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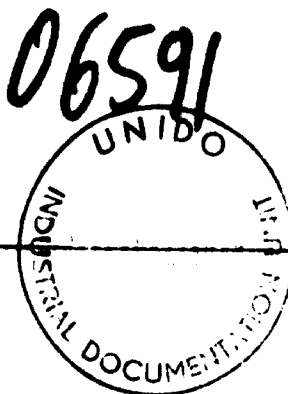
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UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION



Distr.
RESTRICTED
UNIDO/TCD.457
13 June 1975
ENGLISH

LONG-RANGE INDUSTRIAL PLANNING ^{1/}

IRAN ,

(DP/IRA/74/010/11-01/12)

Project findings and recommendations .

Terminal report prepared for
the Government of Iran by

Paul Borel

for the United Nations Industrial Development Organisation
acting as Executing Agency for
the United Nations Development Programme

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PROJECT FINDINGS

Summary

There are some practical means which should be adopted as of now in order to complete establishing a correct strategy for the industrial development of Iran.

1. The base for this strategy has been correctly established by giving priority to the erection of basic industries, using the natural resources in oil and mineral ore, but the linkage between the growth of this sector and that of the others has not been considered sufficiently. Economic development is not a balanced process but rather a chain reaction from one element of the system to another. In the past other countries have built a sound basic industries sector which, however, had no effect on the overall economic growth since all the profit went to the foreign countries which were the suppliers of machines and equipment and the buyers of the products.

In Iran, happily enough, a large part of the profit from the basic industries sector will be used by the Government to promote investment in the other sectors; but this is not sufficient. Priority must be placed on the correct building up of the engineering industries sector, which alone is in a position to receive the impact of the basic industry demand and afterwards facilitate through its production capacity the other sectors' growth. There is a well established theory that engineering industries are considered the crucial element in industrial development. Setting up this sector by joint-venture agreements is only a part of the solution; accurate analysis of the problem demonstrates the necessity for either a special planning, programming, investigating and designing institution for the sector or a physical integration of these industries into an industrial complex, when feasible.

2. It is quite clear that at present and in the future the limiting factor of Iranian economic growth is the shortage of skilled manpower,

technicians and engineers, not the lack of capital. This shortage is expressed not only by the limited available trained manpower but also by the lack of experience, which is measured in years and for which there are limited opportunities for special and intensive training methods. This leads us to the necessary substitution of labour through (a) capital, (b) technology, and (c) organization.

It is commonly recognized that technology and organization are production factors as well as capital and labour; they have become essential planning elements. Why not incorporate them at the project level? Strangely enough, when doing project feasibility analysis in Iran, one does not pay attention to the optimization in the use of these factors as much as one does to the rentability of capital, however abundant it may be.

3. This rapid survey demonstrates that Iran must pass the three barriers of organization of industry, improvement of skills, and technology development to become competitive with the developed industries in certain selected sectors. It will have to develop these sectors along Western lines, disregarding the others, which will therefore inevitably result in a dual economy. A dual economy may have no drawbacks if it is established in such a way as to sustain a well-integrated society, which could be the objective of the industrial strategy.

Project Background

In 1974 the rise in oil prices produced new possibilities for the economic future of Iran; consequently, demand for planning and development on both a short- and long-range basis has become more acute. Planning as well as research and economic studies has a long history in Iran, in particular with regard to industry in the Research Centre for Industrial and Trade Development, which was founded in January 1976 with the assistance of UNDP. Concerning new fields such as technology and long-term industrial forecasting, the latest development has been the Joint UNIDO/UNDP Mission of Messrs. Y.R. Cho and P. Sanghui (DP/IRA/73/007), which took place in March of this year.

It is interesting to recall that the main chapter of the Mission Report has the following title: Abundance of Capital and Foreign Exchange and New Elements of Planning. For this reason it may be said that the present report is exactly in line with this previous approach.

The terms of reference of my mission were established jointly by the Ministry of Plan and Budget and UNDP in 1974 as follows:

Duration: One month

Base: Plan and Budget Organization

Duties:

1. Assist in strengthening the long-range industrial capacity of this Organization;
2. Identify alternative short- and long-term industrial development strategies and areas where new strategic devices could be made;
3. Determine the implications of each strategy on the whole economy.

The present report covers only a part of these duties.

The Plan and Budget Organization, which is responsible for formulating the Five-Year Development Plans and which has produced not only the Fifth Plan (1973-1978) but also a revised version thereof, approved by the Cabinet in August 1974, has also been charged with the preparation of the 20-year perspectives for Iranian development. Upon arriving in Iran we found that no special steps had been taken with regard to industrial forecasting but, however, that the Research Centre was receiving an economist and also expecting other reinforcements for this purpose. At the Plan and Budget Organization, a Planning Bureau was installed and an overall economic projection model in 20-year periods produced by the Planometrics Division had recently been revised. A one-week seminar with the Club de Roma was also being held.

I received from Mr. Abu El-Haj of the Research Centre valuable information on three Master Plans for cotton textiles, capital goods industry, and the copper industry. Most of the Master Plans were outdated, having been written in a different economic situation (1971, 1972); they are presently being updated and new ones prepared.

In addition, I received valuable assistance from Mr. Vallet, the ILO Project Manager, and Mr. Wheeler, the Employment Evaluation and Planning ILO consultant to the Plan and Budget Organization with regard to vocational training prospects.

