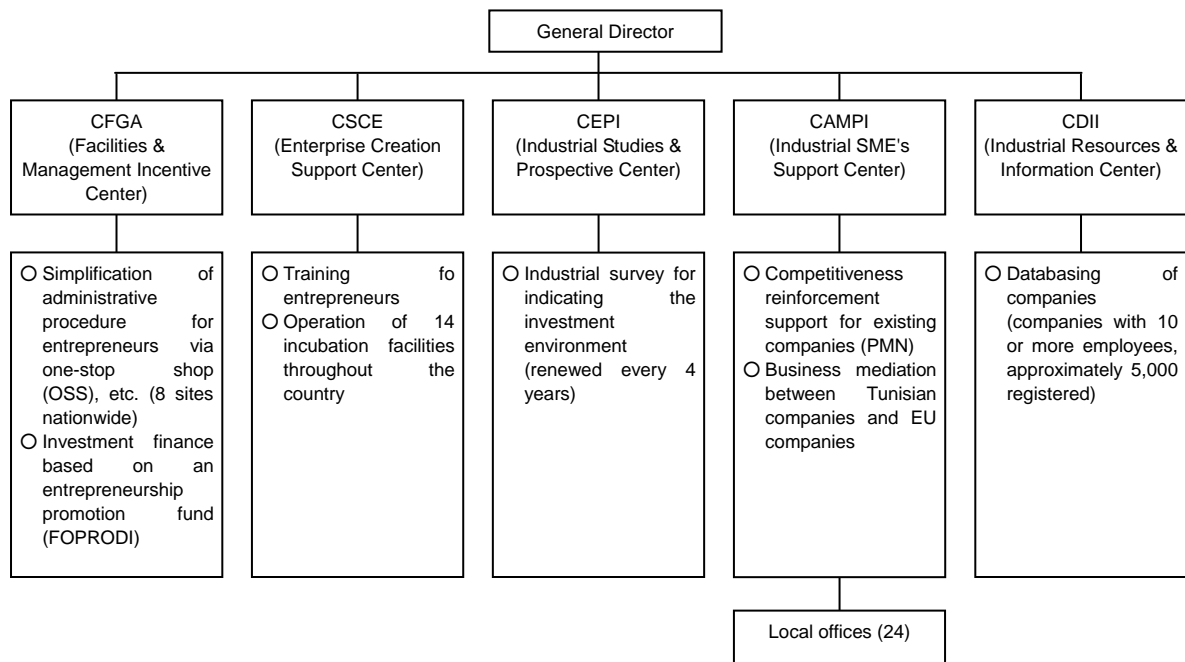
⁵⁸ For example, the abovementioned welding, machine maintenance and CAD courses, etc. at CETIME. Moreover, the ISET Sousse School provides two courses in quality management and production control to college graduates in economics and business management.

(OSS) enable procedures to be completed in 24 hours. There are currently eight OSS throughout the country in Sfax, Sousse, Gabes and Gafsa, etc., and it is planned to install one in each of the 24 prefectures during 2008.

- 2) Promotion of business startups: 14 incubation facilities located throughout the country conduct short-term training for young entrepreneurs and teach them practical management tools. API regards “Entrepreneurship” as its keyword and says that it wants to increase the number of incubation facilities to at least 24 by the end of 2007. Incidentally, these incubation facilities are integrated with the technical colleges (ISET: Institut Supérieur des Etudes Technologiques) located throughout the country.

The entrepreneurial training courses provided by the API Sousse Office are as follows:

- Courses are provided in business plan formulation, market research, closing statement preparation, legal knowledge and so on. The course term is 2.5 months with lessons being held once per week for half a day each time. The reason for such scheduling is because the trainers are too busy with their regular work to conduct training on consecutive days. Participation costs nothing.



Data: API

Figure 1-6 API Organization Chart

- Such courses are held two times per year (at the start and end of the year) and attract around 25 participants each time (50 in total). Moreover, trainers are external professionals such as accountants, bankers and legal experts, etc. who are well-versed in the respective fields. Trainers are not invited from universities.
 - Training is carried out in the training room inside the API incubation facility that is combined with the ISET Sousse School.
- 3) Industrial survey: The objective here is to survey current conditions of industry in each sector, competitiveness in international markets and examples of best practice in order to clarify the investment environment for entrepreneurs and enterprises. The survey covers 30 industrial sectors and is renewed every four years.
 - 4) Support for reinforcement of international competition in existing enterprises: This consists of (a) mediation between Tunisian enterprises and EU enterprises, and (b) implementation of PMN based on linkage between the API and technical centers. 20 consultants are assigned to implement PMN.
 - 5) Maintenance of a database of enterprises: The API has a database of approximately 5,500 enterprises employing 10 or more employees. The data, however, is qualitative and does not contain account settlement information. The data comprises items such as such as company name, sector, name of representative, address, telephone number, names of products, number of employees, ratio of exports, exporting destinations and ratio of foreign capital, etc. The API posts such information about each enterprise on its website with a view to advertising enterprises to the world and thereby attracting business opportunities and developing the enterprises.

Concerning data collection, staff of the 24 API regional offices throughout the country visit enterprises, hand out survey forms for the enterprises to fill out, and renew the collected data every year. The reason why only enterprises with a workforce of 10 or more employees are targeted is because micro enterprises with less than 10 employees frequently belong to service and handicraft sectors separate from the API field of manufacturing. Moreover, information from micro enterprises lacks accuracy.

The BFPME is the government-run financial agency that was established in March 2005 with the objective of promoting investment by entrepreneurs. It has 60 employees working at the headquarters in Tunis and four development offices in the regions.

