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DEVELOPMENT OF SCIENCE AND TECHNOLOGY  
POLICY FOR KUWAIT

Two Volumes

VOLUME I

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## DEDICATION

This thesis is dedicated to my Country, KUWAIT, where the most formative years of my life were happily spent. KUWAIT has provided me with an excellent education, good health and the opportunity to further expand my knowledge of Science, in pursuit of the present Degree.

By this dedication, I hope to repay a small part of what KUWAIT has given me, and I will always try to further the development of the KUWAITI society.



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Summary

The status of Science and Technology in KUWAIT has been analysed in order to assess the extent of the application of Science and Technology needed for the Country's development. The design and implementation of a Science and Technology Policy has been examined to identify the appropriate technology necessary to improve KUWAIT's socio-economic-industrial structures.

Following a general and critical review of the role of Science and Technology in the developing countries, the author has reviewed the past and contemporary employment of Science and Technology for development of various sectors and the existence, if any, of any form (explicit, implicit, or both) of a Science and Technology Policy in KUWAIT.

The thesis is structured to evaluate almost all of the sectors in KUWAIT which utilise Science and/or Technology, the effectiveness of such practices, their policymaking process, the channels by which policies were transformed into sources of influence through Governmental action and the impact that various policy instruments at the disposal of the the Government had on the development of S & T capabilities.

The author has studied the implications of the absence of a Science and Technology Policy in Kuwait by examining some specific case studies, eg, the absence of a Technology Assessment Process and the negative impacts resulting from this; the ad-hoc allocation of the research and development budget instead of its being based on a percentage of GNP; the limitations imposed on the development of indigenous contracting companies and consultancy and engineering design offices; the impacts of the absence of Technology Transfer Centre, and so forth.

As a consequence of the implications of the above studies, together with the negative results from the absence of an explicit Science and Technology Policy, eg, research and development activities do not relate to the national development plans, the author suggests that a Science and Technology Policy-Making Body should be established to formulate, develop, monitor and correlate the Science and Technology Activities in KUWAIT.

5 Key Words

Design consultancy

KUWAIT

Science and Technology Policy

Technology Transfer

Technolgoy Assessment

Technology Policy-Making Body should be established to formulate, develop, monitor and correlate the Science and Technology Activities in KUWAIT.

KEY-WORDS:

Consultancy and Engineering Design Offices  
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Technology Assessment & Technology Transfer

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## GLOSSARY OF ABBREVIATIONS

AT	Appropriate Technology
CEDO's	Consultancy and Engineering Design Offices
DC's	Developing Countries
ECWA	Economic Commission of Western Asia
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GNP	Gross National Product
HMSO	Her Majesty's Stationary Office
IDA	International Development Aid
IDRC	International Development Research Centre (Canada)
ILO	International Labour Organisation
IMF	International Monetary Fund
KFACO	Kuwait Fuel Aviation Company
KFAS	Kuwait Foundation For The Advancement of Sciences
KISR	Kuwait Institute For Scientific Research
KNPC	Kuwait National Petroleum Company
KOC	Kuwait Oil Company
KPC	Kuwait Petroleum Corporation
KU	Kuwait University
MEW	Ministry of Electricity And Water
MIC	Melamine Industries Company
NIC	National Industries Company
NSF	National Science Foundation (U.S.A.)
NY	New York (U.S.A.)
OAPEC	Organisation of Arab Petroleum Exporting Countries
OECD	Organisation of Economic Co-operation And Development
OPEC	Organisation of Petroleum Exporting Countries
OTA	Office of Technology Assessment
PIC	Petrochemical Industries Company (Kuwait)
R & D	Research And Development
SPMB	Science Policy Making Body

SPRU	Science Policy Research Unit (University of Sussex, U.K.)
STPI	Science And Technology Policy Instrument
TA	Technology Assessment
TF	Technology Forecasting
TPU	Technology Policy Unit (University of Aston, U.K.)
TT	Technology Transfer
UN	United Nation
UNCTAD	United Nation Conference on Technology and Development
UNDP	United Nation Development Programme
UNESCO	United Nation Organisation For Education, Science and Culture
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation
WRDC	Water Resource Development Centre

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## INTRODUCTION

Science and technology play an important role in the various aspects of a country's development. A nation's prosperity, military and political status are all largely measured and evaluated by the scope and advancement of scientific knowledge and outputs and by the effectiveness of her technological, innovative and inventive activities.