Engineering Industries as the Core of Industrial Development

The strategic importance of the engineering industries sector should be viewed in connection with the future physical investment requirements of the country. In the revised Fifth Plan of Iran, the growth rate of gross fixed investment is 29.7 per cent against 19.3 per cent for consumption expenditures. The ratio of the amount of investment to consumption expenditures was 23 per cent in 1346 and should be 49 per cent in 1356. Economic investment amounts to two-thirds of the total fixed investment. Currently, machinery and equipment represent 50-60 per cent of investment and the remainder is for construction, transport, trade and services. This indicates that the engineering industries should have the highest growth rate of all sectors. In addition, their linkage is most frequent with those sectors which are presently developing at the highest rates as shown in Table 1 below. One will notice that the table has been calculated at an annual growth rate in per capita income of only 4 per cent; but the elasticity of demand, for instance, from the chemical industries is 1.66. Other data for the chemical industries may surprise the reader (see Table 2). In five countries current inputs for equipment in the chemical industries are 20 per cent in machinery and equipment to 25 per cent in raw materials.

A UNIDO monograph based on an average twelve-year service life of the equipment evaluates the needs for machinery and equipment replacement at 8 per cent of the sales value and at 13 per cent for expansion (assuming a growth rate for the economy of 8 per cent and for the chemical industry of 13.3 per cent), making a total of 21 per cent of inter-industry sales.

Table 1. Linkages at 4 per cent Annual Growth in Per Capita Income

Value of Purchases from the Engineering Sector

Sector	Current Account	Capital Account		Total	Grand Total
		Expansion	Replacement		
Engineering	167	23	25	53	220
Basic metals	6	44	36	86	92
Paper and related products	1	31	28	60	61
Printing and editing	3	25	26	54	57
Chemical, petroleum, coal	0	26	27	53	53
Textiles	2	20	24	46	48
Wood	2	20	23	45	47
Rubber	0	21	22	43	43
Food and beverages	0	7	11	18	18
Clothing	1	7	9	17	18
Footwear	1	5	8	14	15
					<u>452</u>

Source: UNIDO Monograph on Industrial Development, No. 4.

Table 2. Chemical Industry Raw Materials and Other Inputs

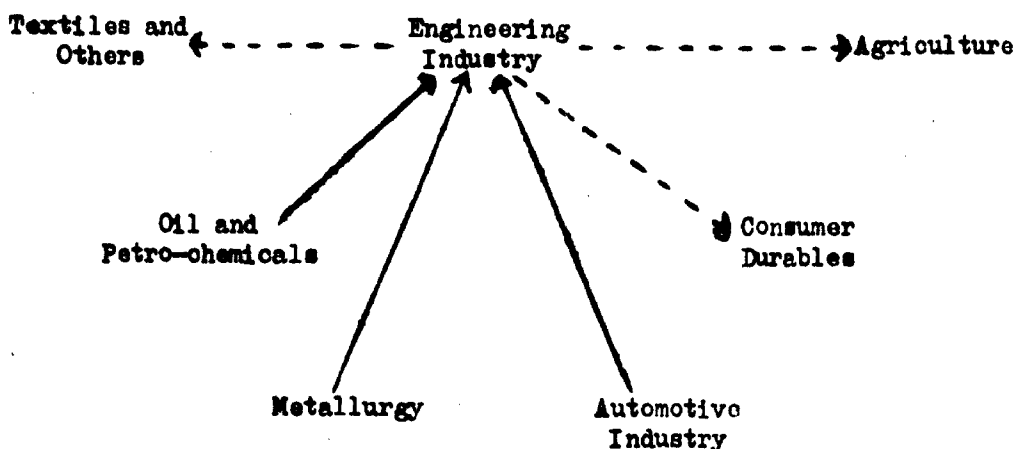
	Input Coefficient (%)
<u>Raw Materials</u>	
Hydrocarbon	1.3
Carbon	1.2
Other minerals	0.5
Raw materials of organic origin	18.0
Others: Metal and ores	2.0
Electric power	2.0
	<hr/>
Total	25.0
 <u>Intermediate Commodities and Other Inputs</u>	
Chemical	25.0
Transport, trade and service	7.0
Machinery and equipment (capital account)	20.0 ^{1/}
Construction (capital account)	7.0

^{1/} Based on a 6-per-cent growth rate of the economy.

Source: UNIDO Industrial Planning and Programming Series No. 1
Techniques of Sectoral Economic Planning - The Chemical
Industries

Unfortunately, in a developing economy the engineering industry is too small to meet this very diversified, elaborate demand, which is therefore satisfied by imports up to the availability in foreign exchange; as a result the overall growth rates progressively decrease. For the time being, this is not the case in Iran due to the present oil revenues, but projections of the planometric model show that this will be the case in the future. At all costs, Iran must build a sound engineering industry for the post-petroleum era.

Iran must use the basic industries and the automotive industry demand to establish an engineering industry which will then serve other sectors, such as the consumer goods industry, agriculture and transportation sectors.



The great difficulty of this task is well known to Iran authorities. It amounts roughly to building in ten years or so what the developed countries have built in 50 years. It is evident that the present policy based on association and joint ventures with foreign companies, producers of machines and equipment as well as the three important machine tool factories, pipe factory and rolling mill, along with capital goods industries, metal products industries, electrical and non-electrical machines already in operation or in the project bring proof that a very ambitious development plan is being realized for this sector.