All loans comprise co-financing with commercial banks. However, concerning the procurement of funds for plant investment, entrepreneurs are required to contribute 40% from their own funds while 30% each is loaned by the BFPME and commercial banks. As of December 2006, 56.3 million TD of loans had been provided in 220 cases at an average of approximately 260,000 TD per loan (see Figure 1-7).

Figure 1-7 BFPME Lending Performance (March 2005~December 2006)

Sector	Invested Amount	Loan Amount	Cases	Case Ratio (%)
Agriculture	5 404	1 338	5	2.3
Energy	5 463	1 731	5	2.3
Building materials, ceramics, glass	35 538	9 056	26	11.8
Food processing	73 071	17 260	58	26.4
Wood products, furniture	3 540	965	4	1.8
Chemicals, plastics	47 855	11 858	39	17.7
Others	18 123	4 665	14	6.4
Leather, shoes	1 877	504	3	1.4
Electric industry	3 357	930	3	1.4
Metal processing	10 522	2 795	9	4.1
Textiles, apparel	2 523	747	8	3.6
Information and telecommunications	8 589	2 627	30	13.6
Others	6 041	1 825	16	7.3
Total (1000 TD)	221 903	56 301	220	100.0

Data: BFPME

Loans are provided to small and medium enterprises with net fixed assets valued at between 80,000~4,000,000 TD including the increment enabled by the investment project subject to the loan application. Loans are directed to existing enterprises in 10~15% of cases and startup enterprises in 85~90% of cases. Existing enterprises are eligible for loans in cases where they wish to branch out into new businesses.

The funds obtained through these loans are used for medium and long-term plant investment. Moreover, short-term loans are provided in cases where human resources from state-run enterprises aim to spin off and start up their own businesses (for example, business startups by software technicians of Tunisia Telecom). According to the BFPME, startup enterprises are supported because “against the background of trade liberalization with the EU from 2008 and with the national policy of supporting employment among new graduates, it is hoped that new sectors and export-oriented sectors will grow in order to boost employment opportunities.”

[Reference Material 7] Japanese Experience and Examples in Quality / Productivity Improvement

Contents

1. Outline of Legal Systems, etc. for Quality/Productivity Improvement
 - 1.1 Establishment of the Small and Medium Enterprise Agency
 - 1.2 Enactment of the Emergency Measures Law for Promotion of the Machine Industry
 - 1.3 Enactment of the Basic Law on Small and Medium Enterprises
 - 1.4 Enactment of the Small and Medium Enterprise Guidance Law
 - 1.5 Enactment of the Small and Medium Enterprise Modernization Promotion Law
2. Principal public Information and Dissemination Activities
 - 2.1 Establishment of the Deming Prize
 - 2.2 Establishment of the Quality Month
 - 2.3 Quality Control Certification System
3. Principal Education Activities
 - 3.1 UJSE Seminars
 - 3.2 Human Resource Training at the Small and Medium Enterprise College
4. Plant Diagnoses and Management Guidance
 - 4.1 Small and Medium Enterprise Diagnostician System
 - 4.2 Small and Medium Enterprise Diagnosis Association
5. Database of Financial Indicators as a Benchmark for Quality/Productivity Improvement Activities
6. Examples of Machine Industry Promotion, etc.

Introduction

Japanese agencies concerned with the promotion of quality/productivity improvement are as indicated in Figure 1. In the fields of quality (Union of Japanese Scientists and Engineers), productivity (Japan Productivity Center for Socio-Economic Development), standardization (Japanese Standards Association), ISO standards (private sector review and registration agencies), technical guidance (public test and research agencies), plant diagnosis & management guidance (Small and Medium Enterprise Management Consultants Association) and human resources development (Organization for Small & Medium Enterprises and Regional Innovation, JAPAN, the Small and Medium Enterprise University), each agency conducts activities according to its respective field of specialization.

Activities are primarily divided into public information and dissemination activities, education activities, and plant diagnoses and management guidance. The following features can be pointed to: 1) since human resources on the level of enterprises promote quality/productivity improvement, all the agencies place emphasis on education activities, 2) in order to realize quality/productivity improvement in products and services, since it is essential for Kaizen activities to be implemented on the production lines of each enterprise, the SME Management Consultant system (national qualification) was established and plant diagnosis and management guidance activities were disseminated at an early stage, and 3) a database of financial indicators according to sector and scale of enterprise has been established and provides the benchmark for promotion of quality/productivity improvement activities by enterprises.

Figure 2 summarizes the activities of these agencies in chronological order. Japan's industrial base was destroyed at the end of World War II, however, in the postwar years it executed a series of measures aimed at recovering from this situation and reinforcing international competitiveness. The reason why the quality/productivity improvement activities described above became so widespread was mainly due to the unflagging efforts of enterprises, with the legal systems established by the government providing indirect support. Accordingly, the major laws that helped promote quality/productivity improvement activities are also shown in Figure 2.

Looking at the flow of activities in Japan, legal systems and agencies were established during the 1960s, and subsequent activities were deployed on the multiple layers of public information and dissemination, education, and plant diagnosis and management guidance.

In the following paragraphs, after outlining the said legal systems, the following contents are introduced: 1) as public information and dissemination activities, the Deming Prize, Quality Month and quality control certification system, etc., 2) as education activities, various kinds of seminars by the Union of Japanese Scientists and Engineers and human resources education at

the Small and Medium Enterprise University, 3) the SME Management Consultant system for disseminating plant diagnoses and management guidance, and 4) the database of financial indicators that provides the benchmark for promotion of quality/productivity improvement activities by enterprises.