The importance and critical role of application of science and technology for development are witnessed by the activities of numerous agencies established by the international community, e.g., UNESCO, FAO, OCED, WIPO, etc., who have undertaken programmes in science and technology and have also established divisions or departments to that end. They have published valuable documents to analyse, criticise, assess and improve the applications of science and technology for development in the developed world as well as in the developing countries.

In this thesis the author is chiefly concerned with that part of the literature dealing with the development of Third World Countries. Specifically, the author is concerned with the development problems and issues of Kuwait.

Kuwait is a part of the developing world which strives to utilise science and technology efficiently to

develop many sectors, improve the life and output of her main economic source, i.e., oil, and to evaluate the standards and status of her national manpower and institutions. Nevertheless, Kuwait possesses a unique status in world classification in that she is neither ~~totally~~ a developed country, nor is entirely a developing country (a detailed analysis of this topic is found in Chapter II). Thus, Kuwait, a rich country with limited manpower, persistently aiming towards development, will need special methods, approaches, choices and application of science and technology for development under the specified framework of policy-making body.

The main aims of thesis are to evaluate the extent, efficiency and criteria adopted to utilise science and technology in developing the socio-economic-industrial structures in Kuwait; and the impediments facing the application of such tools for the development of Kuwait. The thesis would investigate further the existence of any form of science and technology policies in Kuwait, e.g., implicit or explicit, to plan for and monitor the application of science and technology; or the implications resulted from the absence of these policies.

To assist conducting such tasks, the author has adopted the following methodology:

- 1) The examination and collection of literature that deals with science and technology policy issues in general and for the developing world in particular.

- 2) The collection of any literature or documents (albeit they are very limited) specific to the science and technology policy in Kuwait.
- 3) Identifying organisations and interviewing individuals in public, legislative or private sectors, who have significant roles in the application of science and/or technology for development, at various levels - such as decision and policy-making, research and teaching foundations, experts and consultants, etc.
- 4) A heavy emphasis was unduly placed on the analysis and study of official statistics which present evidence of original investigations and testing some ideas in relationship to this investigation, i.e., tenders executed for various sectors, R & D activities, etc., which were not available and/or were prepared and presented for the context of this thesis. This data would provide a basic knowledge that will help to formulate firm and meaningful conclusions and recommendations, and to gain credibility with interviewees. The author should state at this stage that he has been given all possible support, encouragement and assistance from the interviewees who expressed their agreement to the necessity for the promulgation of an explicit National Science and Technology Policy in Kuwait.

In order to analyse and assess fully the criteria,

trends and status of science and technology in Kuwait, the author has divided the thesis into sections which examine the effectiveness of the application and employed criteria in involving science and/or technology in various sectors. The form of presentation consists of investigating the following topics:

- 1) A review of the role of Science and Technology for development and the various issues related to science and technology policy as expressed in the published literature.
- 2) The Socio-Economic Structure and Setting in Kuwait.
- 3) Planning, Policy and Decision-Making Process in Kuwait.
- 4) Manpower Development and The Role of Scientific Associations in Manpower Development.
- 5) Research and Development Activities and Trends.
- 6) The Higher Education Institutions.
- 7) The Role of Science-Based Service Institutions.
- 8) The Status, Objectives and Performances of Research Funding Foundations.
- 9) The Contemporary Position and Impediments Facing the National Consultancy and Engineering Design Offices.
- 10) The Extent of Utilisation of Science and Technology in the Electricity and Water Sectors.

- 11) The Effectiveness of Science and Technology to Develop the Oil & Petrochemical Sectors.
- 12) The Status and Comparison of Health Policy and Services in Kuwait With Some Developing and Developed Countries.
- 13) The Degree of Mutual Co-operation and Effectiveness of Links With Regional and International Scientific and Technical Organisations.
- 14) The Implications of the Absence of a Science and Technology Policy in Kuwait.