Due to lack of time I was not able to visit the existing plants and to analyze the projects. Therefore I am not in a position to judge the manner of operation, for which reason the following suggestions might well in fact be unrealistic and excessively theoretical. They apply to the following industries: metal products; machinery; electrical machinery; transport equipment.

1. In these industries, the number of combinations of individual operations to obtain a specific product is very large. The choice of the best process combination can result only when existing firms and their existing processing facilities are reviewed in connection with new kinds of processing operations that might be introduced into the country. What is required for successful project selection is an institutional approach that combines the perspective of planning at a sectoral level with the accurate information available at the enterprise level.^{1/}
2. Economy of scale may be obtained by substituting serial production of certain parts for batch production. This implies sub-assembly design, modular design, recognizing joint production functions between industries and programming this total production in one plant only by sub-contracting.
3. Economy in indirect and overhead costs: management, engineering, design, research and development and marketing. This may be obtained by sharing the organization resources for the profit of a number of processors.

The engineering industries of Europe and America have developed into a pattern of extreme specialization which is not suitable for Iran at the present time. In the developed countries the machinery and equipment are designed for large customers and in serial production. In Iran serial production can be attained only by joining demands from different markets by decomposing the different products into similar sub-components. However, the re-arrangement of demand and production methods presents problems too difficult for individual entrepreneurs.

^{1/} UNIDO Monograph Engineering Industry.

Foreign investors, accustomed to working for specialized, large markets, are not prepared to handle them and are likely to propose an expenditure in equipment which will create some idel capacity. The investment cost can be reduced only in the long run and only when the central authority is aware of all existing potentialities and of the development stages.

The rationalization movements in the European industrial scene through consolidation of smaller firms, formulation of producer's associations, establishment of sub-contracting centres, etc., should be introduced in Iran under a special authority.

The question as to whether the present administrative system is able to handle these problems relates to a problem very commonly encountered in developing countries: the relationship between the administration, which represents the level of evolution consistent with the overall social structure, and the modernizing sub-systems which keep apace of change and are inhibited by the system of laws and regulations convenient for the other social sub-systems.

This point is especially acute in Iran because such external circumstances as the rise in oil prices have offered new opportunities for a higher rhythm of change and have set some sectors of the economy in motion at a rapid pace but have not transformed the previous pattern and speed of social changes of the whole nation in all its sub-systems such as education, administration, agriculture, philosophy of life, etc.

In fact, at present industry is in a struggle with all the elements of society and is changing its culture, way of life, social communication, family life, occupations, etc. This was bound to happen since one can not have a developed industry prior to the emergence of a thoroughly "industrialized" society. During such a transitional period, one has to provide the most important sectors with a special legislative (and sometimes physical) environment. Different ways exist to preserve the impetus of some industrial sectors without producing conflicts with their administrative and social

environment. In Iran the establishment of the IIRD^{1/} seems to have been a successful step in this direction. However, the Engineering Industry should merit similar attention due to its long-range importance.

Another means of finding an answer to the problem is to integrate physically the engineering industries into a big industrial complex, at the same time giving them administrative autonomy. We have seen in Table 1 that the highest linkage of this sector is with itself (220 sales) as against 452 to the rest of the economy. As will appear in the following section, technological linkages with itself are also high.

The drawbacks of this strategy are well known: lumpiness of investment; long delays for planning and construction; difficulties for extension; limited adaptability to new circumstances; confrontation in the construction sector with a task which it at present would be unable to fill.

Strategy for Future Scarcity in Experienced Manpower

Our concern lies first in an appraisal of the current situation in higher and intermediate technical education. It is true that some engineers and technicians are presently unemployed or employed incorrectly; this fact obscures the commonplace judgement but has upon analyzation no bearing on a diagnosis concerning the future.

Crash training methods presently in operation on a large-scale may well solve the future problem of skilled workers, foremen and low-grade technicians, but it is a fact that for higher categories Iran, which at present has the world's highest industrial growth rate, has neither changed its methods nor intensified its means. The system is not integrated; diplomas do not have a certified quality; Honarestan graduates have unequal and uncertain levels; equipment is lacking; curricula and manuals should be revised (South Korea had 890 different textbooks revised for vocational high schools and 340 for junior technical colleges). Teachers should be retrained; the

^{1/} Industrial Development and Renovation Organization.

Arya Mehr Institute represents only a beginning. Training abroad of engineers and technicians is a palliative solution but disadvantages are and will become apparent. This situation is not altogether surprising in a society where the educational structure is one of the most resisting elements to change.

Returning to the problem of skilled workers, which is the more acute problem at present, the worker psychology is one of the three factors in the training process. A crash programme of training, as the one entered into, or a few months of in-plant training, as promoted by the Industrial Training Board, can produce the first step of adaptation to work, but after this training period, the worker returns to the influence of his social environment, its traditions, and its philosophy of life. A definite change in the worker will not take place before it has occurred in the society as a whole.

In addition, one must not under-estimate other negative factors: insufficient mobility of the labour force from its place of residence to the regions where there is a demand; inequalities in industrial sectors between those who can pay higher wages because they are capital-intensive and those who can not because they are labour-intensive (low rate of worker wages as a consequence of low productivity per worker and the present distribution of income).