1. Outline of Legal Systems, etc. for Quality/Productivity Improvement

1.1 Establishment of the Small and Medium Enterprise Agency (1948)

The Small and Medium Enterprise Agency was established as an external organ of the Ministry of Commerce and Industry (the present Ministry of Economy, Trade and Industry) based on the Small and Medium Enterprise Agency Establishment Law of July 1948. According to the said law (Article 1), the objectives of the agency were to offer technical guidance to small and medium enterprises, to enhance management efficiency, and to establish a plant diagnosis system, etc., in order to “nurture and develop small and medium enterprises and to prepare the necessary conditions for them to enhance their businesses so that sound small and medium enterprises can stabilize and enhance the national economy, prevent the centralization of economic power and secure fair business opportunities for prospective entrepreneurs.” The establishment of the Small and Medium Enterprise Agency laid the foundations for the subsequent deployment of small and medium enterprise policies.

1.2 Enactment of the Extraordinary Measures Law for Machine Industry Promotion (1956)

In order to promote the machine industry, which was the key sector in Japanese industry, the Extraordinary Measures Law for Machine Industry Promotion was enacted in June 1956 with a limited mandate of five years until June 1961. Placing emphasis on the role the machine industry could play in future stable economic growth in terms of absorbing employment, promoting exports and enhancing the standard of technology, the government aimed to promote the machine industry as the pillar of heavy and chemical industrialization in Japan. In particular, the government stressed the modernization of equipment and improvement of productivity in the key machine industry areas of basic machinery (machine tools, forge rolling machines, molds and tools, etc.) and components.

After that, the law underwent revision in April 1961, resulting in its extension for another five years, expansion in the range of covered sectors and bolstering of the contents. In the previous version of the law, whereas the emphasis had been placed on measures to modernize obsolete equipment in the basic and component divisions of the machine industry, under the revised law the emphasis was switched to reinforcing the international competitiveness of the Japanese machine industry in response to trade liberalization. Also, machine fixture parts processing sectors such as metal treatment and forged product

manufacturing, etc. were added to the targeted scope, resulting in 40 sub-sectors⁵⁹ being identified as specific machine industries.

1.3 Enactment of the Small and Medium Enterprise Basic Law (1963)

From the 1960s onwards, the environment surrounding small and medium enterprises became harsher due to the labor shortage, resulting price inflation, and internationalization of the economy, etc. Amid such circumstances, it became necessary to give direction to small and medium enterprise policy corresponding to the new needs of the time and to systemize individual measures in line with that.

Against this background, the Small and Medium Enterprise Basic Law was enacted in July 1963 with the objective of comprehensively implementing the following measures: 1) modernization of equipment, 2) upgrading of technology, 3) consolidation of business management, 4) optimization of enterprise scale, 5) correction of unfair trading conditions, 6) promotion of exports, 7) appropriate securing of opportunities for business activities, and 8) enhancement of welfare for employees, etc.

In order to secure consistency in the implementation of measures targeting small and medium enterprises, the definitions of small and medium enterprises (which had been diverse until then) were unified. In the manufacturing industry, the definition was set at companies possessing capital of no more than 50,000,000 yen and no more than 300 regular employees⁶⁰. Moreover, in order to clarify the direction of national policies on small and medium enterprises, this law made it compulsory to compile the Small and Medium Enterprise White Paper every year.

1.4 Enactment of the Small and Medium Enterprise Guidance Law (1963)

The Small and Medium Enterprise Guidance Law was enacted in July 1963 with the aim of efficiently facilitating company diagnosis guidance activities by the state, prefectures and Japan Small and Medium Enterprise Guidance Center (established in 1962, now the Small and Medium Enterprise University), in order to enable management consolidation and technology upgrading essential for promoting the development of small and medium

59 The 40 sub-sectors included pig iron casting, screws, gears, metal machine tools, cutting tools, electric welding machines, dies, carrying equipment, textile machines, agricultural machines, woodwork machines, foundry machines, precision measuring instruments, test devices, clock components, valves, railway rolling stock parts, automobile components, etc.

60 Japan currently has 1,520,000 enterprises (in all industries) (as of 2004), of which small and medium enterprises account for 1,508,000 or 99.2% of the total (according to the SME White Paper). In Tunisia, the ratio of small and medium enterprises (no more than 199 employees) is 99.8% (National Statistics Department).

enterprises. Based on this law, the functions of the Japan Small and Medium Enterprise Guidance Center were strengthened and its principal duties were designated as the training of small and medium enterprise guidance personnel on the prefectural level and nurturing of SME Management Consultants (a state qualification).

The said SME Management Consultants went on to conduct plant diagnoses and management guidance geared to supporting management consolidation and quality/productivity improvement in small and medium enterprises.

1.5 Enactment of the Small and Medium Enterprise Modernization Promotion Law (1963)

The Small and Medium Enterprise Modernization Promotion Law was enacted in March 1963 in order to comprehensively implement modernization measures in small and medium enterprises. The law aimed to upgrade the industrial structure and reinforce international competitiveness via the modernization of small and medium enterprises; and as the means for realizing this, it intended to improve productivity through modernizing equipment.

In specific terms, sectors⁶¹ requiring modernization of small and medium enterprises were designated by government ordinance and various measures comprising the provision of long-term credit for modernization of equipment from government financial institutions, special tax measures for promoting amalgamation of enterprises, establishment of an equipment modernization additional depreciation system, and guidance on changing businesses, etc. were taken.

2. Major Public Information and Dissemination Activities

2.1 Establishment of the Deming Prize (1951)

The Deming Prize, which was established by the Union of Japanese Scientists and Engineers (UJSE), is awarded to enterprises deemed to have achieved excellent results for implementing TQM activities in a year.

