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## SCIENCE AND TECHNOLOGY POLICIES IN TUNISIA

1962 - 1988.

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## **INTRODUCTION.**

**This mission report attempts:**

- 1. to present a diagnostic survey of the national technological situation in Tunisia (imports of technology, research, development, commercialization, technological information, standardization, metrology and quality control);**
- 2. to pinpoint to some major problems and constraints which confront Tunisian public and private authorities, in charge of the industrial and technological development;**
- 3. to suggest some possible UNIDO's contribution in overcoming some of these problems.**

**For the sake of clarity, the report is divided in four major chapters:**

- 1. Brief survey of economic policy in Tunisia, 1962-1988.**
- 2. Survey of Tunisian industrial policy, 1962-1988.**
- 3. Technology policy in Tunisia, 1962-1988.**
- 4. Technological situation in Tunisia, 1982-1988.  
Missing elements and proposals for action.**

**Although our mission to Tunisia was short (10 working days) most of the information contained in this report derives from interviews with more than 35 Tunisians (Ministry directors, engineers, technicians, support institutions directors, etc...) besides UNDP and UNIDO officers and consultants, in Vienna and Tunis.**

## Chapter I

**SURVEY OF ECONOMIC POLICY IN TUNISIA  
1962 - 1988**

Prior to the 1980's, economic development in Tunisia was almost a state affair. There was no economic sector where the state does not intervene either directly or indirectly. It acts as lawmaker, planner, investor, manager and owner. And as an author put it in 1979: "*As a source of regulatory legislation and as the author of comprehensive planning for development, the state is supreme*" (1).

**1.1. The 1970's.**

At the end of the 1970's reorientation and liberalization of economic policies has resulted in Tunisian involvement and controls in the industrial sector, and a much reduced level of public investment in the parastatal sector. Industrial policy becomes more open and out-ward looking; it aims at export promotion (2).

By 1979, manufacturing made a 12 % contribution to GDP. But major export sectors remained petroleum (45 % of 1979 total value against 36,7% in 1978), clothing and textiles (20 % - 1979, 14,5 % - 1978), olive oil, superphosphates and phosphoric acide, fruit. In the same year (1979), the total value of Tunisian exports was \$ 1.766 million. One quarter of Tunisia's export earnings came from manufactured goods and 24 % of labor force was employed in the industry. Average annual growth rate of production in the manufacturing sector reached a high 10,6 % on 1970-79. (Annexes: Tables 1, 2, 3 and 4)

On the whole, between 1970 and 1979 the Tunisian economy has

performed well on average; the per capita GNP in 1979 went over the 1.000 \$ mark. Income floors moved up slowly; although "distribution income has been quite uneven (the share of the richest 5 % went from 18 % in 1966 to 22 % in 1975). Doubtless part of the explanation of Tunisia's good economic performance in the 1970's was the outward orientation which succeeded in unleashing industrial activity; in attracting both investment and assistance from capitalist sources.

And yet, the policies of the 1970's acquired an outlet not only for goods but also for labour. During the boom years France was their safety valve, providing jobs for Tunisians. In 1973 only, 21.000 Tunisian migrant workers crossed to France to reduce the pool of unemployment at home. Libya absorbed by 1975 more than 40.000 Tunisians. Thousands of Tunisian university graduates and technically qualified people left the country, where unemployment was estimated to a quarter of a million out of a population of 6 million in 1979.

## 1.2. The sixth five-year plan (1982-86).

The investment allocations of Tunisia's sixth five-year plan (1982-86) acknowledge the problems that have to be solved if the discontent was not to be exacerbated. By 1981, the official unemployment rate was reported to be 14 % with near 200.000 people out of work or under-employed. Nevertheless, the plan warns against "*investment which merely creates jobs without increasing production for this would reduce Tunisia to a mere building site in the struggle against unemployment*".

The plan as a whole envisaged investment of TD 8200 million (\$ 13.534 million) and an annual growth rate of 6 % down from 7,5 % in the previous plan (1977-81). The trade deficit was to be reduced to 6,6 % of gross national product by encouraging diversification of exports away from oil. It sought also to stabilize external debt at 36 % of GNP as in 1981, and to keep the debt-service ratio at 16 - 17 % of foreign currency reserves, again as in 1981.

Various economic difficulties thwarted Tunisia's endeavours to

materialize the objectives included in the sixth plan. By 1985, the government imposed a severe cutback on imports. The rising deficit on the current account in 1982-84 brought about a worrying increase in external indebtedness. Foreign exchange reserves have dwindled from \$ 607 million at the end of 1982 to \$ 233 million at the end of 1985. Growth in industry and tourism has been sluggish. Constant GDP growth has been roughly 5 per cent a year. Trade deficit exceeded \$ 1000 million every year in the 1980-1984 period but fell back to about \$ 810 million in 1985.

The government has attempted various ways of reversing the growth in the budget deficit that took place between 1982-85. In January 1984 it tried to reduce an annual commodity subsidy of about TD 100 million (\$ 140 million) by doubling bread and wheat product prices. The move sparked off violent rioting. Cuts have been imposed instead on the investment budget. An 18 % cut has been budgeted for 1986 in an attempt to reduce the budget deficit by 11 % to TD 430 million (\$ 596 million). Meanwhile, debt servicing accounted for an evergrowing slice of government spending - 22 % of total budgeted spending in 1986. (Annexes: tables 5 and 6)

Difficulties facing the Tunisian economy were acknowledged already in March 1984 by the new Planning Minister Ismail Khalil who declared that *"the present five-year was conceived and elaborated during a recession. We have difficulties in marketing our goods and selling them for cash. We were counting with joint ventures with Europeans but it was not the proper time to invest in Tunisia, even in joint ventures."*(3)

### 1.3. The seventh five-year plan (1987-91).

The situation became so worrying that the World Bank and the IMF, as of the beginning, began pressing Tunisia to gradually adjust the prices of the sensitive goods in the next development plan which runs from 1987 to 1991. Agreement on an eight-point reform programme (see annexe) was reached in 1986, with the World Bank and the IMF, following a foreign exchange crisis caused by the combined effects of the oil price collapse,

a poor 1986 cereals harvest and a disastrous tourism season.

The Planning & Finance ministry estimated total capital requirements in the five years at TD 5,600 (\$ 6,364 million) of which TD 2,450 million (\$ 2,784 million) would be in the form of medium-term lending.

In the seventh plan period non-oil exports are projected to increase by 8 per cent annually in constant terms; imports are expected to fall about 1 percent a year. The plan aims to keep external debt at a manageable level, totalling TD 6.170 million or 51 % of gross domestic products (GDP) by 1991. The debt service ratio will rise slightly from 20 % of current account receipts in the last plan to 26 %.

It is employment that will suffer. The planners hope to guarantee annual GDP growth of close to 4 % in real terms between 1987-91, allowing the creation of 250.000 jobs instead of 345.000 jobs needed to keep pace with the number of job-seekers. At the end of 1986, official unemployment figures (which are generally too low) showed that 15 % of the active population was out of work. This is expected to rise to 17 % by 1991.(Annexes: table 7)

### Conclusion.

Tunisian economy has gone through three major phases:

- a. 1962-1970 has been marked by a strict control of salary growth. Salary index (SMIG) in real terms fell from 100 in 1962 to low 84 in 1969, as the following table shows:

#### Real salary index (1962-1970) (4)

	1962	63	64	65	66	67	68	69
SMIG	100	97	93	87	03	91	88	84
Average salary	100	99	100	90	98	91	86	83

b. 1970-80 has been marked by the oil rent and government spending; which led to the development of an important industrial infrastructure, accompanied by increased imports, account deficits, and significant rate of indebtedness. The country looked outward for its exports, encouraged joint-ventures mainly in textiles and clothing.

c. 1980-1987.

The internal logic of the preceding period produced its grave effects. Aggravated trade and account balances, foreign debts, debt services. Sluggish industrial growth, social discontent, higher rates of unemployment, and sectoral and regional imbalances.

Tunisian planners are conscious of all these grave consequences and endeavour to reduce imbalances in the 1987-91 plan.

Will they succeed ?



## Chapter II

## SURVEY OF TUNISIAN INDUSTRIAL POLICY.

1962 - 1988.

**Introduction.**

Since the independence, successive governments have endeavoured to industrialize the country as a part of their overall socio-economic development efforts.

It is possible to distinguish roughly between three stages in the industrial development of Tunisia.

The first decade (1961-71) has been characterized by the construction of a basic infrastructure for the processing of raw materials and the development of the human legislation and institutional resources necessary for the take-off of industrialization.

The second decade (1972-1981) has been characterized by the drive toward diversification and the completion of the support and institutional mechanisms.

The third decade (1982-1991) the main feature has been the launching of an ambitious program aiming at:

1. The increasing of production.
2. The qualitative improvement of industrial development:
  - increasing the degree of national integration,
  - improving the generation of added value.

- improving the quality of production.

3. The creation of jobs.

4. The development of export industries.

5. Decentralization.

6. Assistance to small and medium-scale enterprises.

## 2.1. "Les perspectives décennales" 1962-71.

Since large industries were almost inexistant before 1962, it was seen as essential to rapidly establish key-industries which were believed to propell development. During the first decades, planned investments amounted to 31 % of GNP and the manufacturing sector 12 % of GNP. Performance of the first three-year plan (1962-64) was down to an appalling half of previous estimates (annual production growth of 4,6 % inspite of 9,4). This bad performance led to augment industry's share in investments planned for the four-year plan (1965-1968), to a high 32 % of national spending, going mainly to heavy public industrialization (oil, steel, transport, sugar, paper pulp). Transformation industries were owned by the private sector, although state role was not negligible.

It was intended to stabilize industrial investments round 30 % in the 2nd four-year plan 1968-1972 but the failure of Ben Salah's experience of collectivization, has led the government to reconsider its role and to lean towards encouraging the transformation industries of the private sector, by providing accrued guaranties to investors.

By 1975, the share of industrial investments exceeded 41 %. The shift from heavy to light industrie was justified by the nécessity to provide more jobs and by the fact the technological, managerial and many other problems have weakened the productivity in heavy industries.

## 2.2. "les perspectives décennales" 1972-1982

With the beginning of the newt decade, Tunisia witnessed a major shift from heavy to light industries. This shift was justified by insutricient

productivity in large industrial complexes, the need to create more jobs, to regionally decentralize industrial projects and to promote exports.

### 2.3. Institutional measures.

Policy measures which were introduced during the first decade to promote industrial investments mainly by the private sector (law 69-35 of 26 June 1969), were further emphasized during the second decade.