On the basis of the analysis of the above topics, the author has reached certain conclusions regarding the establishment of an institutional structure in Kuwait, responsible for the formulation, implementation and monitoring of policies and criteria to ensure full utilisation of Science and Technology in consonance to the overall national development plans, needs and ambitions.

At this point, some explanation is necessary to the reader for the length of this thesis. The author believes that a series of special circumstances justify his decision to err on the conservative side when determining what material should be included. These are:

- 1) The thesis contains a great deal of new data that is not available, otherwise in English and even to some extent, is not published in Arabic as it appears in the

context of the thesis, and believes that the collation of such data in the form of Appendices will make them available for the scientific community and for further studies.

- 2) There is a great demand to build up indigenous Arab (and Kuwaiti) expertise in the field of science and technology policies and perspectives, and thus the thesis is concerned with providing the correct and appropriate methods for R & D activities, the development of scientific and technical manpower, the encouragement of national contracting companies and specialised agencies, etc., in Kuwait in comparison with their utilisation in the developed world. The thesis also aims to provide the critical lines of transferring technical knowledge to Kuwait. Since the thesis is part of a developed country institution, the author felt a certain conflict of duties between the academic requirements of Third World institution and his concern over what he perceived to be the needs of his country, and future researches in the Arab World. The author feels, therefore, an obligation to make his data and accumulated knowledge, available for readers in Kuwait.
- 3) The thesis investigates the historical and contemporary employment of science and technology for development in Kuwait and thus all matters related to them, rather than analysing a specific case study. To evaluate the

existing trends and formulating an overall policy for a country, requires detailed analyses and assessment and thus a lengthy thesis.

- 4) Due to the limited resources concerning science and technology in Kuwait, the author had to rely mainly on personal interviews and data collation and felt that information thus provided should all appear in the thesis.

Obviously, in analysing and formulating a National Science and Technology Policy for Kuwait, several limitations have faced the author during the conduct of the course of the thesis, namely:

- a) The author did not want to involve science and technology policy studies, for political reasons, in some restricted sectors such as the Military Sector and the Ministry of Defence.
- b) The author had to eliminate or minimise the answers of some of his interviewees to limit the length of the thesis.
- c) In some sectors, the author, due to the difficulty of collecting or to the absence of data, had to analyse descriptively the effectiveness of the application of science and technology in these sectors.



d) Statistics were collected from different national and foreign sources, therefore, exaggerations might appear due to the variation of sources.

The author believes that the purpose of this thesis should extend beyond the academic study and hopes for the future of Kuwait and the generations to come, to promote the establishment of a Science and Technology Policy-Making Body to be responsible for suggesting, implementing and monitoring all topics concerned with science and technology for development in the State of Kuwait.

CHAPTER I

SCIENCE AND TECHNOLOGY POLICY FOR  
DEVELOPMENT

1) Introduction

The special feature of the current age is that it is one dominated by science and technology; a paradoxical situation that they are potentially the sources of both a possibility of unlimited progress and of unlimited disaster. They have created the basis for new wealth but this in turn has opened a gap between rich and poor countries. Science has made possible the means of advanced transport and communication which practically make the globe a single place but also the terrible means of destruction which nations can use to threaten each other. Scientific decisions have, therefore, taken on an unprecedented importance, indeed the policies of each country have an international impact. No decision of any consequence can be taken in isolation. Nothing of importance can occur in any part of the world without causing repercussions all over. On the other hand, it is very important that scientific knowledge is incorporated into government policy-making. In the U.S.A., this has happened on the very-large scale with a huge post-1945 expansion in government supported science for military purposes<sup>1</sup>.