The Deming Prize was first advocated by the American Dr. William Edwards Deming (1892-1986), who was one of the founders of statistical quality control, with the objective of disseminating company-wide quality improvement activities based on that technique. After that, TQM steadily spread among numerous Japanese enterprises, leading to improvement in the quality of products and services and reinforcement of international competitiveness.

61 Almost all sectors with a high ratio of small and medium enterprises are covered, including *sake* making, canned products, screw manufacturing, gear manufacturing, car parts manufacturing, metal tableware manufacturing, knit goods manufacturing, fabric manufacturing, electric plating, work tools manufacturing, etc.

2.2 Establishment of Quality Month (1960)

In 1960, the Japanese agencies concerned with quality control, i.e. the Union of Japanese Scientists and Engineers, Japanese Standards Association, Japan Productivity Center and Japan Management Association, decided to designate November as Quality Month. In order to disseminate activities, support was provided by the Science and Technology Agency (the present Ministry of Education, Culture, Sports, Science and Technology), the Ministry of International Trade and Industry (the present Ministry of Economy, Trade and Industry), the Japan Chamber of Commerce and Industry and Japan Broadcasting Corporation.

The objectives of Quality Month are to raise quality awareness among all company workers, to thoroughly ensure customer satisfaction and employee satisfaction, to confirm the quality assurance setup, to raise the quality of products and services, and to improve quality levels following the acquisition of ISO certification.

Specific activities during Quality Month include the staging of seminars and forums, the national convention of QC circles and the Deming Prize award ceremony, while activities on the enterprise level include subscription of posters and slogans, in-house TQM diagnosis by top management, in-house QC competitions, evaluation and commendment of employee performance over the past year and so on.

2.3 Quality Control Certification System (2005)

The quality control certification (QC certification) system intends to objectively evaluate via a nationwide written examination the quality control know-how of employees working in that field in enterprises. This system was started under the initiative of the Union of Japanese Scientists and Engineers (UJSE) and the Japanese Standards Association in 2005. Through enhancing quality control awareness in enterprises, it aims to contribute to the improvement of product quality.

Moreover, in the QC certification, since the knowledge required differs according to each level from quality control department leaders to new recruits, examinations are conducted from level 1 (for quality control department leaders) to level 4 (for new recruits).

3. Principal Education Activities

3.1 Seminars by UJSE

Ever since its establishment, UJSE has implemented quality control seminars characterized by practical statistical quality control techniques applicable to production lines. The following are examples of the courses it offers:

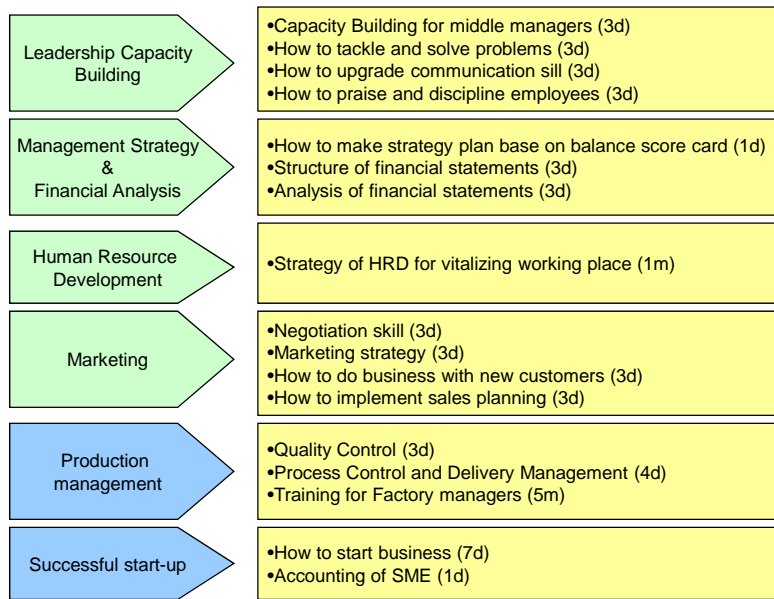
- Quality control seminars basic course (for QC certification level 1)
- Problem-solving practical course for quality improvement
- QC techniques basic course
- Multivariate analysis seminar
- Regression analysis utilization seminar for prediction and factor analysis using Excel
- TQM seminar
- Quality trouble prevention seminar
- TQM seminar for the marketing department

3.2 Human Resources Development at the Small and Medium Enterprise University

The Small and Medium Enterprise University, under the Organization for Small & Medium Enterprises and Regional Innovation, JAPAN (SMRJ), has nine schools (training centers) throughout the country.

Contents of training at the SME University are as follows: 1) SME Management Consultant development course for nurturing SME diagnosticians, 2) Small and medium enterprise support officer training for public authority personnel in charge of SME support, and 3) Small and medium enterprise managers training for top management and middle management in small and medium enterprises. However, 1) SME Management Consultant development course is only provided at the SME University in Tokyo.

Since trainees consist of business owners and consultants, etc. who provide direct support and guidance in small and medium enterprises, curriculums place emphasis on the learning of concrete and practical techniques. For example, in the following diagram of principal training courses for top and middle managers, the following contents for improving competitiveness of enterprises are covered: not only 1) production control for quality/productivity improvement, but also 2) leadership capacity building for raising the problem-solving capacity and employee communication skills of business owners, 3) management strategy for securing enterprise growth and development, 4) human resource development for vitalizing workplaces, and 5) marketing strategy for developing markets and marketing geared to improving marketing skills.