- a. Law 72-38 of 27 April 1972 on exclusively export-oriented industries is a clear indication of the shift in investment priorities. This law grants certain benefits to any investor setting up a production unit in Tunisia, whatever its location, at any scale of production, using any technology that suited him.
- b. Law 74-74 of 3 August 1974 related to investments in the manufacturing sector, replaced law of 26 June 1969 and was meant to grant benefits and tax exemption to enterprises catering for the needs of the local market.
- c. Decree 75-793 of 16 August 1974 deals with the creation, organization and operation of the Fonds de promotion et de décentralisation industrielle (FOPRODI). This fund is reserved for Tunisian citizens who personally set up or take over the management of small and medium-scale projects, mainly in the non-coastal areas.
- d. Law 81-56 of June 1981 promulgated an investment code intended to establish procedures for protecting any industry, without discrimination as regards nationality in granting benefits. It applies to investments for the creation, expansion or renewal of projects in the manufacturing industries that are subject to a declaration procedure or are submitted for approval (5).

Besides this wide range of legislation to regulate and encourage investments during the 2<sup>nd</sup> decade (1972-1981), the government has set it

support structures.**2.4. Support structures.**

2.3.1. As of 1968, the Centre National d'Etudes Industrielles (CNEI), a public corporation, has been established. The purposes of the Centre are:

- to advise the government on action to be taken in the industrial development,
- to evaluate projects,
- to undertake technical and economic studies of specific industrial projects,
- to advise to the possibility of establishing new industries and on questions related to their financing and implementation,
- to provide vocational training for professionals recruited for the needs of the Centre,
- to disseminate information and data compiled by the Centre in the course of its work.

2.3.2. Agence de promotion des investissements (Api).

Set up in 1972, this Agency is a public corporation responsible to the Ministry of National Economy, with almost the same purposes as the CNEI, raising a real problem of overlapping.

2.3.4. Agence foncière industrielle (AFI).

Set up under law 73-21 of 14 April 1973, AFI is a public corporation of an industrial and commercial nature whose work supplements that of API. Its principal objective is to carry out all kinds of real estate operations and to undertake directly or indirectly all infrastructural and construction work for the establishment and development of industrial zones to be made available to industrial promoters.

2.3.4. Centre d'étude et de promotion des exportations (CEPEX).

This public corporation as set up under law 73-20 of 14 April 1973. Its overall task is:

- to contribute towards the development of Tunisian exports and to provide permanent assistance to exporters in the conclusion and implementation of export agreements.

Besides CEPEX, two other agencies are concerned with export promotion:

a. L'Office du Commerce Tunisien (OCT)

b. La Société nationale d'exportation (SNE) which is a company for external trade.

## 2.5. Evaluation of industrial policy.

Evaluation may differ according to measurement criteria. In a recent report published in 1987 by the Tunisian Ministry of Industry and Commerce, the term "*remarquable performance*" has been used in evaluating this period (6).

The criteria which were used to measure this performance concerned the added value of manufacturing industries which amounted to 8,2 % in the first decade and 9,8 % in the second, while GNP growth was respectively of 5,2 % and 6,3 %. As for employment, more than 190.000 jobs have been created. Industrial exports jumped from a low 10 MD in 1965 to 50 MD in 1971 and 480 MD in 1981. But this sector has benefitted from 11,5 % of total investments in the first decade and 17,5 % of total investments during the second: 1.117 MD out of 6.406 MD.

On the whole, little is said about the rate of indebtedness which grew to preoccupying proportions, the constraints of debt servicing, the limitations in technological adaptation and innovations and the problems linked to the development of sub-contracting with foreign firms. On the other hand, regional disparities didn't seem to have been treated with the deserved attention.

On the whole, textiles and clothing had the lions' share in industrial creation. The following table illustrates this striking feature:

Breakdown of enterprises created from 1972

	Creation of enterprises 1973-74		% exporting enterprises in June 1986	
	Total	Export-oriented enterprises	Number of enterprises	Jobs
Food industries	163	1	1,2%	0,3%
Construction materials	4	-	-	-
Mechanical and electrical	83	9	3,7%	3,6%
Chemistry and rubber	57	6	2,5%	2,3%
Textiles and clothing	182	92	86,4%	90,3%
Other industries	179	6	6,2%	3,5%
<b>Total</b>	<b>668</b>	<b>114</b>	<b>100 %</b>	<b>100%</b>

Source: M. FALISE and F. MASSON: "La politique de développement technologique en Tunisie", in *Technologies et Développement au Maghreb*, Editions du CNRS, Paris, 1978, tabl. 2, p.166.

Another point should be stressed. It concerns the break down of licenced projects by nationality. Obviously foreign investors are very interested in International Sub-contracting (ISC) in Tunisia.

Breakdown of jobs created by export-oriented enterprises according to the nationality of the promotor.

Nationality	Number of jobs				% by nationality period 73-76
	1973	1974	1975	1976	
<b>Tunisian</b>	<b>2973</b>	<b>1000</b>	<b>852</b>	<b>1051</b>	<b>13,5%</b>
<b>Foreign</b>	<b>6666</b>	<b>4991</b>	<b>6446</b>	<b>4644</b>	<b>52,2%</b>
- German	2349	2610	2371	2340	22,2%
- Benelux	1049	941	2374	936	12,2%
- French	469	1238	843	976	8,2%
- Italian	1318	35	170	116	3,8%
<b>Mixed</b>	<b>4989</b>	<b>3351</b>	<b>2640</b>	<b>3936</b>	<b>34,3%</b>
- Tuniso-German	798	581	593	283	5,2%
- Tuniso-Benelux	1028	740	688	252	6,2%
- Tuniso-French	1356	1358	938	1045	10,8%
- Tuniso-Italian	1548	182	124	502	5,4%
<b>Total</b>	<b>14631</b>	<b>9342</b>	<b>9932</b>	<b>9631</b>	<b>100%</b>

Thus of a total of 43.546 jobs created in the period of 1973-1976, by export-oriented enterprises, the share of Tunisian enterprises did not exceed 13,5% compared to 52,2% for foreign firms and 34,3 % for mixed enterprises. Thus, the predominance of the textile sector in the manufacturing industry and the importance of the ISC (International Sub-contracting) appear to be the main features of this period.

## 2.6. The industrial policy in the VI<sup>th</sup> Plan (1982-86).

The institutional measures and support structures were designed to provide a further stimulus to manufacturing industries. Tunisian industrial policy had to strengthen its competitiveness, to adapt to the changes in the domestic economic environment (slump in oil prices and revenues), to efficiently meet the general needs of the population (mainly employment and products of better quality), to encourage and facilitate foreign investment, to augment productivity and exports, and to promote new industries (mainly mechanical, electrical and electronic new lines of production).

The VI<sup>th</sup> Plan forecasted investment of 1.600 MD, representing 19,5% of total commitments; 24% of which were to go to mechanical and electrical industries. The average annual growth in the added value was to reach a high 10,5%. Exports were estimated to total for the 5 years of the Plan some 4.056 MD; i.e. 49% of total exports of goods. The Plan also envisaged the creation of 109.000 jobs, some 40% of total job creation.

On the whole, the ambitions of the Plan did not materialize. Results did not come up to the government expectations. Investments totalled 1.543 MD, annual growth of added value did not exceed 5,4%, only 70.000 jobs have been created, exports grew by 12,3% (in current price) and only by 4,6% (in constant prices).

## 2.7. New institutional and support structures.

New improvements have been added to the law 81-56 of 23 June 1981, by the decree-law 85-10 of 27 September 1985 allowing small projects creating less than 10 jobs to benefit from the fiscal advantages of the law of 1981. List of eligible industries benefitting from fiscal and other advantages was extended to encompass industries of maintenance, assembly and local engineering.

Previous law 72-38 which was meant to encourage exporting industries has been abrogated and replaced by a new decree-law 85-14 of 11 October 1985, providing for assimilation of export-oriented industries to free-zones, and the softening of regulations regarding foreign technicians recruitment.

As for support structures, three technical centers have been set up:

1. Le Centre Technique des Industries Mécaniques, Electriques et Electroniques (CETIME).
2. Le Centre Technique des Matériaux de Construction de la Céramique et du Verre (CTMCCV).
3. L'Institut Supérieur des Industries Textiles.

Another institute has also been set up in 1982 and became operational in 1983: the INNORPI (Institut National de la Normalisation et de la Propriété Industrielle).

The main purpose of the Institute is standardization and quality control. Since 1982, more than 2000 norms have been adopted. 16 certificates of conformity have been delivered.

In 1985, a "Plan National de Promotion de la Qualité dans l'Industrie Tunisienne" has been adopted in order to better control the quality of Tunisian exports.

A further move in the direction of export promotion, the law 84-20 of 9 Mai 1984 provided further fiscal incentives to specialized companies which would help promoting abroad the exports of small and medium size



enterprises. More than 16 companies of this kind had been set up and some are already operational.

The law 84-40 of 23 June 1984 dealt mainly with export insurance in order to cover risks of small and big exporters in traditional and new markets. To this effect, a new society has seen the light: COTUNACE (Compagnie Tunisienne pour l'Assurance du Commerce Extérieur).

To assist potential exporters in their work of prospection of new markets, FOPRODEX (Fonds de Promotion des Exportations) has also been established.

During this period, joint-ventures in finance and banking were further developed:

- Banque Tuniso-Koweitienne de Développement.
- Banque Tuniso-Qatari d'Investissement.
- Banque Tunisienne et Emirats Arabes Unis.
- Banque Tuniso-Saoudienne d'Investissement et de Développement.
- Beit Altamwile Essaoudi Al-Tounsi.

All these banks specialize in medium-term loans (maximum 7 years) and may take out equity participation in enterprises. The banks (except the Banque de Développement Economique de Tunisie) are interested only in large-scale projects.

## **2.8. Evaluation of the IV<sup>th</sup> Plan.**

Some major salient features could be drawn from the following tables: The first is a diminution of the share of textiles, leather and shoe industries in the structure of the Added Value (21,5% in 1986 against 23,7% in 1981).

Structure of Added Value - %

	<u>1986</u>	<u>1981</u>
Food industries (FI)	22,3	24,5%
Construction (CI)	15,5	14,9%
Mecanical/Electrical (MEI)	13,8	13,4%
Chemistry (C)	11,5	11,3%
Textile, Leather, Shoe (T)	21,5	23,7%
Other (OI)	14,4	12,2%
<b>Total</b>	<b>100,0</b>	<b>100,0%</b>
Compared to GNB	16 %	14 %

The second feature is that total investments in the textile, leather and shoe diminished drastically to a low 9,3% of total investments of the IV<sup>th</sup> Plan.

Breakdown of investments by sub-sector.

	<u>MD</u>	<u>%</u>
FI	205,7	13,3
CI	389,2	25,2
MEI	315,6	20,2
C	359,5	23,3
TI	143,6	9,3
OI	129,4	8,4
<b>Total</b>	<b>1.543</b>	<b>100%</b>

The third point which captures our attention is that inspite of diminishing investments in textiles, leather and shoe industries, these latter continue nevertheless to provide in 1986 almost half of export

earnings (395 million TD out of a total of 859 MD) of the manufacturing sector and a fifth of total exports (2.115 MD in 1986).