In summary, for all categories of personnel, improvement in number and in quality may come only progressively. On the contrary, Iran intends to become a highly developed country in 20 years, which means that its industry must at that time be at the same level of quality and capacity as those of other developed countries. This is a challenging objective for the industrial strategy.

Another way of explaining the problem is as follows: Industrial development experts who usually divide the process into several stages would say that Iran is rapidly entering into the third stage - basic industries, simple machinery and production materials - but they

affirm that the more complex skill requirements start upon approaching the fourth step, i.e. the "high industry stage".^{1/} In economic terminology, the problem may be stated as how to substitute other physical or non-physical inputs for the deficient labour input, i.e. capital, technology and organization.

Substitution by Capital

1. Directly productive - mechanization;
 - automatization;
 - elaborate measurement inputs;
 - elaborate preparation of raw materials;
 - production control by electronic devices and digital read-out.
2. Indirectly productive - special care in building construction;
 - special care in industry buildings lay-out;
 - air-conditioning in workshops;
 - optimal geographic localization of the plant regarding costs of transport, energy and other inputs even at higher infrastructure costs.
3. Psychologically productive - improvements to the health and comfort of the worker and his family;
 - elementary social services located in the plant;
 - erection of adequate psychological and social environment;
 - cafeterias to complete cities with parks, museums, sport facilities, etc. (e.g. Togliatti and Kama, USSR).

It is a fact that present conditions of life for the Iranian worker and his family in the city are psychologically worse than in the country.

Substitution by Technology

Iran could take a first step by testing and introducing advanced technology in pilot plants. For instance, in the textile industry

^{1/} UNIDO, Planning for Advanced Skills and Technology.

- Clothing industry: Automatic machines (Cincinnati, Gerber) for cutting tissues with laser (less than a dozen are presently in use in the United States);

- Printing and dyeing: According to specialist estimates, within 10 years, 60 per cent of the items colored in polyamid and 50 per cent in acrylic will use the organic solvent technology. Later polyester will assume 30 per cent of this development.

- Spinning: The important innovation of turbine spinning ("open end" technology) reduces to one-third the number of workers at the workshop stage. One considers that it will be diffused in France at a rate of 3 per cent, progressively increasing, notwithstanding the negative rate of growth of the sector.

- Knitting: Automatic knitting increases the adaptability and the possibility of diversification of product mix.

In France it has contributed to the concentration and industrialization of the sector but medium-scale plants can benefit from this innovation, with the support of service centres for production sampling.

Of course, I have not been in the position to examine carefully what could be done in the textile sector, which was chosen as an example because it currently has the lowest research and development expenditures of the manufacturing industries.

Current Technology

In no industry are technological arrangements for a given production unique even if the core processes are, in theory, unique. Consequently, the labour structure and the labour component vary broadly even in so basic an industry as aluminum production.^{1/} Let us take some examples of Profiles of some industries.^{2/} Table 3 shows that productivity of highly skilled labour may be quite different in one plant from another, due to different technology, although issued from the same technique. Unfortunately most of the engineers

^{1/} UNIDO, Monograph, The Aluminum Industry.

^{2/} UNIDO, Problems of Industry.

do not make great attempts to adapt their technique to the concrete situation, even if it is a foreign technique.

Table 3. Proportion of Highly-Skilled Workers^{1/}
in two Plants of Similar Size

<u>Industry</u>	<u>Plant 1</u>	<u>Plant 2</u>
Clothing of textile fabric	.0170	.0640
Heating and cooling equipment	.0100	.2140
Alcoholic beverages	.0320	.0128
Telecommunication equipment	.0900	.2000

What is the cause of this? As José Quevedo Procel, Director of Information and Documentation Services of the Council of Science and Technology of Mexico says, "Our experience shows that engineers need information on standards, patents, maintenance methods, quality control techniques, properties of materials, new equipment, manufacturing processes, testing equipment, etc."

Nevertheless, let us not discuss the problem of rehabilitation of present Iranian industry by new inputs of technology; what is more important now is to know if present projects and new industries are choosing the technology which makes the best use of the limited amount of skilled labour. The question is open to doubt because one finds that current rate of return on capital in these projects is more than 20 per cent and in effect profits of existing factories amount to a similar value. The economic reason is clear: the opportunity cost of skilled labour is higher than the present level of wages, which the investor uses in his calculation. The opportunity cost should include the development cost of a skilled worker, and,

^{1/} Highly-skilled: supervisors, engineers, designers, tool makers, experienced technicians.

moreover, of an engineer and also should be valued in the provisional programme of expenditures along the project life, at a higher level than today and perhaps at present imported foreign engineer wage level. Also for an investor difficulties and delays in equipment deliveries, from abroad and from Iran, problems of maintenance and repair parts are not in favour of more important expenditures in capital and for him. What counts most is the time of recuperation of his capital in order to invest it in new promising ventures.

Intermediate Technology

Also called "low-cost technology" or "adapted technology", it is the only technological process which can be applied at the village level and at the handicraft level. There is no substitute for it if one wants to preserve some economic and social well-being in the rural areas during the transitional period. Concerning our present debate: technology and skill improvement, it is a highly educative factor.

Iran should not despise it because it is "low-cost" and "technologically backward". In fact, in many instances, some advance technology is used. It ought to be subsidized and, in fact, the cost of capital per output may not be lower than in an ordinary industrial plant. The profits are elsewhere: (a) in the penetration of skills and of industrial rationality into the population; (b) in social returns; and (c) in external economies for indirect, overhead and social costs.