4. Plant Diagnoses and Management Guidance

4.1 Small and Medium Enterprise Management Consultants System

The SME Management Consultant System is a national qualification (Ministry of Economy, Trade and Industry) consultant system geared to supporting the growth and development of small and medium enterprises, based on the Small and Medium Enterprise Guidance Law of 1963. In order to be registered as an SME Management Consultant under this system it is necessary to either 1) graduate the SME Management Consultants training course (6 months) at the abovementioned SME University (Tokyo), or 2) pass an annual examination staged by the Japan SME Management Consultants Association (J-SMECA) under consignment from the Ministry of Economy, Trade and Industry.

SME Management Consultants need to possess diagnostic capacity concerning not only line production control ability linked to quality/productivity improvement, but also management strategy for supporting enterprise development from the long-term perspective, organization and personnel control, marketing strategy and financial control.

4-2 Japan SME Management Consultants Association (J-SMECA)

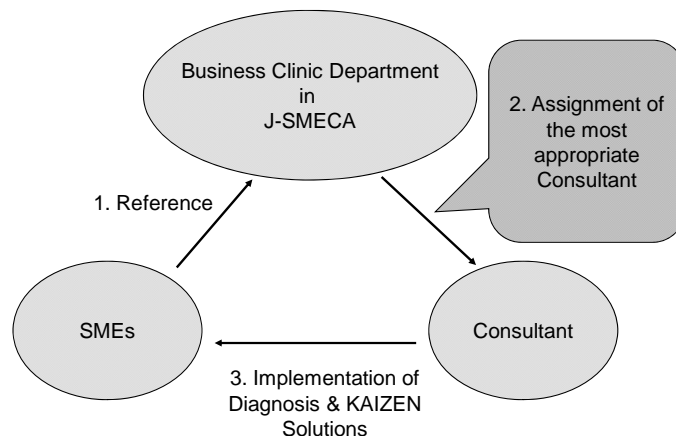
J-SMECA (established in 1954) has the mandate of “contributing to the promotion of small and medium enterprises and sound development of the national economy through promoting dissemination of the SME Management Consultant system, and its major activities are as follows: 1) implementation of plant diagnoses and management guidance by SME

Management Consultants, and 2) implementation of capacity building training for SME Management Consultants.

Approximately 8,500 SME Management Consultants are registered with J-SMECA, and it keeps a database of the detailed career information of each consultant including favorite fields and specialties, consulting performance and lectures, authorship of papers and so on. This database is utilized in activity 1) implementation of plant diagnoses and management guidance, according to the following flow:

- 1) Receipt of the request for consulting from the enterprise,
- 2) Introduction of an appropriate SME Management Consultant from the database, and
- 3) Implementation of diagnosis and improvement guidance by the consultant.

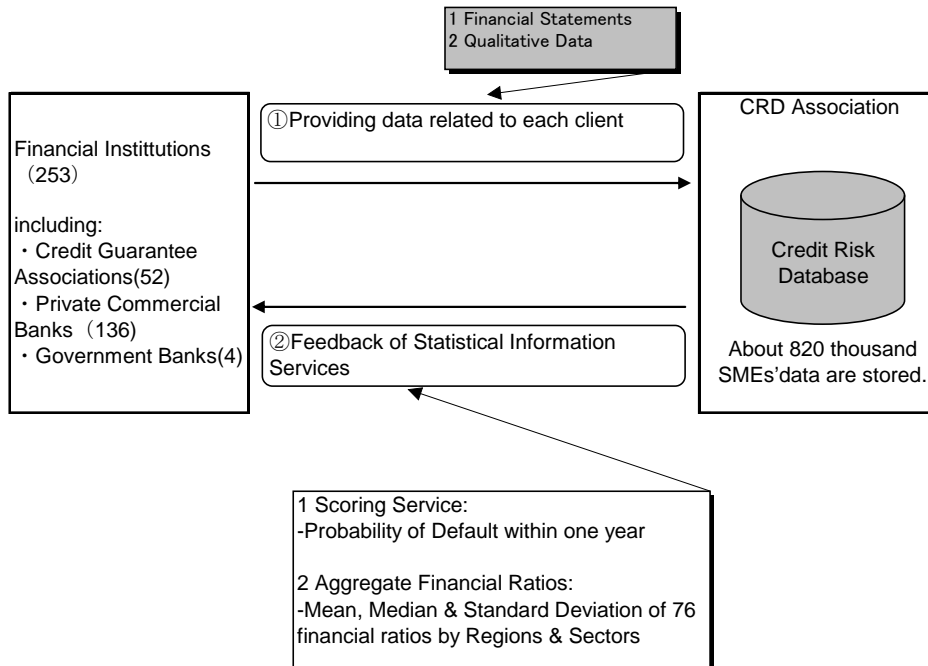
The following diagram gives an illustration of this setup.



5. Database of Financial Indicators as a Benchmark for Quality/Productivity Improvement Activities

Private sector financial institutions, credit guarantee associations and government financial institutions belonging to the Credit Risk Database (CRD) Association periodically submit financial and non-financial data of small and medium enterprises who they conduct transactions with to the CRD (enterprise names are all codified so that individual enterprises cannot be identified). The CRD Association then utilizes the accumulated data to 1) offer a scoring service that digitalizes the default risk of trading enterprises, and 2) provide statistical information (mean values, medians and standard deviations) of financial indicators such as added value productivity stratified according to scale, sector and area, etc. to member financial institutions (see the figure).

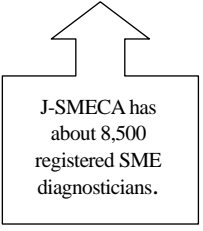
Credit Risk Database(CRD) in Japan



Meanwhile, this extensive database is utilized to perform the following: 1) issue the “Small and medium enterprises sector-separate and scale-separate financial indicators” from J-SMECA, and 2) provide the Enterprise self-diagnosis service of the Organization for Small & Medium Enterprises and Regional Innovation, JAPAN.