Exports of manufacturing industries in MD

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>growth 82-86</u>
FI	69,0	69,9	41,7	72,0	63,0	75,0	- 2,3%
CI	4,9	10,0	11,0	12,0	13,0	26,0	+ 38,4%
MEI	40,0	58,5	57,1	87,0	80,0	95,0	+ 22,0%
C	159,6	182,0	213,3	233,0	250,0	255,0	+ 12,0%
TI	198,0	236,6	270,3	269,0	312,0	395	+ 13,8%
OI	12,2	8,8	11,2	10,0	12,0	13,0	- 2,8%
<b>Total</b>	<b>483,7</b>	<b>565,8</b>	<b>604,6</b>	<b>683,0</b>	<b>730,0</b>	<b>859,0</b>	<b>+ 12,0%</b>
<b>Total Exports</b>	<b>1.721</b>	<b>1.773</b>	<b>1.947</b>	<b>2.113</b>	<b>2.253</b>	<b>2.115</b>	<b>+ 5,7%</b>

Source: Ministère de l'Industrie et du Commerce, *VII Plan*, mars 1987, p.37

The fourth point is that out of 70.000 jobs created in the period of the VI<sup>th</sup> Plan (82-86) more than a third (25.000 jobs) have been created in the textile sector, as indicates the following table.

Job creation in the manufacturing sector (MS)

	<u>1982-86</u>
FI	11.900
CI	5.910
MEI	9.370
C	2.850
TI	25.850
OI	14.120
<b>Total MS</b>	<b>70.000</b>
<b>Total Job creation</b>	<b>200.000</b>
<b>% of MS</b>	<b>35 %</b>

Thus on the whole, no drastic modification has been noticed during the

VI<sup>th</sup> Plan period. Manufacture industry remains prevailingly dominated by the textile, leather and shoe industry, according to all parameters: investments, contribution to the Added Value, employment and exports earnings.

Due to the very liberal import of technology and very many incentives for capital investments for a long period, sub-contracting with foreign firms have been encouraged and stimulated.

On the whole, there is almost no vertical integration in industry. Reliance on transfer of technology is always the rule.

Industry has suffered from lack of qualitative organization and management, insufficiency of skilled and well trained technicians, inadequate information on international markets and also lack of tight vertical interconnection. Tunisian industrial structure has been able to buy and import technology embodied in machine and know-how but not sufficiently able to exploit it mostly because of the lack of technological support in raw materials and so additional import of technology (in materials and components) was induced. But on the whole, imported technology was outdated and non-competitive.

On the other hand, Tunisian industrial structure suffered from a lack of tight interconnections among industries. This led to an irrational and inadequate use of existing means of production. While lack of circulation of information regarding local markets has induced imports of products which are or could be produced by local firms.

Another weakness of the Tunisian industrial structure lies in the under-utilization of existing capacity of production. Many factories didn't exceed 40 to 60% of the production capacity. Existing codes of investments have been responsible - to a certain extent - for such shortcomings, since they provided fiscal benefits for new job-creating enterprises on the detriment of maintenance and renewal of existing ones.

Moreover, insufficiency of local and external competitiveness for a

substantial part of products has probably retarded the search for better quality, and hindered the commercial "aggressivity" on the part of the operators.

Finally, Tunisian industrialization during the VI<sup>th</sup> Plan period suffered from imported inflation, evaluation of foreign currencies, etc..., to such an extent that investment cost per job jumped to 22.000 TD instead of 14.700 forecast in the Plan.

## 2.9. The VII<sup>th</sup> Plan (1987-91).

Given the shortcomings and inherent weaknessess of the VI<sup>th</sup> Plan, the ambition of the Tunisian planners consists in benefitting from the errors of the past and elaborate a pragmatic industrial strategy for the next five years, taking into account local and international constraints.

Forecasts for the VII<sup>th</sup> Plan could be summarized as follows:

- a. A growth of industrial added value to 6,4 (5,4% in the VI<sup>th</sup> Plan) with a participation of the manufacturing sector in the GNP amounting to 18,5 in 1991 (16% in 1986).
- b. Total investments in industry are not estimated to outstrip the 1.580 MD mark (1.543 MD in the VI<sup>th</sup> Plan). But in constant prices this total does not exceed 70% of disbursed investments in the previous plan. But what deserves a special attention is the reduction of public sector's share to a mere 38%, (instead of 57% registered in the previous plan. Priority is still given to job-creating investments (52% against 40% in the previous plan).
- c. Exports earnings are to double in five years, going up from 859 MF in 1986 to 768 MD in 1991, thus bringing the manufacturing sector's share of all exports around 40% (instead of 33,7% in the VI<sup>th</sup> Plan).
- d. 67.000 new jobs are to be created in this sector, representing 27% of total job creation for the period.

## 2.10. Institutional modifications.

To achieve these objectives, Tunisian planners repealed previous laws; in particular:

- a. Law 81-56 of 23 June 1981 setting forth incentives for investments in the manufacturing industries and for industrial decentralization, including texts completing or amending this law.
- b. Decree-law 85-14 of 11 October 1985 defining incentives for investments in exporting industries.
- c. Article 30 of the 1983 Finance Act, Law 82-91 of 31 December 1982.

All these laws and decrees are replaced by law 87-51 of 2 August 1987 establishing the new **INDUSTRIAL INVESTMENT CODE**.

The following checklist of benefits offered by the new industrial investment code is impressive.

### **Checklist of benefits offered by the industrial investment code.**

Investments in manufacturing industries are wholly unrestricted and not subject to prior approval.

They must, however, be registered with the Industrial Promotion Agency. Foreign nationals investing in manufacturing industries enjoy guaranteed transfer of capital invested via imported foreign exchange and the revenue generated thereby.

### Main benefits accruing to investments in wholly export-oriented manufacturing industries.

- Full tax exemption of earnings.
- Unrestricted repatriation of profits.
- With the exception of prohibited products or those restricted by decree, wholly export-oriented companies may sell on the domestic market up to 20% of their turnover net of taxes, after payment of all statutory duties and taxes.
- Refund of turnover tax on purchases from local, non-manufacturing

firms.

- Refund of customs duties and taxes on capital goods and raw materials imported or acquired on the domestic market.
- Suspension of turnover tax on sales by bonded warehouses whose services are performed, and supplies and purchases are made by local producers.
- Flat-rate personal income tax scheme for foreign employees, fixed at 20% of gross income.
- Companies may recruit up to four foreign employees without formality.
- Benefits attaching to decentralization:
  - i. Assumption by the State of expenditure on infrastructure work necessary in order to implement projects.
  - ii. Assumption by the State of the full cost of the employer's contribution to the official social security scheme on wages and salaries paid to Tunisian employees for a period of five years, renewable for a further period of five years.

Main benefits accruing to investments in manufacturing industries other than wholly export-oriented industries.

Common tax benefits.

- Suspension of turnover tax on capital goods imported or purchased from local manufacturers.
- Suspension of turnover tax on services performed and purchases of goods and products from local producers required for construction of the company's buildings.

Tax benefits for exporting companies.

- Suspension of turnover tax relating to purchase of goods and products from local producers and services performed necessary for production intended for export.
- Refund of customs duties on raw materials and semi-finished goods imported and acquired locally to be used in the manufacture of products intended for export.

- Refund of a percentage of customs duties on capital goods imported and written down as normal annual depreciation in proportion to export sales.
- Exemption of profits from export activities from the tax on industrial and commercial profits.
- Exemption of profits deriving from transactions on the local market to the amount of 20% of profits resulting from export activities.

Additional benefits attaching to decentralization.

- Assumption by the State of expenditure on infrastructure work necessary in order to implement the projects.
- Assumption in full by the State of the employer's contribution to the official social security scheme for a period of five years.
- Payment of the tax on company profits at the reduced rate of 5% during the first seven years of actual operation.

Other benefits may be available to:

- industrial undertakings operating shift systems;
- industrial undertakings in difficulty experiencing a revival in business;
- investments of particular value to the national economy;
- industrial undertakings bringing in technological know-how linked to a high degree of integration.

## 2.11. Modification in the support structure.

The major modification is the creation of a public body of industrial and commercial nature, with legal personality and financial autonomy, bearing the name "INDUSTRIAL PROMOTION AGENCY" (IPA) or API (abbreviation of the name in French), which shall replace the National Center of Industrial Studies, the Investment Promotion Agency and the Industrial Agency.

Thus the law of 1987 repeals:

- a. law 68-39 of 16 December 1968 setting up a National Center for Industrial Studies,
- b. article 43 of the 1976 Finance Act, law 75-843 of 30 December 1975.



**Law 87-50 of 2 August 1987 - Article 2**

The Industrial Promotion Agency's task shall be to implement government policy on promoting industry within the context of the economic and social development plans

- a. carrying out sectoral studies of manufacturing industry in order to assess the state of the sectors, their development and prospects;
- b. setting up and managing an industrial data bank and a subcontracting exchange to aid identification of viable projects and optimum utilization of installed production capacities;
- c. identifying investment opportunities in the industrial sector and providing assistance for their implementation;
- d. undertaking technical and economic feasibility studies of industrial projects, in particular those provided for in the economic and social development plan;
- e. examining the dossiers concerning the granting by the State of advantages and guarantees to investment projects in the industrial sector, and submitting them for an opinion to the committee on the granting of advantages and guarantees provided for by the industrial investment code;
- f. devising information and promotion campaigns, in collaboration with public or private bodies, in Tunisia or abroad with the aim of publicizing investment opportunities and facilitating their implementation;
- g. monitoring the implementation of industrial projects;
- h. assisting promoters of industrial projects in the preparation of studies and implementation of their projects;
- i. providing assistance to enterprises and public or private bodies in the field of organization, improvement of management techniques and staff training, for the benefit of small and medium-sized enterprises in particular;
- j. contributing to the training of promoters, in particular by organizing seminars, training and refresher courses in all fields relevant to the operation of enterprises;
- k. organizing surveys of industrial activities among enterprises and public or private bodies of the purpose of compiling statistics and conducting analyses and studies in conformity with the legislation in force;

- l. carrying out technical, economic or social surveys and studies concerning the determination, viability and facilities of industrial, craft industry and cottage industry zones in keeping with official policy in the field;
- m. carrying out all types of transactions involving movable and immovable assets and undertaking directly or indirectly all infrastructure and superstructure work as a basis for creating industrial, craft industry and cottage industry zones, administering them and assigning or letting them to industrial promoters on the terms provided for in Law n°73-21 of 14 April 1973 on the management of tourist, industrial and residential zones. Land used for depot or warehousing operations and land set aside for complementary activities contributing to the development and promotion of the zone has the same status as land for industrial use;
- n. performing all tasks contributing to its goal assigned to it by the State.