Perhaps science as a form of progress should be

judged by the contribution and output it makes to society<sup>2</sup>. Science could also be used as a means for stimulating human thought, of solving certain problems and of providing understanding of various phenomena that occur in the world about us. It could also promote co-operation between nations, enhance the world's standard of living and assist toward world peace and unity. Various definitions and issues regarding science and technology have been cited by several authors each in a different context, according to their academic and socio-economic status and background.<sup>3-23</sup>

## 2) Science Policy

Science policy is not merely concerned with a plan for scientific research, nor should it be treated in isolation from the society's needs and ambitions or, from the socio-economic structure of the country. The overall development plan must enable the usage of science and technology - both within the nation and externally - of be directed towards national goals, while at the same time science and technology could increase the selective options available to the country. It is viatal to realise that science and technology have destruction effects on the country as is evident from the environmental pollution, depletion of resources, technologically acuted unemployment, etc.<sup>24</sup>

The success, vigorous activities and accomplishments of scientific research, and the success and fruitful effect of its technological employment, are frequently

recognised as indicators of the advancement and attributes of a nation's life. Science is so essential, and precious, that the dominant policy decisions regarding its development are increasingly being adopted by the State, rather than by the scientists and their associates. Consequently the progression and pace of science becomes a political issue where every citizen directly or indirectly in the community is implicated in the consequences of science policy. Practical problems need to be elucidated via state-planned scientific and technological research schedules.<sup>25</sup>

The author has chosen two definitions of science policy, one by UNESCO<sup>26</sup> and the other by Leiserson.<sup>27</sup> The author in this attempt aims to compare the similarities and differences (if any) of both definitions given by a world-known agency and an author who, in his article, viewed the issue in a philosophical arguments terms of politics of science, science politics, science policy and policy sciences.

UNESCO has defined science policy as:

"The sum of the legislative and executive measures taken to increase, organise and use the national scientific and technological potential, with the object of achieving the country's overall development aims and enhancing its position in the world".

Leiserson has defined science policy from his point of view as:

"Specifying the criteria for allocating by political decision the appropriate portion of national or world resources devoted to the growth and the direction of scientific knowledge and personnel."

The difference in the **definitions** stems from the

UNESCO's view of science policy as "measures", whereas, Leiserson expressed science policy as "criteria". However, both definitions are comprehensive in the sense that they involve science policy measures with optimisation of the natural resources (human or capital) to achieve the national plans and prestige. Nevertheless, Leiserson's terminology is more explicit by stating the role of science policy in the growth and progress of the manpower, which is considered as a laudable objective of such policy. UNESCO, however, as a key development organisation does not specify such an issue which the author believes is an important topic in any science policy formulation.

Science policy objectives are not confined to the collection of policy statements or to the preferences of scientists, instead, they call for studies of statistics of manpower development, the economic contributions of pure and applied research, the distribution of efforts, geographical locations of research, commuting habits, mechanisms of creativity and communication of science.<sup>28</sup>

Several concerned organisations have dealt with and published valuable documents in the field of science policy. SPRU<sup>29</sup> has sponsored research which envisaged the nature and duties of SPMB's in 61 countries. UNESCO<sup>30</sup> has published a series of science policy study documents which examine the scientific and research activities in a country (or region), evaluate their relevant infrastructures (universities, manpower, etc.), and propose a plan to further develop their

science policy. In addition, the Research Policy Institute<sup>31</sup> (Sweden) has published a series of documents related to scientific research.

### 3) Science Policy in the Arab World

"Developing Countries are those without science, pre-research cultures, deficitting institutional and inducement factors."<sup>32</sup>

The discussion of science policy issues might be considered a new trend in the developing countries in comparison with the developed world who experienced this topic more than half a century ago. The well established key studies for science policy in developing countries have been performed by UNESCO (See Reference 30), and the International Development Research Centre (IDRC) located in Canada. The Centre has published a science policy instrument module series<sup>33</sup> to discuss science policy issues and the evaluation of them in several developing countries, i.e., Egypt, India, Brazil, etc. In addition, the centre has published<sup>34</sup> a series of "Science and Technology For Development", which investigated essential development issues, such as: national consultancy, engineering and design offices, manpower and technology transfer, technological self-reliance or self-independence, etc. Furthermore, the United Nations Conference on Science and Technology for Development (UNCSTD), has sponsored a major global conference in the summer of 1979 in Vienna, Austria, to discuss the national science policy papers presented by the participating developing countries.