When implementing Kaizen activities aimed at improving quality/productivity on the level of enterprises, the information described in 1) and 2) above is utilized to compare with other enterprises in same sectors (mean values) and to discovers issues requiring improvement.

(Figure 1) Agencies for Promoting Quality / Productivity Improvement in Japan

		Private Sector Agencies				Government Agencies		
		JUSE Union of Japanese Scientists and Engineers (1946)	JSA Japan Standards Association (1945)	JPC-SED Japan Productivity Center for Socio-Economic Development (1955)	ISO Review and Registration Agency (1990's)	J-SMECA Small and Medium Enterprise Management Consultants Association (1954)	SMRJ Small and Medium Enterprise Infrastructure Development Organization (1967)	PTRI Public Test and Research Institution (1950's)
Role		Promote industrial development through support for product and service quality improvement.	Promote production efficiency through industrial standardization and unification of standards.	Realize sustained socioeconomic development and a fair society through promoting productivity improvement.	Promote improvement in quality of products and services through disseminating ISO standards.	Support strengthening of the management base and quality/productivity improvement through SME diagnosis and guidance, etc.	Support SME development through human resources development, entrepreneurship support and sophistication programs, etc.	Conduct technical development for supporting technical improvement and resolving technical issues in SMEs.
Activities	1. Public information and dissemination	<ul style="list-style-type: none"> - Deming Prize - Quality Control Certificate (QC Certificate) - QC Circles National Convention - Promotion of Quality Month (November) - Issues of monthly magazines ("Quality Management", "QC Circle") 	<ul style="list-style-type: none"> - Quality Control Certificate (QC Certificate) - Issue of JIS standard slips 	<ul style="list-style-type: none"> - Policy recommendations to the government - Japan Quality Award (Japan Quality Award) 				
	2. Education activities	<ul style="list-style-type: none"> - TQM seminars - Statistical quality control seminars - ISO quality management seminars 	<ul style="list-style-type: none"> - Quality control and standardization seminar 	<ul style="list-style-type: none"> - Seminars 	<ul style="list-style-type: none"> - Management strategy - Production - Marketing - Financial affairs - Information systems 	<ul style="list-style-type: none"> - Seminars for capacity building of SME diagnosticians 	<ul style="list-style-type: none"> - Human resources development at SME universities 	<ul style="list-style-type: none"> - Technical training
	3. Plant diagnosis and management guidance	<ul style="list-style-type: none"> - TQM diagnosis - ISO review and registration 	<ul style="list-style-type: none"> - JIS plant - ISO review and registration 	<ul style="list-style-type: none"> - Plant diagnosis - Management guidance 	<ul style="list-style-type: none"> - ISO review and registration 	<ul style="list-style-type: none"> - Plant diagnoses - Management guidance 	<ul style="list-style-type: none"> - Diagnoses and advice in sophistication programs (support for efficient business activities through SME associations, etc.) 	<ul style="list-style-type: none"> - Product performance testing and analysis - Technical guidance by consultants
	4. Environmental preparation for quality / productivity improvement activities			<ul style="list-style-type: none"> - Preparation and disclosure of manufacturing sub-sector-separate labor productivity statistics (monthly) 		<ul style="list-style-type: none"> - Issue of SME financial indicators by sector and scale (yearly) 	<ul style="list-style-type: none"> - Provision of company self-diagnosis services utilizing the Credit Risk Database of SME financial data 	

(Figure 2) History of Quality / Productivity Improvement Activities in Japan

	1940's	1950's	1960's	1970's & 1980's	1990's	2000's
1. Public information and dissemination activities	- Issue of JIS standard slips (JSA, 1949)	- Issue of monthly magazine "Quality Management" (JUSE, 1950) - Deming Prize (JUSE, 1951) - Policy proposals to the government (JPC-SED, 1955)	- Quality Month (JUSE, 1960) - Issue of monthly magazine "QC Circle" (JUSE, 1962) - QC Circles National Convention (JUSE, 1963)		- Japan Quality Award (JPC-SED, 1996)	- Quality Control Certificate (UJSE, JSA, 2005)
2. Education activities	- Quality control and standardization seminars (JSA, 1949)	- Quality control seminars (JUSE, 1950) - TQM seminars (JUSE, 1955) - Seminars (JPC-SED, 1958) - SME diagnostician capacity building seminars (J-SMECA, 1954) - Technical training (PTRI)	- Human resources education in SME universities (SMRJ, 1962)		- ISO quality management seminars (UJSE, 1992)	
3. Plant diagnosis and management guidance	- JIS plant notified inspections (JSA, 1949)	- J-SMECA (1954) - Product performance testing and analysis (PTRI) - Technical guidance by consultants (PTRI)	- Diagnoses and advice in sophistication programs (support for efficient business activities through SME associations, etc.) (SMRJ, 1967)	- TQM diagnosis (JUSE, 1971)	- ISO review and registration (UJSE, JSA, private sector agencies)	
4. Environmental development for quality/productivity improvement activities		- Preparation and disclosure of manufacturing sub-sector-separate labor productivity statistics (monthly) (JPC-SED, 1958)				- Provision of company self-diagnosis services utilizing the Credit Risk Database of SME financial data (SMRJ, 2001) - Issue of "SME sector-separate and size-separate financial indicators" utilizing the CRD (annual) (J-SMECA, 2005)
(Reference) Development of legislation, etc.	- Establishment of the SME Agency (1948)	- Emergency Measures Law for Machine Industry Promotion (1956)	- SMEs Basic Law (1963) - SMEs Modernization Promotion Law (1963) - SMEs Guidance Law (1963)		- Revised SME Basic Law (1999)	

[Case Example] Promotion of the Machine Industry in Japan

One of the most successful cases of industrial policy in Japan has been the promotion of the machine industry. Although not directly applicable to Tunisia, this is introduced here as a reference case. Incidentally, the machine industry is here assumed to cover the general machinery, electric and electronics, automobile and aircraft sectors.