## CONCLUSION.

On the past, Tunisian private enterprise was hampered in by regulatory measures at all levels. The VII<sup>th</sup> Plan introduces a programme to gradually phase-out restrictive measures and eventually reach free market conditions. During the transitory period between heavy regulation as was the case in the past and free market conditions, as is expected to be the case in the future, existing and new support institutions are expected to play a key role in laying the groundwork favorable to private sector development.

It is also expected that such development will lead to higher growth and job creation. But all this is conditioned by three major requirements: prices will be freed, investment choices left to the entrepreneurs and foreign trade liberalized. The social price which Tunisia will have to pay remains the major unknown factor.

## Chapter II

**TECHNOLOGY ACQUISITION POLICY IN TUNISIA  
(1962-82):****The State of the Art.****Introduction.**

Since more than 25 years, analysis of technology transfer in the LDC's has crystallized around three main axes:

- a. firstly the call for a better technology transfer.
- b. secondly the application of appropriate technology.
- c. and more recently, the use of science and technology for the development of LDC's. The Vienna Conference of August 1979 on Science and Technology was mainly concerned with this important issue.

Tunisian policy makers have acknowledged, very soon, that technological change is a major contributing factor to economic development at various levels: national sector, company and product.

And yet, the practice of development planning in Tunisia since 1962 to roughly 1982, remained void of any domestic preoccupation with the development of local abilities to absorb, adapt and master technology. It is only very recently that Tunisian planners seem to be really concerned about technological development. This chapter intends to clarify the reasons behind this shift.

### **3.1. The practice of development planning 1962-82.**

The Tunisian development plans of the first two decades (1962-82) have consisted primarily of a compilation of projects to create modern infrastructure, to set up some basic industries and to facilitate international sub-contracting. This industrial policy was not accompanied by a technological policy as such, to attain technological competence, use traditional skills, identify the technological alternatives, and arrange for modernization of both equipment, products and processes, and improve production speedily through greater efficiency and fuller utilization of existing capabilities, enhance the quality and reliability of performance and output and finally to ensure maximum development with minimum capital outlays.

As a matter of fact, for more than 20 years, the first step in the investment-decision process takes place without any concern about technical problems or building local capacity to deal with imported technology. Under pressure of time (necessity of job creation, foreign exchange earnings, and take-off) and poor staffing, ministries and government agencies tended to rely on foreign consultants and foreign financial organization to provide detailed engineering studies and supply equipments through foreign consultants.

Until the 1980's, there was no such thing in Tunisia as "General Directorate for Technology" or an independent "Ministry of Technological Research" or a "National Scientific and Technological Research Institute". Planning institutions were not primarily concerned with the promotion of local skills needed to create the basis of an autonomous technical capacity. Unsufficient attention was given to technological choices available, to the adaptation of norms, specifications and quality control to local and international (in case of exportable products) conditions, and to the potential local capacities in implementing projects, especially the potential of the private sector.

### **3.2. Turn-key projects.**

As noted in the first two chapters (Survey of Economic Policy and Survey of Industrial Policy in Tunisia) the faster rate of investment between

1962-82, led to the adoption of turn-key contracts whereby foreign firms are entrusted with all aspects of the project:

- a. Design and planning.
- b. Equipment.
- c. Semi-finished and raw materials, spare parts.
- d. Transfer of technology.
- e. Vocational training.

Local institutions and government or private concerns are kept out of the whole process. At best, some private firms might act as sub-contractors for the non-sophisticated part of the work.

In practice, the experiment with turn-key arrangements has led to some unfavourable effects:

- a. the excessive cost of a project is supported directly or indirectly by the client who does not participate in price negotiations;
- b. there is no guarantee of production and smooth operation in the long-run;
- c. there is lack of effective transfer of technology.

Other negative effects derive from the turn-key experiment:

- little attention as paid to regular preventive, maintenance and repair programming;
- facilities are lacking for the fabrication of even minor spareparts requiring unsophisticated technological capability;
- equipment imported for the same or closely similar use has been acquired haphazardly with standardization requirements seldom being prescribed;
- long periods of constant-level efficiency and productivity were common, while continuous product improvement was rare. Many factories could not move from one technology base to another by steps or jumps. This is of course in sharp contrast to what happens in a typical factory in the industrialized world.

All these effects reduced the technological capacity required to generate technological dynamism within the existing structure of industrial production. Economic literature of Tunisian development suggests a widespread absence of explicit efforts to "use technology transfer" projects as a means to enhance domestic technological capabilities for

generating technical change. Thus on the whole, in the first two decades of development Tunisia resorted to imported technologies, embodied in engineering services, managerial services and capital goods, which is only the first stage of technological capacity development. But the two subsequent stages have been neglected: the development of skills and know-how for operation and maintenance and the development of expertise, experience for generating and managing technical change.

Thus, the management of technology acquisition was oriented to technology imports and, only to very lesser extent to the accumulation of technological capacity. Even when local capacities did exist to produce elements of technology needed by industry, those local resources were not often used. Local existing engineering has often been under-employed.

This could be partly explained by the lack of interconnexion between industrial and technology policies. The central focus of action has been usually the individual investment project. National plans for industrial development are often simple aggregation of individual projects. Management of individual projects has not been set in the context of objectives about the long-term evolution of industries through sequences and technologically related projects.

### **3.3. Investments policy.**

Not only has the focus of industrial policy centered on individual investment projects - by means of turn-key contracts, but also investment has been seen largely as a matter of accumulating fixed capital (machinery, plants, infrastructure, etc...)

Moreover, in the absence of a real financial market and capital market, domestic banks have been restricted to pure commercial banking activities (mainly financing foreign trade). Specialized institutions created to supply long-term finance for development have been narrowly dependent on government funds and foreign exchange loans. And in general they used to rely on foreign expertise during all the phases of investment.

On the other hand, because of artificial exchange rates, customs exemptions, and subsidized interest rates for importing foreign machi-

nery, it often happens that an additional bias is created in favour of projects requiring sophisticated foreign equipment and technical assistance and containing a high degree of foreign components for their execution.

### 3.4. Regulation of technology imports.

No doubt that Tunisia has extended subsidized exchange rates, interest rates and tax exemptions to development projects based on foreign technology. But as far as the regulatory context is concerned, emphasis has been placed on subsidy and protection policies. In fact, local production has been protected and encouraged while domestic technical capabilities have been left unprotected, albeit discouraged by the various subsidies granted to the import of foreign equipment and technical skills. Thus Tunisia found itself in the beginning of the 1980s with a large availability of equipment, licences and patents of various degrees of sophistication, but with an unsufficient domestic technological base, embodied in the combination of a knowledge and managerial skills, which at its turn entails development policies emphasizing the adequacy of the educational system, and the upgrading of local research and the encouragement of local engineering companies.

What aggravated the situation, was the weakness of the monitoring system of technology transfer. Curiously enough the body responsible for supervising technology transfer was the Banque Centrale de Tunisie (B.C.T.), which tried to coordinate its approach, to a limited extent, with various directorates in the government administration.

The main concern of the B.C.T. was centered on the availability of foreign exchange, tax exemption, payments of royalties, but considerations about technological choices and technological adequacy to local environment were not of its scope of interest.

Thus the weakness of the monitoring system has led to the fragmentation between a sophisticated industrial sector which is not mastered and other sectors which, due to lack of integration, are marginalized.

### **3.5. The role of local engineering.**

Theoretically, a consulting and engineering design organization (CEDO) is situated at the crossroads between the selection, planning and execution of industrial projects, the development of subsequent acquisition of technology and in general, the integration of a large number of elements such as pre-investment studies, selection and acquisition of technology, purchase of machinery, supervision of plant construction and installation, training personnel for maintenance and repairs.

Besides this, CEDO can provide a vital link in the transfer of technology from the R/D laboratory to the production centers of the economy.

In Tunisia, the development of consulting and design engineering capability seems to have followed the pattern and stages of industrial growth. The Tunisian reliance on turn-key projects in the first development decade (1962-72) and the obvious neglect of local engineering, has confined local capabilities to construction of houses - buildings and roads - and to providing few services to industrial promoters.

In the second development decade, three major forms of local engineering and consultancy have been developed:

- a. Public institutions like (API, CNEI, CETIME, CTMCCV, Laboratoire Central) whose activities centered on feasibility studies, sectoral studies and general assistance to industries.
- b. CEDOs within big firms like (STEG, le Groupe Chimique et L'ETAP). The function of these intra-firm CEDOs consisted in reviewing feasibility studies, negotiating and managing contracts and only in very few cases did they engage in operational activities. The fact that these specialized CEDOs were linked to a big firm has been an excellent incentive for the diversification of their operations, to the point that some of them are providing services to the local market and not only to the mother-firm. The most significant examples are STEMI-STEG, TECI-GROUPE CHIMIQUE, TECI-CIMENTERIE.



- c. Private CEDOs (around 40 in Tunisie) are quite active in the construction sector, road building, agriculture and hydraulic sector. However, these companies have not attained the critical size and professional development to assume a dominant role in project planning and execution. In most areas of sophisticated technology (transport, energy, big dams building, etc...) these private CEDOs are quasi absent. This stems from the fact that private CEDOs have not been involved, from the beginning, in the industrial process, have not been fiscally encouraged. Moreover, the autonomy of each ministry in planning its projects; the absence of a science and technology content in the national development plans and the vertical integration of each sector of the economy into a foreign technology enclave; all contribute to the shunting of local private CEDOs.

Thus on the whole, the packaged form of acquisition of technology in Tunisia has been most unfavourable to local CEDOs. More potential for developing local engineering capabilities exists with the unpackaged forms.

### 3.6. Industrial technological information (ITI).

Exploitation of information in industrial activities has two main-objectives: day-to-day problem-solving and innovation. Adequate information can contribute to solve problems which arise constantly in the day-to-day running of any industrial enterprise. Innovation is much more difficult, since what is involved here is not so much information about the familiar, current operation of an enterprise, but about its possible future operation.

There are many problems in supplying industry with the industrial and technological informations it requires:

- a. industrial enterprises may be thinly spread over a large area;
- b. they may be infrastructural problems preventing ITI from being rapidly channeled to ultimate users;
- c. information storage may be inadequate or insufficient;
- d. recipients of ITI are not sufficiently motivated or are unable to identify their information needs or to adequately read the information

- received;
- e. average industrial enterprises may be content with conventional processes;
  - f. language difficulties may constitute another hindrance to acquire pertinent information and to disseminate it to those who need it.

On a national scale, many different organizations endeavour to meet the specific information requirements of industry. These organizations include government agencies, industrial associations, professional societies, research institutes, universities, libraries information and documentation centers, and data banks of all kinds.

In Tunisia, from 1962 to 1982, ITI has been neglected to a very large extent.