The Arab Countries are not exception amongst the

developing countries although they might differ in their socio-economic-political structures, i.e., some countries are capital intensive whereas others are labour intensive and so forth. Such differing factors might call for planning of different science policies.

The foundation of modern science in the Arab World started between 1800 and 1950 when a momentous sequence of incidents led to the establishments of 18 institutions aimed to be utilised as centres of scientific learning.<sup>35</sup> However, except in some distinctive cases, no institutionally upheld scientific activity existed prior to 1950.

The history and trends of academic and research activities in the Arab World differ among these countries due to the country's financial and socio-economic patterns type of links with the developed world and their colonial status, e.g., colonised by countries or religious missionaries. Details of such activities are provided by the key sources: "Encyclopaedia of Education",<sup>36</sup> "The World of Learning"<sup>37</sup> and Zahlan.<sup>38-39</sup>

However, the author believes that the establishment of higher educational systems in the Arab World could be divided into two main categories:

- i) Countries which were colonised or controlled from the 19th century by France or Britain have started their educational system earlier, with colleges or universities endowed, administered and taught by natives of these countries. At least such colonial

and foreign based systems have initiated the foundation of higher educational centres in the Arab World, viz, Egypt in early 20th century, Sudan in 1924, Syria by the end of the 19th century, Iraq and Lebanon in early 20th century. It is worth mentioning here that these countries have taken rapid State control of these educational systems.

ii) Countries who were not explicitly colonised to the same extent as countries in the above categories, have started their higher educational systems in the middle of the 20th century by endowing the most vital colleges needed for their development (Engineering, Agriculture, Science, Medicine). This has been achieved by secular and national efforts although they have studied, evaluated and called for the advice and assistance of the educational systems of the Arab countries, particularly Egypt, who have valuable experience in such matters.

The history of the establishment of the research centres in the Arab world parallels the endowment of the higher educational sectors, in that Egypt and Lebanon were the pioneers of the Arab World together with Iraq which started its research endeavours in the 1930's.

As for the Gulf States, the higher educational institutions and research centres were established in the second half of the 20th century. The author relates this delay in establishing these activities in the Gulf States to one (or



all) of the following causes:

- i) The Gulf States' societies were closed, underdeveloped and less exposed to Europe (as compared to other Arab countries mentioned earlier) and thus would not appreciate the impacts of education and **R & D** activities on their socio-economic development.
- ii) The Gulf States' populace were conservatives and very strict to the exposure of any non-Islamic cultures and missionaries or to allow for any non-Islamic-managed institutions or centres to be operated in their lands. Kuwait had an exceptional case by allowing for American missionaries to construct and operate the American hospital in the 1913.
- iii) The political neglectance of the foreign countries to such area of the World due to the importance (at that time) of several other Arab lands, i.e., Egypt, Lebanon, Iraq, etc.
- iv) The unawareness of the policy-makers of the Gulf States of the fundamental importance of scientific research in developing their countries.
- v) The absence of any sort of communications between the Gulf States' societies and the international educational and scientific communities.

The author aimed, from the above sections, to illustrate the following factors:

- a) Higher educational institutions and **R & D** centres

are important establishments in the development of socio-economic structure of any country.

- b) Some Arab countries which were colonised and had contacts with European countries had started their academic and research activities sooner than countries which were in less contacts with these foreign countries.
- c) Kuwait and the Gulf States, due to their conservativeness and less-developed societies started their academic and research activities in a later stage. A phenomena which might induce implications to their manpower development and thus delay the establishment of their technical and industrial infrastructures.

The implications of such late start in Kuwait would be discussed in the following chapters to appraise the challenges facing Kuwait in her socio-economic development.

The topic of the next section would deal with issues related to technology policy.