The history of machine industry policy in Japan dates back to the early 1950s. The primary national objective for Japan at that time was to catch up with Europe and America, and it realized that it would need to reform and modernize its industrial structure for that purpose. Review and research committees comprising experts from the world of finance (industrial and financial circles), academia and the mass media were established to pool their know-how and examine the priority issues that needed to be tackled in order to enhance Japan's industrial structure in the future. As a result, they concluded that promotion of the machine industry was the highest priority issue to be tackled.

The reason why the machine industry was selected for vigorous promotion was because it conformed with the criteria that were adopted by the Ministry of International Trade and Industry for selecting priority industries, i.e. the income elasticity criteria (or demand growth rate) and productivity increase criteria (or rate of technology progress). In particular, the machine industry was deemed to have potential for wide ripple effects on overall industry due to 1) the wide scope of related sectors, 2) the wide scope of the technical base, and 3) the wide scope of applied sectors.

1. Miyodaira Shinohara: "Japan and Asia Viewed in Growth and Cyclicity," Nihon Keizai Shimbun, Inc.

I. Transitions

1. Prehistory (before the Extraordinary Measures Law for Promotion of the Machine Industry)

As the first step, the Ministry of International Trade and Industry encouraged the import of foreign-made high performance machine tools. It established the machine tool import subsidization system in 1952, thereby offering subsidies worth 50% of the cost for machines imported by machine tool makers and 30% of the cost in other related sectors. Meanwhile, in order to promote the production of domestic machine tools, prototype manufacturing costs were subsidized up to 50% under the machine tool, etc. import subsidization system over three years from 1953~55. However, since the subsidization system alone was insufficient to satisfy the demand for credit, a new system based on loans by the Japan Development Bank was established. This was the Extraordinary Measures Law for Promotion of the Machine Industry.

2. First Extraordinary Measures Law for Promotion of the Machine Industry, 1956~ (5 years)

The law was composed of the following components:

- (1) Objective: To promote consolidation of the machine industry. In other words, to realize 1) establishment of rational production setups in the machine industry, 2) modernization of equipment in the machine industry, 3) promotion of exports from the machine industry, 4) promotion of production technology in the machine industry, and 5) price stabilization and quality improvement of raw materials.
- (2) Compilation of plan: Concerning specific machine industries designated by the Minister of International Trade and Industry, a consolidation basic plan and consolidation implementation plan shall be compiled upon hearing the opinions of the Machine Industry Council (basic consolidation plan: 1956~1960).
- (3) Securing of funds: The government shall secure the necessary funds for executing the said plan.
- (4) Instruction of joint activities: In cases deemed necessary for realization of the consolidation objectives under the said plan, the Minister of International Trade and Industry can instruct concerted actions (consolidation cartels) concerning the following activities as exceptional measures under the anti-monopoly law: 1) restriction of quality, 2) restriction of manufacturing quantities according to product category, 3) restriction of technology, and 4) method of purchase of components and raw materials.
- (5) Establishment of a deliberative council: The Machine Industry Council shall be established within the Ministry of International Trade and Industry to investigate and discuss important items concerning the machine industry.

3. Second Extraordinary Measures Law for Promotion of the Machine Industry, 1961~ (5 years)

The law was extended for another five years and with the following perspectives incorporated in response to trade liberalization:

- (1) Reinforcement of international competitiveness
- (2) Specialization of production varieties
- (3) Establishment of mass production
- (4) Reinforcement of consolidation cartels

4. Third Extraordinary Measures Law for Promotion of the Machine Industry, 1966~ (5 years)

The law was extended again in 1966 and with measures incorporated in response to the liberalization of capital.

5. Extraordinary Measures Law for Promotion of Specific Electronics Industries and Specific Machine Industries, 1971~ (7 years)

When the Third Extraordinary Measures Law for Promotion of the Machine Industry expired in 1971, this coincided with the end of the Extraordinary Measures Law for Promotion of the Electronics Industry, which had a mandate of seven years. In order to deal with changes in the social environment at that time (1) internationalization, 2) liberalization of capital, 3) information orientation, 4) labor shortage, and 5) pollution problems, etc.), these two laws were combined (integration and systemization of machines and electronics) and the Extraordinary Measures Law for Promotion of Specific Electronics Industries and Specific Machine Industries was enacted with its targets limited to test and research activities and pollution prevention, etc.

6. Extraordinary Measures Law for Promotion of Specific Machine and Information Industries, 1978~ (7 years)

When the Extraordinary Measures Law for Promotion of Specific Electronics Industries and Specific Machine Industries expired in 1978, the Extraordinary Measures Law for Promotion of Specific Machine and Information Industries incorporating the software industry was enacted out of concern regarding the following conditions:

- (1) Manifestation of lagging behind the United States in the advanced technology and software sectors,
- (2) Gains made by nearby developing countries, and
- (3) Need for conservation of resources and energy following the oil shocks.

- II. Outline of Machine Industry Promotion Systems centering on the Extraordinary Measures Law for Promotion of the Machine Industry

Related policy fields including the system of the Extraordinary Measures Law for Promotion of the Electronics Industry, which was inextricably linked to the Extraordinary Measures Law for Promotion of the Machine Industry, were as follows.