1. At the university level, information remained rudimentary. The Faculty of Science has a limited number of scientific items (in 1986, it had only 39.000) while world norm puts the necessary figures to more than 230.000.

2. Moreover, until 1980 research carried out in universities did not benefit from any government subsidies.

It is only in 1980 that the Ministry of higher education and scientific research adopted the formula of "contrat-programme" which allows scientific institutions to apply for research subsidies.

This new formula has helped in launching in 1980-81 some 94 research programs with a global cost of 386.995 DT in operating costs and 720.087 DT for the acquisition of scientific equipments.

The beneficiaries of these subsidies are (in 1981):

1. C.R.G.R. (Centre de Recherche du Génie Rural) - 4 research programs.
2. Ecole Nationale d'Ingénieurs de Tunis (ENIT) - 7 programs.
3. Ecole Nationale supérieure (ENS) - 5 programs.
4. Ecole Normale Supérieure de l'Enseignement Technique (E.N.S.E.T.) - 6 programs.
5. Faculté des Sciences de Tunis (F.S.T.) - 47 programs.
6. Faculté des Sciences et Techniques de Sfax (F.S.T.S.) - 7 programs.
7. Institut de Recherche Scientifique et Technique (I.R.S.T.) - 9 pro-

grams.

8. Institut National de la Recherche Agronomique de Tunisie (I.N.R.A.T.) - 2 programs.
9. Institut National de Recherche Forestière (I.N.R.F.) - 3 programs.
10. Institut Technologique d'Art, d'Architecture et d'Urbanisme (I.T.A.A.U.T.) - 1 program.

The remaining research contracts went to faculties of medicine, to social and human sciences and to programs of national research like solar energy (P.N.R.), phosphates (P.N.R. phosphates et saumures), study of the national movement (P.N.R. mouvement national), sea science (P.N.R. sciences de la mer) and water (P.N.R. Eau). (7)

3. The support structures like CNEI (1968), API (1972), AFI (1973, CEPEX (1973), did endeavour to collect and disseminate industrial and technological information. But these support structures developed piecemeal, without liaison between them, without coordination, in a somewhat haphazard fashion. This resulted in providing unnecessary duplication and overlapping in some spheres and inadequate facilities in others.

Moreover, these support structures concentrated their work more on industrial and marketing information than on technological information. They provided good by insufficient information about:

- a. local market conditions,
- b. industrial existing equipment,
- c. raw materials,
- d. infrastructure (availability and supply costs of energy, water, transportation, electric current, labour situation, training opportunities, wages, social insurances, etc...),
- e. industrial zones,
- f. industrial legislation,
- g. extension services and export promotion.

But on the whole, industrial information did not provide enough details about available technological alternatives, prices, capacities, spare-parts situation, maintenance and repair facilities.

In other words, support public organizations (like API, CNEI, etc...) concentrated their attention to "who's who" in industry. But technological

information as such remained missing.

By technological information we refer not only to information on technologies that are utilized in producing goods and services, but also to knowledge about new processes and products and to information related to the possibility of upgrading current technologies, and enhancing new linkages between science and technology and the industrial structure. Technological information refers also to ways of collecting R/D results and integrating them with the industrial development in order to produce new items, with new know-how.

There is no such ministry in Tunisia called Ministry of science and technology (MST), like the MST established in Korea in 1967. And until 1982, there is no such support structure which specializes in ITI, like the Korea Scientific and Technological Information Center (KORSTIC) or The Technology Information Dissemination Center which became operational in Korea in 1985, or the "Plan for industrial and technological information system" drawn up in 1980.

As for the other support structures of Tunisia, mainly concerned with promotion of exports like (CEPEX, OCT and SNE), they do have information on products available for export from Tunisia and the names of suppliers of these products. They do participate in international fairs and publicize Tunisian industrial products, but they still lack up-date marketing information through an international network and they are still reluctant to conduct research on overseas markets and analyse foreign buyer's potential requirements.

### **Conclusion.**

Until 1982, Tunisia has made big strides towards industrialization. But it remained short of building local scientific and technological competence. It lacked a requisite infrastructure of technological information, trained technical manpower in sufficient numbers, the critical mass in R/S personal, subsidies, and the adequate linkages between fundamental and applied sciences and between the later and industrial production and technological change.

For all these reasons industrial development has not been coupled with a gradual technology transformation in a creative, inventive and innovative environment. Problem solving capability and productivity remained limited. Science, technology and industry did not interact sufficiently. Technology transfer has often followed the tail and of technology innovations in industrialized countries. Indigenous technologies had little opportunity or incentives to develop. Technological information has been to a certain extent shunned.

## Chapter IV

**TECHNOLOGICAL SITUATION IN TUNISIA  
1982-1988.****New measures, missing elements and possible fields of  
cooperations with UNIDO.****4.1. Enhancing local technological competence.**

Tunisian policy-makers became conscious as soon as 1980 of the shortcomings mentioned in the previous chapter and embarked on a new policy with the explicit purpose of enhancing Tunisian technological capabilities.

Many endogenous and exogenous factors provided the stimulus for this new orientation.

- a. Changed conditions in Tunisian economy in the last years of the 1970s and the beginning of the 1980s: development of foreign indebtedness aggravation of budgetary deficits.
- b. The increasing cost of technology imports which amounted to 80 million TD for the year 1980, i.e. 1/6th of the total imports of capital goods  
The fact that Tunisia imposed heavy taxes on royalty payments (15 to 27%) had led to a declining trend in royalty payments. But technology suppliers have used other means than royalty payments (e.g. over-

pricing of inputs) to circumvent government fiscal regulations.

- c. The absence of a technological balance of payments (balance de paiements technologiques) and the difficulty to regulate intangible technology imports (9)
- d. The absence of an official body (other than the Banque Nationale de Tunisie B.C.T.) responsible for supervising technology transfer and keen to coordinate its approach with other competent bodies in the government administration:
- d. The absence of a restrictive policy on transfer of technology accompanied by a similar policy towards foreign direct investment.
- f. The absence of a competent support structure for ITI gathering, processing and dissemination.

The combination of these negative factors has awakened a new awareness of the necessity of a new technology approach.

But there were other elements which pushed in the same direction. The most important is the development of human resources since the independence.

As a matter of fact, the rate of literacy jumped from 16% to 65% in 1986, the rate of enrolment in elementary school went up from 66 to 100%, in secondary schools from 12 to 30%, in post-secondary establishments from 1 to 5%.

Another factor relates to the increase in the share of equipments in total manufactured goods which exceeds 8% (against 17% in Spain and 20% in Yugoslavia) although the share of equipments in total exports remains very low (2% against 20% in Spain and 22% in Korea).

Although Tunisian officials are proud of these advances, it is nevertheless worth noticing that:

- a. R/D remain marginal since less than 0,5% of total active population are engaged in R/D activities against 5%\* in developed countries. Financial allocation of R/D is another constraint and represents a mere 0,2% against an average of 2% of GNP in the developed countries.

- b. Talented scientific workers is another major weakness of the Tunisian S & T sector. The capacity of professional formation centers is estimated to 40.000/year while needs of technical workers seem to exceed 80.000 according to government figures.

#### **4.2. New measures: missing elements and possible fields of cooperation with UNIDO.**

All these factors have prompted the government to undertake a dual task of trying to correct the existing imbalances and looking into the future with renewed dynamism in order to build up local science and technological competence and self-reliance.

To achieve these objectives, the Tunisian government has taken a series of concrete measures the implementation of which requires UNIDO's assistance.

We shall in this section review the most significant measures, pinpoint to possible missing elements and indicate possible fields of cooperation with international organizations, mainly UNIDO.

##### **4.2.1. Technology policy.**

Under the pressure of circumstances, Tunisian polyc-makers began to feel the necessity to set up a body to assess and monitor technology transfer and its implications for Tunisia, to review and reorient the existing institutions, groups and support structures or to create new ones, and to suggest industrial technology promotion policies and methods of implementation.

Thus, by decree n° 84-777 of 6 July 1984, a national commission for technology mastery and the promotion of industrial technology (Commission nationale pour la maîtrise et la promotion de la technologie industrielle). It held its constituting assembly on 31 August 1984.



Since that time the Commission held several working sessions and by September 1985 it published its first preliminary report in french entitled: *"Elements d'une politique pour la maîtrise de la technologie"* (49 p.) drawing up the new technology policy, identifying and defining clearly the technology tasks to be undertaken within the country and the priority areas. The national priorities are: industrial engineering, food industries, mechanical and electrical industries, informatics and electronics, construction materials industries, chemical industries, textile and clothing industries and services (see Annexes: Composition of National Commission).

Integration, monitoring and review of technology appear to be the main task of this newly formed body. Unfortunately, at the time of our mission in Tunisia - January 1988 - there was no indication that this Commission was operational.

The second novelty has been the creation within the D.G.I. (Direction Générale de l'Industrie) in the Ministry of Economy, of a new Directorate for the mastery of technology and industrial transformation (Direction de la maîtrise de la technologie et des mutations industrielles). This new directorate has only been set up in 1987. Its proposed activity is dual:

- a. Control of technology transfer and creation of a "Commission d'agrément des contrats d'achat de technologies" including representation from the B.C.T., A.P.I., I.N.N.O.R.P.I. and the technical centers.
- b. Promotion of technological innovations and industrial transformation.

In summary, this new Directorate seems to highlight the necessity of a framework for national action:

- a. based on technical and socio-economic assessment of imported technologies,
- b. integrating technology systems with industrial and other systems,
- c. upgrading domestic technologies,
- d. introducing innovative skill profiles,
- e. forward-looking and adjusting to rapid technology change (10).

When I visited in January 1988, Mr Afif Chelbi the newly nominated

director of this new body, was just in the phase of furnishing the new offices and staffing them. This is to say that no assessment is possible at this stage.

#### 4.2.2. Strengthening of science and technology infrastructure.

The weakness of existing S/T research infrastructure is recognized by most technological institutes, their relevance, effectiveness and interaction have to be reassessed. Among existing institutions, interlinkages and transdisciplinary, transsectoral links have to be strengthened. New technical institutes have to be created and a few centers of excellence will be set up. Relevance of research priorities to national needs appear to be widely accepted.

These seem to be the new objectives fixed by the newly appointed director of Scientific Research, Mr Baccar (within the Ministry of Higher Education and Scientific Research).

This implies the strengthening of the existing science and technology infrastructure and the development of new infrastructure.

##### - Existing infrastructure -

###### a. Science faculties.

Tunis: +/- 4.500 students.

Sfax: +/- 1.500 students.

Monastir: +/- 1.500 students.

###### b. Engineering schools.

1. E.N.I.T. (Tunis): 1.800 students.

2. E.N.I.G. (Gabes): +/- 500 students.

3. E.N.I.S. (Sfax): +/- 400 students.

4. E.N.I.M. (Monastir): just established.

ENIT: civil engineering, electro-mecanics, mecanics.