#### 4) Technology Policy

Technology policy, or the interaction between socio-economic processes and development with scientific and technological application to meet the ambitions and demands of a nation has been one of the major and vital issues to both the policy and decision makers. This interaction involves the analysis and study of numerous factors related to technology

in a nation such as R & D activities, qualified scientists and engineers (Q.S.E.), budget allocation, innovation, industrialisation, remifications of products and trades, science and technology planning, manpower development, etc. The extent of these parameters will make a nation, fully technologically independent (self-reliant), fully technologically dependent, or somewhere between these extremes.

To this context, the Technology Policy Unit (University of Aston - Birmingham) has defined technology policy as<sup>40</sup>:

"Technology policy is the totality of measures by private or public bodies which control the creation, application and use of technology. Technology Policy Research, therefore, covers all areas of knowledge required for the effective formulation and execution of technology policy."

The author has selected this definition because it relates the measures of creating a technology to its application and utilisation and consider these measures as totality and not as separate items. Although the measures might be a uniform process for the developed world, nevertheless, the situation is different for the DC's where most of them are users of technology rather than inventative or producers of it and hence such self-independent concept stipulates the DC's to formulate technology policies which are different than policies adopted by the developed world.

#### A) Comparison Between Science And Technology Policies

The concepts of Science Policy and Technology Policy might create confusion and to some extent could be treated as

one policy. Therefore, a distinction between these notions must be drawn and defined accordingly.

In science policy, the concept deals with actions related principally to scientific research involved with basic and applied knowledge which could not be utilised directly in productive activities. The scientific results of such activities are shown mainly in widespread and open publications. Furthermore, the evaluation of the results of research projects is primarily related to the scientific community. There is a marked emphasis on science policy within educational institutions.

As for technology policy, its prime goal is to evaluate the totality of criteria which control the creation and utilisation of a technology and the development of relevant and related matters (manpower, resources, impacts, etc.).

#### B) Science & Technology Policy In Developed and Developing Countries

A concise overview of the evolution of policies for science and technology in the ~~OECD~~ (including all the industrialised capitalist economies), since 1945, has been given by Freeman.<sup>41</sup> His interest was mainly to describe the likely and the desirable directions for science and technology policy (STP) in the New Economic Context of the 1980s but in order to do that convincingly he had to trace the trends of the past decades. Three phases of STP could be identified, reflecting phases in the economic development of the Western countries.

World War II left science with an enormous prestige, especially nuclear physics which had produced the weapons that had won the war and determined the pattern of post-war strategic power. In the U.S.A. and USSR, also in Britain, the post-war period of the 1940s and 50s saw a strong emphasis on high technology and Big Science in the related nuclear, military and aerospace fields. By contrast, the defeated nations, Germany and Japan, concentrated R & D efforts into civilian industries and consequently laid the foundation for very high levels of growth in their industrial output and competitiveness during the 1960s and 1970s. Emphasis on Big Science and military projects can be related to the relatively poor performance of Britain's ageing industries in the same period, while in the USSR agriculture and consumer goods suffered from the concentration on nuclear and military competition with the U.S.A.

The lop-sidedness of scientific effort, similar to that reproduced in Third World countries like India, was accompanied by an over-emphasis of R & D generally and neglect of the application of science and technology to generating new commercial products and raising the productivity of processes. Technical change in industry tended to be neglected by economists who, under the influence of the Keynesian paradigm, assumed that if the level of demand of goods was sustained new products and processes would inevitably arise to satisfy the market. A high level of R & D was agreed to be beneficial and in fact, expanding R & D budgets did contribute to the unprecedented economic growth in that period.

The mechanisms of technical change, criteria for allocating resources within R & D and the direction of science policy generally, remained neglected areas of concern. The lobbying of the big scientific institutions engaged in Big Science activities continued to be the major factor in pre-empting a large slice of available funds.

The slowdown in economic growth in the late 1960s, produced a new phase of science and technology policies, according to Freeman in which a more cost-conscious and critical attitude appeared. Private firms suffered increased competition which forced them to examine their R & D efforts more carefully. Similarly government projects experienced embarrassing time and cost over-runs, especially in weapons and aerospace, leading to pressure for greater public accountability. Much new work was done in elaborating the theory of the role of technical change in economic growth and competitiveness,<sup>42</sup> also on the economic and social environment conducive to innovation and diffusion of technologies. More emphasis was placed on technology assessment and project evaluation.<sup>43-45</sup>

In general, Freeman regarded the changes as more at the level of ideas than practice. Cost and environmental factors led to the establishment of new ministries for science and technology policy and to departments for its academic study.