Substitution by Organization

It is obvious to any observer of Iranian industry that through organization and management progress, a much higher productivity and therefore an economy in skilled labour per unit of output could be obtained. We hope that intensive efforts will be made in this direction as initiated now. This refers to these elementary methods such as budgetary control, working time analysis, etc., which are currently lacking in most developing countries' industries.

What we should suggest for advanced industries would be these advanced methods of management and organization which cannot for some time be learned and applied by other people than organization specialists. These are sophisticated methods of analysis and measurement, for example: process analysis, skilled manpower analysis, etc.

Organization strategy does not end at the factory level; organization at the branch level is equally important. We have dealt in detail with this subject in a previous section, on what regards the engineering industries, but the trend of concentration, association, redistribution of functions between firms in the developed countries proves that similar conditions prevail in other industries and will be more acute in the future owing to technological developments as they may be presently foreseen.

Finally, organization at the level of the world economy and trade are also important. That means that the firm or, better, the country which will succeed by inter-state co-operation agreements, to fix at his best place its role in the new world distribution of work will have ensured the future of its industries.

Let us now turn to another problem: the scarcity of qualified manpower and raise the question of how to administrate the use of this limited resource. It is our opinion that planning and administration of high-level technical personnel must be made centrally. This includes training of specialists in advanced management techniques, special skills and professional tasks which require 7 or 8 years of training, and informatics, auto-matization and measures, as well as the training abroad of engineers and technicians.

An institution should exist which would keep a roster of all this personnel, classified as junior - experienced - highly experienced in his speciality. It should possess initiative means to direct this personnel to where it would be the most useful, i.e. design centres, technological institutes, engineering bureaus, training institutes and organisms in charge of curricula and manuals, etc. Communication, exchange of experience between them would be facilitated by seminars, etc.

A special category deserves our attention: administration of industrial development. This category of personnel does not exist in the Public Service of Iran. They exist in many developed countries, for instance in France, for each technical field: mines, public works, industry, armement, etc. We suggest that in Iran an Industry Administrators Corps be established, recruited competitively from among university graduates^{1/} but also trained in administrative science, limited to a relatively small number, receiving prestige and special privileges of status, of wages, assigned to posts which have the responsibility for change.

Through these agents, the authorities would have assurance that their decisions are correctly and quickly implemented. When new fields of problems and decisions do appear, they would have available reliable people to tackle them.

Administrative Strategy

There again we find difficulty in preparing a line of action in conformity with the rationality of our analysis. The industrialists are not prepared to accept our suggestions; they have no direct motive of adopting a way different from the present one to make larger expenditures to care for social and psychological factors.

Technology and organization efforts are done by them as experience proves in every country only under pressure by circumstances. The biggest investments and the re-organization are done by them only during crisis. There is no crisis in Iran; pressure by larger imports has a limited scope.^{2/} Also to introduce roughly technological and organisational changes in such sectors as textiles, footwear, food small industries would kill them.

1/ Who have received technical training either in Iran or abroad.

2/ In this instance, to introduce a new sort of competitor, a State-owned industry may prove to be efficient. This was the case in France in 1946 in automotive industry when Régie Renault was founded.

In developed countries the exporting sectors are always the only ones who accept with readiness the double challenge of technological change and of improvement of skills. This opens a gate towards the strategy we shall discuss in the next section: a selective strategy, a dual strategy.

There again exists the solution of a technology and organization institute, with branches toward engineering, textiles, etc. Basic activities would be liaison programmes to visit industries, inquiry service and information analysis. We advocate also design institute, with branches, prototypes production and visitors to industries.

Please refer to "Programming of Technology Transfer, Adaptation and Development" by Mr. R. Abu El-Haj of the Research Centre, 5 March 1975. Especially valuable is the notion of kernels of technology. On the other hand, I regret that this document does not advocate in addition to other recommendations the setting up of a special Bureau for Adaptive Technology, a means of tackling the technological problem from the other side, i.e. from the existing techniques. See the following chapter, "Towards a Dual Economy".

Methods of Industrial Forecasting

Methods of industrial forecasting are well known (see for instance flow chart showing construction of an industrial forecast in review: "Futures", October 1974). The problem is to adapt them to the current situation and resources of a developing country.

Tendential, alternative and contrasted scenarios are established by analysing the influence of variables on the industrial system.

The industrial system must be known in its structure (patterns of production and organization): in it one finds physical, financial and social and human flows with material, legal and social constraints.

The current situation could be analyzed in the manner of survey of selected manufacturing industries (Bank Markazi) augmented by data on productivity information on quality, data on ratio of value added, imports and exports.

The technological variables require an information on technology developments not easily accessible. It is the task of a technological institute already referred to.

Changes in national environment concern the agricultural sector and other sectors' forecasting.

Changes in world economics and in world trade: forecasting to be made by the institutions in charge of exports.

Organization of industrial forecasting requires the participation of all sectors of industrial development, viz. consumers, industrialists, legislators, planning agencies.

Usually the long-term Planning Bureau in the Ministry of Planning or the Ministry of Industry holds monthly meetings with interstate agencies and organises a yearly meeting of representatives of categories mentioned above.^{1/}

Fragmentation of Strategies

Before entering into an overall strategy exercise which may perhaps be considered as not urgent at the present moment, the same method may be used to tackle long-range problems, either sectoral or general such as those mentioned in the present report:

- organization of engineering industries;
- problems of training of technical personnel and the use of this limited resource;
- sectoral development by stages (see Table 1).