ENIG: chemistry, mining, civil engineering.

ENIS: food industries, mechanics, electricians, some electronics engineering.

ENIM: energy.

c. Ecole Normale d'Enseignement Technique (ENSET).

It forms students in various aspects of technical education, has departments of applied research (R/D) and has inaugurated a tradition of linkages with the industrial sector.

d. Ecole Normale Supérieure de Bizerte.

Smaller in size, its research activities are still embryonic.

e. Institut National de Recherche Scientifique et Technologique.

Set up in 1980 at Suleiman, it became operational only in 1984. Several constraints related to financial problems and insufficient equipments (50% of these latter are out of order in 1987) and lack of competent engineers in sufficient number, limit its effectiveness.

f. High Technical Schools.

In Tunis, Gabes, Gafsa, Monastir and Sfax.

Other projects are either decided:

1. Centre de Compostage which will probably be financed by the EEC, is to be set up by November 1988;

or in the pipeline, waiting for government approval and financing:

1. Research center of immunology.
2. Research center of pentonite (clay).
3. A center for maintenance and repair of scientific equipments.
5. Research center on teledetection.

These five proposed projects are shelved for the time being because of lack of funding. The collaboration of international organisations, mainly UNIDO, is most welcome.

All these centers and schools suffer from several constraints which make them less effective:

- a. Lack of well-equipped laboratories.
- b. Lack of linkages with industries.
- c. Lack of sufficient funding.

### 4.2.3. Industry and technology information in Tunisia.

- API (1987).

With the merger of API, CNEI and CETIME and the establishing of the Industrial Promotion Agency known by its abbreviation API, by the law 87-50 of 2 August 1987, Tunisian government has recognized the importance of an accurate, adequate and timely ITI information for supporting decision-making.

The move is indicative of a new approach which is perceptible in Tunisia aiming at the centralization of industrial information in order to facilitate collection, storage and retrieval of information, as quickly as possible and to set up a "center of excellence" in this field.

At the time of my visit to Tunisia, the Director General, Mr Ali Hedda, was just nominated and was in the phase of completing the staffing of API. 7 directors were appointed in charge of 7 directorates: Assistance and follow-up (Mohamed Chaieb), External Relations (Mounir Zalila), Administration and Finance (Mohamed Khelifa), Sub-contracting Exchange (Fawzi Dhemaied), Study and Project Identification (Samir Mzoyghi), Legal Affairs (Brahim Sabri), Formation and Documentation (Abdelfattah Jemal).

It clearly appears that technology information has been largely disregarded, since the accent has been put mainly on industrial information (industrial approvals, demand-supply gap, economical size of production, availability of raw materials, availability of training facilities, information on products available for export, details on earlier collaborations, etc...)

My interviewees were very conscious of these limitations and are keen to correct this bias in favor of industry information. But they ascribed this bias to the fact that to collect, collate, and store all information relevant to industry and technology would be a prohibitively costly solution, that this would require updating of databases, new equipment and the assiduous cooperation of specialized institutions like UNIDO and within UNIDO, the assistance of INTIB and TIES. Moreover, they think that it is futile to collect, store and retrieve technology information, if the categories of end-users are not well defined, and adequate networking

facilities are not available; and if particular divisions in the government are reluctant to allow flow of information to the public. Moreover, the magnitude of technology information implies that it should be available on magnetic storage media which means the purchase of new computers and the constitution of new databases. A UNIDO expert, Mr Decornet, is studying this particular problem.

Thus API is already engaged in setting up an industrial information system in the form of a centralized database which it wants - in the near futur - to be integrated through a multi-node computer communication network with widely spread dissemination points through a large number of interactive terminals being set up around the country.

As for the establishment of an efficient system and analysis of relevant technological information, including availability, alternatives, costs, appropriateness, regulations, transfers, etc., the Agency is looking for international cooperation.

In this context, precise requests have been formulated and addressed to international specialized organizations, like UNIDO.

1. UNIDO could assist in "industrial partnership" mainly in micro-partnership (on a sector or country level).
2. UNIDO could assist in the process of evaluation of industrial projects submitted by various promotors, mainly in examining the technology component of the project.
3. UNIDO could react to projects involving one or two Maghreb countries, by evaluating on-going projects like the on-going Tunisian-Moroccan projects of:
  - a. Unité de machines à travailler le bois (in Tunisia)
  - b. Unité de machines à fabriquer le métal (Morocco).

or assisting in the feasibility studies of projects which are in pipeline like the Tunisian-Algerian projects:

- a. Unité de ciment blanc.
- b. Moteur diesel: basse gamme.
- c. Unité de lithopone.
- d. Briquetterie.
- e. Unité de charpentes métalliques.

Other requests seem to concern more specifically INTIB and TIES. Presently information available in Tunisia, is to a large extent, bibliographic. It includes at least 8 databases, some of which are completed and the other are under completion:

- a. Base données études industrielles.
- b. Base données gestion, hommes et bâtiments industriels.
- c. Base de partenariat international.
- d. Base bourse de sous-traitance (sub-contracting exchange).
- e. Base agréments industriels et octroi avantages fiscaux.
- f. Base de données des services de l'API.
- g. Base de données du fichier national.
- h. Base documentaire.

The criteria which have been used in compiling the information are outdated and the whole process of storage should be modernized. This modernization implies better technology and probably more active technical assistance.

So there is an obvious need for both selectivity of information and proper methods of collection, handling and dissemination. Hence the importance that API attaches to its cooperation with INTIB and TIES programs, understood not only as industrial inquiry services but also as positive dissemination of industrial and technological information services. That's why API is looking forward to benefit from the technology database which is to be set up within INTIB.

In this regard, INTIB and TIES are requested firstly to send to API advisory and evaluating missions, to offer training opportunities in-house, or collaborate in training courses in Tunisia itself.

Secondly API wants to be considered as a formal national focal point in INTIB's strategy of setting up specialized nodes in various developing countries. This implies a two-way service system: Tunisia would provide up-dated information on its production system, its export capabilities and would answer directly inquiries from potential importers of Tunisian products and potential suppliers of goods and technology; while INTIB would let Tunisia benefit from its "Industrial Inquiry Exchange System" and contribute in strengthening Tunisian industrial and

technology information activities in order to make them more effective. This could be done through technical assistance, advisory services, training workshops and supply of compatible PC's, some mini-micro software, and some data diskettes of INTIB and LINK.

As focal point, API would like to have on-line connections with INTIB. But it is felt in Tunisia that INTIB should not charge a fee for access to its network. At its turn, API would disseminate the information to its local network, mainly in small and medium scale industries.

Furthermore, as "centre of excellence", API could play a far more active role within the region, at least by:

- a. Taking the lead in developing at the level of the Maghreb countries the use of A.C.T. methodology (Analyse complexité technologique) by training personnel from Algeria and Morocco in this field. Mr Dallaji (who benefitted from UNIDO assistance since 1979) and his team have acquired a large experience in ACT methodology and are now in a position to help other countries, with UNIDO's assistance.
- b. Playing a major role in Regional Arab sub-contracting exchange. For the time being 6 Arab states are involved in this project. (Tunisia, Algeria, Morocco, Egypt, Jordan and Irak). The programme which should be extended beyond 1988. In this perspective, UNIDO could assist Tunisia in setting up a telematic network for regional subcontracting information.

#### **- Other Support Structures.**

In this section we shall single out some other support structures which deserve a special mention, given their specific contribution to science and technology policy in Tunisia, and their specific demands for UNIDO's assistance. These support structures could serve the following functions in UNIDO's strategy:

- a. as a referral point,
- b. as a source of information,
- c. they may have on-line connections with programmes like INTIB.

#### **1. Centre Technique des Industries Mécaniques et Electriques (CETIME).**

CETIME is a publicly owned institution with a trade and industrial

character created by law n°82-45 of 25 May 1982. Its organisation and operation are defined by decree n°82-1282 of 18 september 1982.

CETIME is a centre at the service of electro-mecanical industries which total +/- 500. It employs some 126 persons of which 26 high qualified engineers, 23 high qualified technicians and 77 technicians. Although financed by the Tunisian government, CETIME has benefitted from World Bank advisory mission and UNIDO (SI/TUN/86/801), assisted in preparation and development of protoyping and manufacturing process of capital good. A pipeline project is being formulated by UNIDO and CETIME in the field of micro-electronics (development of micro-electronic industry /CETIME).

As of 1987, CETIME has merged with API, so probably it will be re-organized within the new structure.

But whatever its new statute will be, CETIME deserves a special attention because it is directly involved in the industrial and technological process. But some problems emerged lately, which if they remain unresolved, might hinder the smooth operation of the Center:

- a. lack of a didactic laboratory to test the quality of the products,
- b. lack of adequate equipments in some laboratories,
- c. lack of sufficient training of technicians.

Here again UNIDO's assistance is requested. Not only to solve current problems but also to contribute to the development of new projects like the setting up of the "Atelier de fabrication assistée" in Sousse. Such a cooperation is however pendent on the reorganization of API-CETIME relations.

## **2. Centre National de l'Informatique, Tunis (CNI).**

CNI is a national institution set up in 1976 under the supervision of the Prime Minister's Office with the following tasks:

- Develop needed capacibilities (and capacity) for data processing for the Prime Minister's Office.
- Acquisition of computers for different public offices.
- Development of software for public and private clients.
- Training and know-how development including organizing seminars (at national and international levels).



- Arabization (development was undertaken with assistance from IBI and DIELI).
- CNI has developed the "HAMIM" system for storage and retrieval of Arabic documents based on a BULMITRA 225 computer. I/O system with biligual capability (Arabic and Latin) Data base applications in both languages uses TRIBUT the Latin data base management system. Development of terminal and printers based on SEMS hardware (now integrated into Bull). Bilingual with Arabic capability of dialogue using ASMO standards CODAR-U Code (8-bit);
- It is developing jointly with Bull a new documentation system based on MISTRAL that accepts Arabic characters and texts to be introduced soon into the market. Serious Arabic word processing and text treatment is still manual, but it is slowly being developed into semi-automatic data entry based on choice of most frequent words.
- Also work with Tunis University for developing programming languages such as BASIC or PASCAL.
- There were about 600 micros in Tunisia in 1984, primarily, used by small businesses (accounting, payroll, store inventory etc...) and high schools for computer-aided instruction. There was a need to develop software for education in Arabic.
- The activities of CNI include computerizing the different public services including creating a file of records for "courts" and "tribunals", budgeting and finance accounting for the Ministry of Finance, Civil services personnel management and hospital management.
- The CNI employs 250 people, 150 of them are engineers or informaticians, including some with intensive experience in France. The Centre expressed the need for high level training including "state of the art" seminars in informatics, artificial intelligence, etc... The centre is ready to host regional activities and to serve as a nodal centre in informatics with local and foreign assistance.
- CNI has two computer centres:
  1. Inter-administration EDP centre
    - Configuration:
    - BULL, DPS 8/46 - DUAL with 4 million bytes main memory
    - 2 Front-End-Processors with over 100 terminals connected to it as well as
    - 1 Mini 6./43 computer installed at the Ministry of Justice.
  2. Direction de Développement EDP centre.
    - Configuration:
    - BULL MITRA 225 with 512 kbytes main memory

4 screen terminals.