Freeman argues that a third stage of STP began in the late 1970s, when it became apparent that a major recession in economic activity had arrived. Keynesian demand management

was no longer adequate to ensure growth and the view became popular in academic circles that depression was connected to a lack of new products and processes is required new technologies as a basis for new industries.<sup>46</sup>

Looking at the experience in the developed countries, however, it is apparent that the features of "inappropriateness" in western science and technology are also increasingly inappropriate in the developed countries themselves. The same criticisms of over-emphasis on big science, lack of linkage to the problems of industry, or to the satisfaction of real needs, especially of the poor and lack of long-term ecological sustainability, are made in both "North" and "South". ~~Heitne~~<sup>46</sup> argues that a world economic/technological/ecological crisis has developed in which neither self-reliance by Third World countries nor easily-maintained affluence by the rich countries are realistic paths. The problems of economic development are now globalised and according to him the distinction between Third World and developed countries may not be so relevant.

This is not to diminish the different nature of the problems faced by countries in which most people face absolute poverty and those where, despite recession affluence it still the norm. However, it is true that in both developed and developing countries the same division is seen between the possibility of using science and technology for meeting the needs of the majority of the population, at whatever level is acceptable in each society, in an ecologically sustainable way and the rigid structures of government, industry and

traditional academic institutions which continue to direct a disproportionate share of effort into prestigious big science and military competition. If Hettne is correct in seeing a small-scale "ecodevelopment" strategy as a possible new, global paradigm, aimed at the problems of overdevelopment as much as those of underdevelopment, he is also correct to see it as very much a submerged option facing powerful opposition from elites in rich and poor countries.

As for a developing country, the author has chosen India which had gone through a whole period of planning science and technology for development, has been establishing several bodies for science and technology planning and policies and had encouraged the development, participation and reliance on indigenous cadres. Nevertheless, India has faced several problems<sup>47</sup> and criticism in this respect, e.g., establishment of university system which is Eurocentric and thus lack relevance to development needs; enormous growth of social sciences in comparison to applied sciences, implementation of projects which relied on foreign experts who favour the interest of themselves and their companies, etc.

To further improve and utilise science and technology in India, Kothari<sup>48</sup> called for efforts to develop science policy studies, leading to more rational methods of evaluating scientific efforts in terms of its contribution to India's economic plans by allocating resources on a more purposeful basis./

The author, from the above discussions, would



deduce that the developed world had mainly to utilise and plan science and technology to three major areas: a) to strengthen its military force and status, b) to enhance its economic power by building diversified industries; and c) encourage for innovations and R & D activities to increase commercial outputs and competitions. As for the DC's and Kuwait as well, their main aim was to employ science and technology (irrespective of their origins) to solve their socio-economic problems and to help improve their standard of living and that most of them did not establish SPMB's to be responsible for planning and employment of science and technology effectively for the development of their homelands. The author also believes that if science and technology are to be directed at social needs in DC's they have to be applied, not in a narrow specialised way, but in a context of planning, which includes economic and sociological realities and is therefore interdisciplinary. Thus a clear national science and technology policies are needed to direct research towards national needs, which would imply critical assessment of the output of research. In the absence of evaluation and assessment, the research is directionless (refer to Chapters V & VIII which prove this fact), and hence there would be no selectivity or priorities and emphasis on those problems which are critical for the progress of the country and would de-attach science and technology from the development of the country.

The links between science & technology and the development of the third world will be discussed in the next section.