In fact, all problems of long-range industrial strategy require the concertation of several categories and sectors, by discussion meetings in the light of prepared alternative strategical models.

^{1/} In September 1974 the study group for Industrial Strategy of France held several meetings with 80 participants; the Ivory Coast holds monthly and yearly meetings.

Iran Industrial Strategy, A Proposal: "Towards a Dual Economy in a Well Integrated Society"

Iran intends to progress within twenty years up to the front rank of developed countries. It is apparent from our analysis that, in doing so, it will by necessity build a dual economy. It is better to look at this fact with open eyes and see if it may not be beneficial under certain conditions.

It will be beneficial if this economic and social constraint is integrated into a new concept of development, a new objective: instead of a "mono-growth" a multi-growth, not only quantitative but discerning the variety of needs and situations, shrewd, varied in forms and methods, attaching as much importance to qualitative progress in ways of life than to consumption expansion.

When development is seen in this light, variety of culture and ways of life in Iran population (even nomadic) is considered as an asset, therefore development policies are diversified, in order to be at the same time modernizing and not destructive.

Goals in matter of economic growth will be conveniently different for two categories of sectors: those which are the most important for national defense, for export and for technological progress, and those whose impact is greater on conditions of life, population welfare, amenity of life and concordance with cultural traditional patterns. This leads to dividing the economy into two sections.

The first section of the economy will consist of the big industries, based on natural resources in oil and metal ores. In order to export no raw materials, but rather semi-finished and finished products, these industries must reach the level of skill, of organization and of technology of the West and follow their rates of progress. This section will also include engineering industries^{1/} which will provide them with machines and equipment, the quality of which must be, for the above reason, also of Western standards.

1/ Including automotive industry.

For the reason of integration, these industries are concentrated in a few regions and in a few places, sometimes in the form of industrial complexes. This section includes also the automotive industry, paper industry and leather industry.

The other section includes agriculture, and all other industries either at the middle or at small-scale, house building, commerce and services. For them a limited rate of growth is accepted, subordinate to the rate of population growth and to the subsidies this section receives from section I. By use of their subsidies and with the help of intermediate technology, traditional ways of life are maintained but improved in their conditions (for instance, bazaars, villages, handicrafts and traditional industries, building construction, household equipment, etc.).

Regional and rural industries are protected from the competition of big factories by a monopoly of production granted to them for a list of goods and by a monopoly of supply to the Government of fabricated goods, of rural public buildings, etc.

In the Government budget, multi-purpose regional development environmental conservation, rural development, small industries investment, social welfare programmes for low income groups in rural areas and in small cities receive a much larger part than in the present budget. By this way some redistribution of income is also obtained.

This utopian scheme presupposes two conditions:

1. that growth of large cities can be stopped;
2. that an integrated society can be built upon a dual economy as base.

We have a beginning of the answer to this second point: developed countries are looking towards a redefinition of their industrial pattern. Smaller plants, localization in the countryside, new pattern of work hours and work organization.

They are feeling the necessity of preserving rural life and the possibility for citizens of easy contact with nature. Unfortunately,

the growth of their "megalopoles" appears as a phenomenon impossible to control. It has been found that welfare of a population is not proportional to the GNP per capita. Also, a smooth transition process from the traditional way of living to a new one is more psychologically acceptable, preserves precious moral values and produces less social unrest and troubles.

Modernization is no more a package deal which implies by necessity not only such necessary progress as health and education but also undesirable features such as life in large cities, stress and fatigue at work, loss of time in transportation, conflicts between generations, difficulties in social communication, anxiety and unsteadiness in place of peace of mind.

Technology must be at the service of man and not man at the service of technology. This is possible now owing to technical progress and in social practices, but it has come somehow too late for developed countries; however, Iran still has the choice.

RECOMMENDATIONS

- A. The general difficulty with regard to the following recommendation is that they call for a more directive intervention on the part of the Iranian authorities in the industrial development process; this is a behaviour which they are not accustomed to having and which they are not technically prepared to assume. Too rapid a change in these practices would be highly damaging. The solution lies, as always, in preliminary training of Government officers (in industrial development methods) and progressive introduction of change. See also recommendation D.
- B. Adopt a strategy "towards a modern dual economy within a well-integrated society". One cannot say that Iran has not made in the past the most important efforts to build a well-balanced society in spite of an already rapid growth of the industrial sector. Research and action

in favour of rural development, regional development, city planning, rural industries, co-operatives, etc., were numerous and in many cases successful. But the situation has radically altered since Iran in 1974 entered in what may be called the petroleum era:

(a) According to some projections, it seems that some people favour the idea that Iran, within twenty years, will become a highly industrialized country in all its elements. To disprove and refute this theory some alternative sort of development model must be drawn.

(b) Also the most dynamic sectors and the most dynamic regions have, by their heavy demands in material and intellectual resources, a deteriorating action on the development potentialities of the other activities and of the rest of the territory.

This is a real crisis, highly detrimental for the future. Owing to its dimension, we could not tackle it comprehensively in this short mission. The following suggestions will nevertheless give an indication of what we have in mind.