### **3. Institut National de Recherche Scientifique et Technique (INRST).**

This institute was reorganized by decree n°83-1037 of 4 November 1983. It is a public institution placed under the supervision of the Ministry of Education and Scientific Research. Theoretically, the institute is in charge of every work of research and experimentation in the field of science and technology. To achieve these objectives, the INRST has seven centres which carry out the research each in its specific field. UNIDO is in the process of formulating with the INRST a project in the field of development of micro-electronics which is listed in the country programme.

As a multi-branch, multi-purpose industrial and technological research institute, the INRST could play a major role in performing the following objectives:

- a. The improvement of existing industries by providing a variety of technical services which may include technical information, testing of materials and products, maximizing equipment capabilities, improving product quality, reducing production costs, etc.
- b. The assessment of technological information on processes, equipment and products, training industry personnel in new technologies.
- c. The adaptation of technology to local conditions.
- d. The development of new technologies by R & D activities, etc...

But it seems that INRST is handicapped by several constraints : lack of massive financial support, lack of industrial experience of INRST staff, lack of know-how information, limited cooperation with other support structures, lack of a large market which is willing to pay for INRST services, etc...

Maybe the managers of INRST could benefit from other countries experience in this field. UNIDO could arrange for an exchange of visits to:

1. The Korean Advanced Institute of Science and Technology (KAIST).
2. Instituto de Pesquisas Tecnológicas (IPT) in Brasil.
3. Instituto de Investigaciones Tecnológicas (INTEC-CHILE).
4. Marmara Scientific and Industrial Research Institute in Turkey.
5. Technological Institute in India (TII).

Some of these institutes, like the TII could offer valuable assistance to the INRST in Tunisia. UNIDO could easily assist by pushing for twinning-agreements between Tunisia and other countries. Networking of technological institutions operating in the Arab region could be another UNIDO project. Such networks would improve national capabilities through regional cooperation, join forces, pool resources and share informations and results in order to maximize the inputs into the research. Although the creation of regional umbrella organizations to stimulate and coordinate joint projects of regional interest is the responsibility of regional governments, UNIDO could nevertheless take the initiative of twinning-agreements involving two or three countries.

#### **4. Laboratoire Central (L.C.).**

The Central Laboratory has been traditionally linked to the Ministry of Economy but it will soon become a public institution, with financial and administrative autonomy. It employs some 100 engineers and technicians and its tasks have been confined to testing and inspecting the quality of products.

At the time of my visit, the LC was in the phase of restructuring. The newly appointed director, Mr Ammar Nouri was just examining ways and means of modernizing the laboratories.

To his mind, the LC could play a major role in all inspection and test forms. Although total quality control could be implemented within the various enterprises in order to eliminate waste, cut inventories, improve customer satisfaction, enhance profitability, the LC should examine whether the marketable products are fit for purpose. Here lies the idea of conformance to specification, reliability of the product and customer satisfaction. It is not the role of the LC to take over the task of the engineering departments in industry. Its role is to monitor quality performance; eliminate possible assignable causes of variation, identify and control random variations and see whether the product is safe, and conforms with accepted standards.

To this end, the Laboratoire Central should perform the following functions : laboratory acceptance testing, inspection and test, inspection and test set-up, inspection and test materials, products quality audits, review of inspection and test results, data processing of inspection and

test reports.

As one could imagine, these operations require well-equipped laboratories, up-to-date calibration and measurement equipment and adequate funding.

As for the laboratories, testing is mainly centered on the following items and fields:

- a. products,
- b. beverage,
- c. bacteriology,
- d. metals,
- e. oil products,
- f. gold and precious metals,
- g. detergents and cosmetics,
- h. textiles, paper, plastics,
- i. mechanical and electrical appliances,
- j. building materials,
- k. calibration and measurement,
- l. explosives.

Obviously, the LC operations cover a variety of the most usual products. But constraints like obsolete equipments (50% of them are out of work) restrict drastically the efficiency of this support structure.

No one can be expected to turn out a good job with unsatisfactory equipment i.g. tools & machines. This does not mean that every operator must have equipment of the highest quality, but it does mean that the equipment provided must be adequate to produce the best testing and inspection.

Hence, the formal request made by the new director and addressed to UNIDO in order to commission a technical audit expert for at least 3 months in order to make concrete proposals to reorganize the whole Central Laboratory (renewal of equipments, modernization of management techniques, training, etc...)

Moreover, since the Central Laboratory's Library is so poor, request is made to up-date its documentation unit.

### **5. Institut National de la Normalisation et de la Propriété Industrielle (INNORPI).**

Although it was set up very recently in 1982 (Annexure) and became operational in 1983, INNORPI employs +/- 100 engineers and technicians. It benefitted from a grant from the World Bank. It is under the supervision of the Ministry of Economy. And since 1982 it already adopted more than 2.000 international norms.

Before 1982, there was a small office of standardization operating since 1936 but its role was indeed very limited. That is why CNEI has set up, with UNIDO's assistance, a National Commission for standardization (Commission Nationale de la Normalisation) whose operations very often overlapped with the work of the Central Laboratory, mainly in testing and inspection.

The INNORPI has the following tasks:

1. Analysis, testing and quality control (overlapping with the Central Laboratory).
2. Certification.
3. Product standardization.
4. Metrology.

These three latter tasks have been subjects of active policy concern in business and government circles. Standards are believed to have significant bearing upon the development, the diffusion of new products and technologies, structure of markets and performance of industries.

So it is not surprising that issues concerning "standardization, metrology and quality control", although quite neglected, have emerged in the beginning of the 1980s as a focus of special attention on the part of Tunisian policy-makers. The setting up of a central support structure like INNORPI was meant to promote both the economic welfare of domestic consumers and the international competitiveness and reliability of Tunisian products abroad in order to maximize the benefits.

INNORPI became very soon member of I.S.O. (International Standard Organization), the International Electro-Technico Committee, the CODEX Alimentarius Commission, the CEI (Commission Electronique Internationale), the OIML (Organisation Internationale de Métrologie Légale), ORAN (Organisation Régionale Africaine de Normalisation), the Arab

**Organization for Metrology and Standardization.** It actively participates in the International Laboratory Accreditation Conference and has various contacts with S.A.S.O. in Saudi Arabia and the Iraqi Organization for Metrology and Quality Control.

But unlike the British Standard Institute and the French A.F.N.O.R. which dispose of their own laboratories, INNORPI is not yet well equipped.

Well equipped laboratories are of paramount importance for quality control and metrology. These two things are nevertheless the least developed within INNORPI and deserve a special mention, mainly metrology.

Precise standards of measurement - not only of dimensions but of weight, temperature, pressure, voltage, current and many other quantities are fundamental to Tunisian industry which not only transforms local raw materials but also assembles cars, produces parts or electric components, which might be purchased by developed or developing countries. This means that every measuring device must be calibrated in order to cater for the needs of potential buyers.

One way this uniformity is achieved throughout the country and the world at large is through a calibration chain which can be traced back to a single set of international standards. Tunisia has its own national set of standards. But these should be regularly calibrated against international standards to ensure that they all agree with each other.

In general, food industries in Tunisia has a pretty good idea of the accuracy of its instrumentation. Unfortunately this is not true of the electrical, mechanical and electronics industries.

One possible reason for this is lack of good measurement laboratories and the other lies in the insufficiency of trained technicians and engineers.

The task of setting up an effective calibration system in Tunisia is highly demanding, and it is not within the reach of small and medium-sized companies. So, it is well worth considering the reinforcement within INNORPI of the Metrology branch which is still in its prime infancy and possibly setting-up within INNORPI a sort of a National Measurement Accreditation Service.

Maintenance of machine tools in Tunisian industries is often overlooked. Machines are often kept running in factories for ten years without a check of their accuracy, which is deteriorating over time. This affects the accuracy of work and the quality of the product. These deficiencies have been recognized by the "Plan National de Promotion de l'Industrie Tunisienne" adopted by the Council of Ministers in 1985.

The calibration, metrology, quality control and standardization are closely linked to each other. The newly appointed Director of INNORPI, who is very conscious of this interrelationship. That is why he is requesting a UNIDO advisory mission which would prepare a technical study and provide advice on re-organization, purchase of instruments and setting-up of more specialized laboratories. At Tunisian level, there is an urgent need to coordinate the activities of INNORPI and the Central Laboratories. On the other hand, as requested, INNORPI could delegate some of its testing activities to other technical institutes.

INNORPI seems to have succeeded in few years in building a good infrastructure. Time has come to improve the efficiency of its work by better coordination with other laboratories and technical institutes, better communication with the industrial sector and a modernization of its existing laboratories and the creation of new ones of higher specification. UNIDO could assist in all these fields thus contributing in building up indigenous scientific and technological competence and self-reliance. UNIDO guidance is needed in formulating operational policy and implementation programmes related to production and quality, to effective technical co-ordination of standardization and management, and technical information on regulations, certification schemes and test methods. The assistance of UNIDO can be in the form of: audit reports, expertise, training and formation.

INNORPI is confronted with efficient staff problems, data updatation, and insufficiency of financial resources. That's why UNIDO should press for more cooperation in order to minimize the negative effects of insufficient information and recommend effective coordination in Tunisia between INNORPI and other support institutions like LC, API, CNEI, other industrial laboratories. This would help avoiding duplication, overlapping and wasting of scarce financial resources.

## CONCLUSION.

For more than 20 years, Tunisian officials were mainly concerned with technology transfer and all the problems deriving from technology acquisition. Little focus has been placed on technological competence, self-reliance and generation. It seems that Tunisian polic-makers have become more aware that technology transfer and technology generation should not be looked upon as successive steps but as symbiotic and interactive. That is why they are setting-up: a) an institutional structure within the Ministry of Economy, in charge of technological mastery and industrial change, b) various support structures like (API, INNORPI, INRST, etc...) and introducing some modifications in the operations and tasks of existing support structures (like the Central Laboratory, CNI, etc...)

Special attention is also given to some priority areas like standardization, metrology and quality control.

It would be hazardous to assert that Tunisia is a success story in the technological field. But it is certain that it has accumulated a large experience in many areas which predispose this small country and its smart people to be a focal point not only in the Maghreb but also in the Arab world and in the African continent.

Still there is an urgent need for a massive effort to mobilize in-country talent to bring it to bear on the problems deriving from old-fashioned technological practices and to search for technological excellence. In this struggle UNIDO contribution is indispensable.