1. Extraordinary Measures Law for Promotion of the Electronics Industry (1957)

- (1) Composition: This prescribed an annual plan, budget measures, credit from the Japan Development Bank and exemptions under the anti-monopoly law, etc. regarding the following devices. Composition was generally similar to that of the Extraordinary Measures Law for Promotion of the Machine Industry. These measures have been highly praised as the reason behind the successful development of the electronic device industry in Japan, one of the few countries to achieve such success outside of America.

- 1) Electronic devices for which manufacturing technology is not established or is at a low level in Japan
- 2) Electronic devices for which domestic production is not implemented or production quantities are small
- 3) Electronic devices for which consolidation is required to improve performance, quality and production costs

(2) Selection criteria

When selecting target devices, priority was given to items that satisfied the following conditions:

- 1) Products deemed capable of becoming core electronic devices in future
- 2) Products that can be applied to new electronics industry fields such as automation, etc.
- 3) Products that can prove useful in improving the current account balance
- 4) Products that can contribute to development of basic technologies

2. Law concerning the Information-Technology Promotion Agency (IPA Law) (1970)

Whereas the hardware industry was catching up with Europe and America at that time, the software industry was still lagging far behind, so the IPA Law was established in order to promote this sector. The law, which was inextricably linked to the systems of the Extraordinary Measures Law for Promotion of the Electronics Industry, comprised the following components:

- (1) Establishment of the Information-Technology Promotion Agency (IPA) as the core organization
- (2) Credit supplementary measures for supporting the weak financial base of the software industry
- (3) Program purchasing and development consignment (including consignment to Joint Systems Development Co. (JSD) geared to the joint development of large programs) for raising the technical standard through developing advanced programs
- (4) Preparation of a program survey ledger for promoting the distribution of programs
- (5) Implementation of an information-technicians examination for training and securing human resources
- (6) Establishment of the Software Technology Center as an auxiliary agency to the IPA for conducting joint research and development of advanced software

3. Development of the Peripheral Environment

In order to make measures based on the Extraordinary Measures Law for Promotion of the Machine Industry effective, supporting steps were taken in the form of establishment of JIS (Japanese Industrial Standards), environmental development such as introduction of the machinery credit insurance system, promotion of technology under the large project/mining and manufacturing technology research association, etc., and facilitation of technology introduction. In particular, when viewed from the ground, in addition to direct subsidization steps for makers, measures directed towards users proved to be highly effective.

At first sight, it appears as though the Ministry of Trade and Industry implemented contradictory measures around this time. Even though domestic makers were calling for the protection of domestic industries through the prohibition of imports, the Ministry was seeking to encourage imports of advanced machinery through offering funding and preferential tariff and tax measures for users from the viewpoint of promoting the modernization of domestic industry overall. Put another way, it adopted a double standard of “encouraging imports of foreign-made machines that couldn’t be produced domestically” and also “encouraging domestic machines.” Although this may seem a peculiar system, it was an appropriate policy in terms of promoting domestic machinery while preventing loss of international competitiveness due to overprotection.

(1) Measures for general users

Measures for general users and other major policies that indirectly contributed to promotion of the machine industry were as follows:

1) Tax system:

Shortening of the service life of machine devices and the machine special depreciation system consolidating important industries, etc.

2) Finance:

Lending of plant investment funds from the Japan Development Bank, establishment of the machine credit insurance system, introduction of machinery deferred payment financial measures in response to the deferred payment offensive of overseas machine makers

3) Small and medium enterprise modernization measures:

1) Small and medium enterprise plant modernization loan system (system for providing interest-free loans via prefectures of necessary funds when enterprises with no more than 100 employees introduce modernization equipment and machinery. Concerning

small enterprises that cannot raise the remaining half of funds, a separate plant lending scheme was prepared; and 2) small and medium enterprise consolidation machinery special depreciation system, etc.

In aiming to modernize small and medium enterprises, the above schemes stimulated the motivation of small and medium enterprises to renew machinery and equipment and provided markets to machine makers. Thanks to these systems, the modernization of subcontractor enterprises that developed their own finished machine markets while supplying components to finished machine makers was realized, and one of the most efficient industrial structures in the world was formed.

4) Establishment of Japan Electronic Computer Company (JECC) (1961):

This was established under joint financing from private sector enterprises based on loans from the Japan Development Bank, with the objective of preparing the distribution environment for development of the domestic electronic computer industry. JECC purchased en masse the electronic computers manufactured by the investing enterprises and rented them to users. Moreover, in readiness for the back-renting of rented electronic computers, a reserve fund to cover buyback losses on computers was also prepared.

5) Installment sales:

In order to disseminate expensive durable goods such as automobiles, etc. among the general population, the transaction scheme was established based on the Installment Sale Law.

(2) Export Promotion, etc.

In addition to measures for general users, emphasis was placed on promoting exports and the following measures were adopted:

- 1) Co-financing by the Export-Import Bank of Japan and city banks
- 2) Development of markets in developing nations through indemnification and economic cooperation
- 3) Mitigation of risk based on the export insurance system
- 4) Survey of overseas markets, staging of and participation in trade fairs and establishment of overseas machine centers, etc. by the Japan External Trade Organization
- 5) Operation of the dedicated trade fair vessel "Sakura"

- 6) Promotion of plant exports based on the Extraordinary Measures Law on Promotion of Plant Exports (1959), etc.

[Remarks]

These were the policies (including measures and steps) introduced by the Japanese government in order to promote the machine industry. In terms of quality/productivity improvement, they are limited to introduction of the Japanese Industrial Standards (JIS) system and environmental development measures such as promotion of equipment and machinery modernization (subsidies, tax systems, preferential financing). It should be clearly stated that vigorous and multifaceted measures for quality improvement and productivity improvement were implemented on the private sector basis (industrial groups and individual enterprises).