1. Divide up Iranian territory in districts or sub-regions having ecological and sociological homogeneity around a polar centre for a goal of maximum self-sufficiency and integration, using, for that, surveys that were done in the past but now in the light of future Iranian wealth and potentialities of action;
2. Distribute them in categories as to their potentialities in economic growth and for each category set up a perspective master development plan;
3. For this task, reinforce the present agencies which deal with rural development, regional development, small-scale industries, etc.;
4. Begin statistical work of Iran's economy in two sections with different rates of economic growth, family income, household expenditures, etc. (Section 2 being the least progressive);
5. Set up an econometric model on this basis;
6. Set up two lines of technological development and two different Institutes. The Section 2 Institute should largely profit

from recent progress in technology which allows in industry reduction in dimension, versatile and diversified product mix, decentralization of functions and thereby make possible modernity and efficiency in small or medium workshops for small markets;

7. Set up master plans and profiles of industry for the low rate of growth section (Section 2) in order to put a ceiling on dimension of factories, give them monopoly of sales to some markets, etc.;
8. Set up two programmes of skill improvement (in order that trainees from rural areas not be induced by their training to migrate to Section 1);
9. Set up two programmes of general education to the same end;
10. Reinforce and set up financial institutions specialized for Section 2;
11. Allocate more of the oil surplus resources to Section 2, as the financial absorption capacity will increase and restore progressively the budget to this end;
12. Produce master plans for villages and small cities in proportion with the greater aid they will be able to receive from the public finances;
13. Reinforce action of the Ministry of Culture in favour of Section 2; call for the co-operation of the social and intellectual elites, also of the opinion makers, journalists, artists, designers, etc.;
14. Accelerate drawing of master plans for large cities and industrial regions for the profit of long-range energy planning, transportation planning, water planning, etc.;
15. Set up a long-range planning department in the Ministry of Planning and Budget.

C. Engineering industries (metal products, machinery, electrical engineering, automotive industry). This crucial and strategic sector for all other industries requires by its structure a very accurate and detailed planning combined with a clear perspective of its development.

We recommend an institution which will stay in close contact with the industrialists, their everyday problems and their projects. It may take in charge common services such as training of personnel, design centres, tool design centres, technology development, marketing problems and it will stimulate between industrialists all kinds of association and co-operation, joint production, heavy machine-hours sharing, highly qualified personnel sharing, etc. It will promote industrial estates and even in the future industrial complexes to facilitate these associations. It must have sufficient credit and autonomy of action to support its policy. It will have its say in localization of these industries and might well prepare for the future a specialised region complex or even a physical industrial complex into which association of producers would take place. It will work concurrently for the long-term and for the short-term.

D. Authority needs special agents to handle its relations with the private industry and to get implemented its decisions in matter of industry. We suggest the institution of an Industrial Administrators Corps, which all the prerogatives, the prestige, the privileges and the independence of a Corps, protected by them against corruption and favouritism. Their mobility and their adaptability makes them available at any moment to be sent in charge of strategic affairs. They are the instruments of selective change in an Administration whose ordinary mission is the preservation of law and order and the promotion of uniform change.

E. Technical Education. We recommend a complete rebuilding of the present technical and scientific education up to the higher levels. The present institutions are inadequate to the Programme of Industrial Growth and are inferior to those of other countries who have lower ambitions. Skills and technology are the trump cards in a world competition.

F. Project Selection and Implementation. Present Government directive proceedings in this field are limited to the granting of a license; the development agencies of the Banks feel themselves in a vacuum

produced by too great a liberty of action as concerns localization of the plant, technology and dimension.

It follows that they accept the investors' choices: with regard to localization, by the expatriate preferences as to their residence, in matters of technology, by the investor preference to machines and ways of production he is accustomed to; in matters of dimension, by the investor financing capacity and risk preferences.

We recommend that a more directive authority be progressively put into function after a training period, after close consultation with the people who presently select and implement the projects after thorough preparation and up-to-date correction of detailed master plans and master profiles. As this is a very time consuming process, it should be initiated by the more sensitive and important sectors. Also, it is urgent that regional planning be in a situation of issuing directives.

G. Planning Production per Stages. Master plans should be able to give a picture of development per stages 10 or 15 years ahead. Not only globally for the sector (see table 4) but also per category of products; each stage corresponding to a certain level in quality or performance of the machine or product, as indicated by its specification. For instance, for bearings one should forecast the stages for different types of bearings, i.e. needle, roller, ball, gas, jewel, plain, sleeve, radial; for tubes, fire tube, water tube, cast iron tube, steel tube. Also the technological development per category of product. Also the self-sufficiency of Iran in each category and the proportion of imports and exports at each stage.

H. Skilled Workers in Construction Sector. Pay special attention to the shortage in this category of personnel, a detrimental factor in the erection of industrial buildings.

I. Small-scale Industries Strategy. Although the Iranian Government has set small-scale industries' development as an objective of national importance, implementation of this policy suffers two drawbacks:

(a) Operational guidelines are lacking because operational methodology of action, that means a strategy, has not been drawn in common by all concerned agencies: Ministry of Rural Development, Ministry of Planning and Budget, Regional Development Division, Ministry of Industry and Mines, Centre for Research and Planning in Regional Development, banks, etc. It should be clear to all that small-scale industries must become in modern Iran, as in Japan and the United States, an important and modern component of the industrial structure. The reasons for that are economical, social and regional. Their role is three-fold:

- sub-contractors to big producers in electronics, consumer durables, automotive industries, clothing, appliances, etc.;
- suppliers of local, regional and national markets and to the Government (equipment of schools, hospitals, urban equipment, etc.);
- exporters.