Bichara KHADER  
March 1988.



## NOTES.

- (1) Harold NELSON: *Tunisia, a country study*, American University, Washington D.C., 1979, p. 122.
- (2) Annette BINNENDIJK: "Assessment of Tunisia's development efforts and AID's contribution", Bureau of Development Support, Agency for International Development, Washington D.C., 1980, p. 28.
- (3) Quoted by *Oil and Gaz Directory*, Paris, 1985, p. 428.
- (4) Hassine DIMASSI: "La crise économique de la Tunisie, Crise de régulation", in *Maghreb-Machrek*, n° 103, p. 60.
- (5) For further development see: Regional and Country Studies Branch, Division for Industrial States: "Systems of incentives for investments in manufacturing industry", UNIDO, December 1985.
- (6) Ministère de l'Industrie et du Commerce: *VII<sup>e</sup> Plan de développement économique et social (1987-1991)*, mars 1987, p. 1.
- (7) See Ministère de l'Enseignement supérieur et de la Recherche Scientifique: *La recherche en cours: années 1980-81*, Tunis, no date, 154 p.
- (8) (and 100 MTD in 1986) *Introduction aux problèmes relatifs aux achats de technologie en Tunisie*, Tunis, 1987, p. 3.
- (9) Columbia for example has set up a Royalties Committee as soon as in 1967.
- (10) See note: Direction Générale de l'Industrie: *Direction Générale de la maîtrise de la technologie et des mutations industrielles, Exposé des motifs et définition du champ d'activité*, mai 1987, 4 p.

## ANNEXES.

Table 1 : BASIC COMPARISONS. (\*)

	Population 1979	Annual Average Growth Rate of Pop.—%		Adult Literacy Rate—%		Life Expectancy	
		1960-70	1970-79	1960	1976	1960	1979
		Algeria	18.2 Million	2.8	3.3	10	35
Tunisia	6.2 Million	1.9	2.1	16	62	48	58

  

	Urban Pop. As % of Total Pop.		Labor Force in (%)					
			Agriculture		Industry		Services	
	1960	1980	1960	1979	1960	1979	1960	1979
Alg.	30	44	67	32*	12	24	21	44
Tun.	36	52	56	35	18	32	26	33

(Source: Compiled from the Statistical Appendix of the World Bank's *World Development Report 1981*, pp. 134-185.)

\* According to Algerian government data, this percentage had dropped to 22 per cent by 1981. See *US Agricultural Attache Report AG-2001*, American Embassy, Rabat, May 3, 1982. Ed.

Table 2 : Structure and growth of production. \*\*

GDP—Millions of \$	Sectoral Composition of GDP—in %									
			Agriculture		Industry		Manufac- turing		Services	
	1960	1979	1960	1979	1960	1979	1960	1979	1960	1979
Algeria	2,800	29,810	21	7	33	58	10	11	46	35
Tunisia	770	6,070	24	16	18	33	8	12	58	51

  

	Average Annual Growth Rate of Production—in %									
	GDP		Agriculture		Industry		Manufac- turing		Services	
	1960- 70	1970- 79	1960- 70	1970- 79	1960- 70	1970- 79	1960- 70	1970- 79	1960- 70	1970- 79
Algeria	4.6	5.8	0.4	0.6	12.9	6.5	7.7	8.8	-3.0	6.1
Tunisia	4.7	7.6	2.0	5.1	8.2	8.6	7.8	10.6	4.5	8.1

(Source: *World Bank Development Report, 1981*, pp. 137 & 139.)

**Table 3 : Merchandise exports. Percentage share of exports (%)**

	Fuels, Minerals & Metals		Other Primary Commod- ities		Textiles & Clothing		Machinery & Transport Equipment		Other Manu- factures	
	1960	1979	1960	1979	1960	1979	1960	1979	1960	1979
Algeria	12	97	81	2	0	0	1	0	6	1
Tunisia	24	44	66	18	1	20	1	3	8	15

(Source: World Bank, *World Development Report, 1981*, p. 151.)**Table 4 : Growth and value of exports.**

	Value of Manufactured Exports— Millions \$		Average Annual Growth Rate of Exports—Volume		Terms of Trade (1975 = 100)	
	1962	1978	1960-1970	1970-1979	1960	1979
Algeria	—	35	4.5	0.0	39	113
Tunisia	10	429	4.2	4.8	64	81

(Source: *World Development Report, 1981*, pp. 149 & 157.)**Table 5 : Tunisia balance of trade, 1983-86 (in \$ millions)**

	1983	1984	1985	1986*
Exports (FOB)	1 492	1 777	1 720	1 400
Imports (FOB)	- 2 559	- 2 397	- 2 570	- 2 400
Trade deficit	- 1 177	- 1 116	- 610	- 1 000
Services and transport	484	362	270	300
Current account	- 693	- 754	- 540	- 700

\* estimation

Source: IMF, *International Financial Statistics*, April 1986.

Table 6: Gross Fixed Capital Formation by Branch of Activity

	Investment in TD million			% Distribution		
	1981	1982	1983	1981	1982	1983
Agriculture & fisheries	178.2	202.5	236.8	13.8	13.2	14.6
Electricity	38.9	43.2	80.0	2.6	2.8	4.9
Water	56.5	66.0	54.3	4.4	4.3	3.3
Oil products	203.1	267.0	150.0	15.7	17.3	9.2
Mineral exploitation	23.4	26.3	29.0	1.8	1.7	1.8
Manuf. industries	216.0	267.7	46.3	16.7	17.4	21.3
Construction & P.W.	12.0	13.0	14.0	0.9	0.8	0.9
Tourism	33.0	47.8	62.0	2.6	3.1	3.8
Transport & Telecomm.	235.4	249.7	247.2	18.3	16.2	15.2
Housing	198.0	236.0	265.0	15.3	15.3	16.3
Other services	101.5	120.8	139.4	7.9	7.9	8.7
<b>Total</b>	<b>1,290.0</b>	<b>1,540.0</b>	<b>1,625.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Central Bank of Tunisia

Table 7: Planned Investment Spending, 1986-91  
(TD million)

	1986	1987	1988	1989	1990	1991	Total plan
Agriculture and fisheries	345	360	390	430	470	500	2,150
Non-manufacturing industry, of which	281	285	305	329	403	428	1,750
Hydrocarbons	141	145	150	159	172	174	800
Manufacturing industry, of which	265	245	309	375	450	521	1,900
Agro-industry	30	30	40	50	60	70	250
Construction	64	56	80	80	80	84	300
Mechanical and electrical	75	52	80	110	140	168	550
Services, of which	667	725	741	766	797	671	3,900
Transport	208	210	230	280	285	315	1,300
Housing	375	436	416	381	372	386	2,000
Other	147	180	180	200	220	240	1,000
<b>Total</b>	<b>1,726</b>	<b>1,775</b>	<b>1,826</b>	<b>2,100</b>	<b>2,340</b>	<b>2,560</b>	<b>16,700</b>

Exchange rate: \$1 = TD 0.6768 (1986)

Source: Planning & Finance Ministry, Tunis

Table 8: Balance of Payments Projections, 1986-91  
(TD million)

	1986	1987	1988	1989	1990	1991	Average % growth
Goods and services exports,							
of which	2,160	2,525	2,795	3,075	3,340	3,700	+12
Energy	295	275	280	223	138	138	-11
Tourism	400	470	540	610	685	770	+15
Phosphates and derivatives	310	370	390	447	478	500	+12
Goods and services imports,							
of which	2,750	3,005	3,245	3,505	3,740	4,040	+8
Equipment goods	475	415	465	520	570	605	+3
Raw materials and semi-finished goods	860	1,020	1,110	1,215	1,325	1,455	+12
Energy	180	185	200	215	175	220	-3
Balance	-590	-480	-458	-430	-400	-340	—
Transfers (net)	-60	-80	-80	-90	-100	-100	—
Current account	-650	-560	-538	-520	-500	-440	—

Exchange rate: \$1 = TD0.8768 (1986)

Source: Planning & Finance Ministry, Tunis

Table 9: Capital Account Projections, 1986-91

	1986	1987	1988	1989	1990	1991
Capital inflows, of which	870	1,045	1,105	1,125	1,155	1,170
Grants	30	20	20	20	20	20
Direct investment	155	145	165	170	180	190
Loans (long-term)	320	440	480	495	515	520
Loans (medium-term)	365	440	440	440	440	440
Capital outflows, of which	410	515	525	545	595	610
Debt service (capital)	385	490	500	525	575	590
Investments	25	25	25	20	20	20
Balance	460	530	580	580	560	560
Current account	-650	-560	-530	-520	-500	-440
Overall balance	-190	-30	50	60	60	120

Exchange rate: \$1 = TD0.8768 (1986)

Source: Planning & Finance Ministry, Tunis

## COMPOSITION DE LA COMMISSION NATIONALE.

### 1. Le Bureau.

M. A. SOUISSI	Président
S. RABEH	Rapporteur Général
Mme N. ARIGUIB	Vice-Président
M. A. MARRAKCHI	-
S. BAHROUN	-
R. MLAYAH	-
E. MAKHLOUF	-

Le secrétariat de la Commission a été assuré par l'API.

### 2. Les animateurs.

#### THEME

A. CHELBI	Transfert de la Technologie en Tunisie
A. BELGAID	L'innovation Technologique en Tunisie
Mme N. ABDELJAOUED	L'information Technologique en Tunisie
H. KHELIL	Ressources humaines et Technologie
A. FRIAA	Recherche-Développement et relations Universités-Industries
S. RABEH	La Technologie et les options socio- économiques du VI Plan

### 3. Les Sous-Commissions.

<u>Secteur</u>	<u>President</u>	<u>Rapporteur</u>
Engineering Industriel	M. ZIDI	R. BOUCHAALA
Chimie	A. KHALFALLAH	H. TURKI/M. FRAD
I M E	M. DALLAGI	N. CHAOUCH
Agro-Alimentaire	A. BEN AYED	S. MTIBAA/R. BEN BRAHIM
Matériaux de construction	R. CHAMARI	F. KCHOUK
Services	B.S. BELKHIRIA	
Industries Textiles	H. JULANI	M.A. KHAMASSI
Electronique	A. MAAREF	A. HALLEB

**4. Membres.**

MM. A. TURKI  
M. BEN ABDALLAH  
M. BELAID  
M. BRIGUI  
M. ZOUAQUI  
F. ZERELLI  
A. ESSASSI  
H. BETTAIEB  
S. PACHA  
M. EL BEJI  
B. EL OUNI  
M. MGAIETH  
M. ANNABI  
N. BEN DEBBA  
K. REKIK  
R. CHAABOUNI  
Mme N. MZGHANI  
MM. M. BOUHRARA  
R. CHEKIR  
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