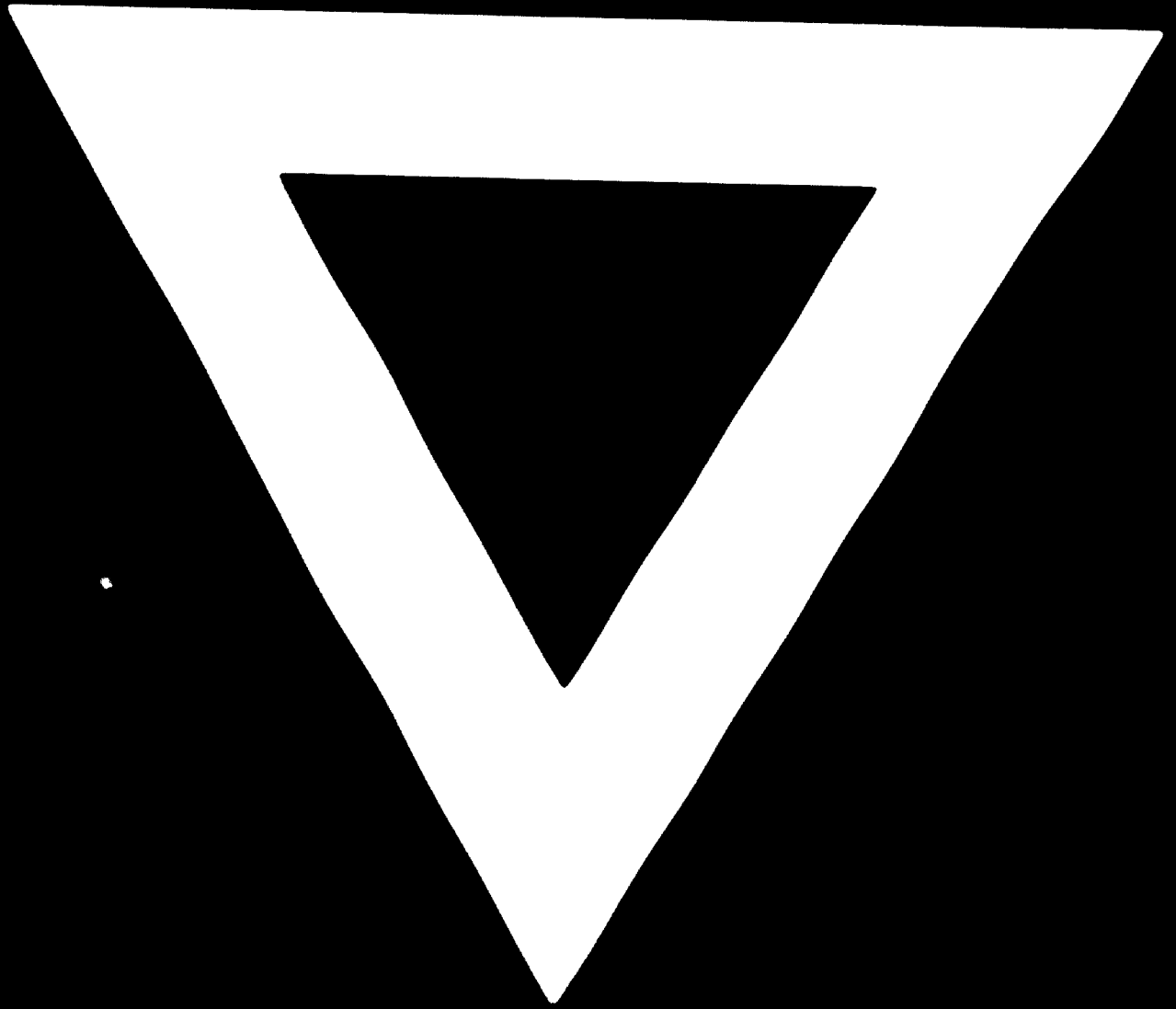
(b) Organisation for small-scale industries and industrial estates has not been established up to a dimension sufficient for efficiency. One must consider that the adequate size should be in the future four hundred staff personnel or more.

This is because there is no other way of working in this field than by direct and personal assistance to local manufactures; this implies to be present in every district, plus regional design centres, statistical units, marketing agencies, training centres, sub-contracting bureaus, etc., plus the centre of organization in Tehran.

Table 4. Economic Indicators in the Development of Engineering Industries at Successive Stages

Stages	All Manufacturing		Steel Consumption/Tons	Engineering Industries			Trade Imp. Exp. (%)	Simple Metals Production in Output (%)
	Value Added \$100,000	No. Engaged 1,000		Value Added \$100,000	Number Engaged 1000	% in Total Mfg.		
1. Simple repairs and manufacture	400	2	400	50	20	8	85-100	50
2. Initial stage production	400-1000	200-500	400-800	50-100	20-50	8-12	80-90	35-40
3. Diversified and developed production	2000-5000	1000 - more	1000-more	400-300	200-more	15-20	50-75	20-30
4. Industrialized countries	na	na	1000 or more	-	200-more	25 - more	10-50	20-50





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