## 5) Development Theory & The Third World

The evolution of the development theory in the post-II War period was defined by Hettne <sup>49</sup> as a concept which has four elements: i) it is interdisciplinary, ii) it is concerned with transformation, iii) it is related to actual development strategy, and iv) it is normative (concerned with goals and objectives and not just analysis of current situations). Furthermore, Hettne applies the concept of "paradigms" to the evolution of development theory. At first it shared a paradigm of economic development that was based on the experiences of the industrialised countries but in the 1960s and 70s, experienced a shift to a new paradigm, derived from the failures of the attempts to transplant Western development paths to third world countries. Beyond this Hettne sees the possible formation of a third paradigm taking shape, "globalism" which can chart a common, converging path for both "underdeveloped" and "overdeveloped" countries. He warns however, that "Paradigms in the social sciences tend to accumulate rather than replace each other"; so that earlier approaches to development, even if academically superseded, are often still powerfully influencing government policies in the Third World.

Hettne also argues that there has been "a general Western development paradigm which colours most Western contributions" - a specifically Western image of reality which Westerners themselves have had difficulty in perceiving. This paradigm dominated development thinking in the 1950s

and 1960s, when third world countries were expected to imitate the paths to industrialisation taken by Western countries in the previous century.

The central idea in Eurocentric development thinking is growth, which is cumulative, directional and increasing in complexity. From the early nineteenth century, the West believed that growth implied progress and that the kind of economic growth seen in Western countries should be imitated by "backward" third world areas. This "mainstream" of Western thinking presented itself to Third World countries as two variants, liberalism and Marxism, which the cold war asked them to choose between but Hettne argues that both are fundamentally similar in their values. Both contain the "missionary assumption", that modernisation necessitates the imitation of the "advanced" countries by the third world; the idea of nature as an object to be exploited; the primacy of industry over agriculture; and the nation state as the basic unit.

For different reasons, the Western models of economic development, based on the experiences of the established industrial countries have not easily been applied in the third world. The liberal, Free Trade model only succeeded for Britain as the pioneer industrialiser, which enforced a world division of labour on to other countries who were then unable to follow the British path to industrialisation. Later industrialisers needed to use increasing degrees of State protection and direction for industry, the extreme example being the

Soviet model, based on forcible accumulation and exploitation. This has led to the same "materialism and growthmanship" as liberalism.

According to Hettne, the domination of third world countries by intellectual elites has produced an urban bias and, in the absence of a native commercial class, a prostrate, antimarket bias, which favoured Western values. The Western model was thus not in any way forced upon the DC's. It was fully consistent with the power structure in those countries.

In the mid-1960s, the experience of third world countries cast increasing doubts on whether it would be possible, or desirable, to imitate the developed world, as "modernisation" implied. It was realised that prevailing structures of world trade confined third world countries to the role of primary producers, whose terms of trade with the industrial economies were deteriorating, so that they remained in a static or worsening position of underdevelopment. In other words, the cause of lack of economic progress was not "endogenous" - due to internal "barriers" - but "exogenous" - due to their relationship to the established industrial powers. In Latin America, sociologists found that local accumulation by a native bourgeoisie was actively prevented by foreign capital. By the early 1970s, the modernisation paradigm was generally replaced in many radical academic circles by the "dependency paradigm".

Dependency theory arose in Latin America and was therefore a paradigm originating in third world experience,

rather than western values. Hettne presents it as an important step in the indigenisation of development theory. It rested on distinction between the Centre and the Periphery (Third World), in which the Centre countries held the rest in a relationship of dependency, through the international division of labour, i.e., restricting local industrialisation so that Periphery countries remained as primary producers only.

The logical response to the dependency analysis was to seek to "de-couple" the national economy from world markets by using the state to implement economic nationalism and build up local production, with the aim of self-reliance. This implied revolutionary politics to displace the local elites, whose interests were involved with foreign capital. In this context, IDRC<sup>50</sup> has published views on technological dependence/self-reliance concepts, in which it expressed the point of views of several scholars from different countries. The author believes however that the development of indigenous (and not foreigncentric based) infrastructures in terms of manpower or capabilities to plan, analyse, design and monitor the scientific knowledge and technological know-how to fulfill the socio-economic plans and objectives. Such trend could be achieved by full integration of scientific and technical activities and infrastructures with institutional and societal needs on one hand, and with policy-making at the political level on the other. Therefore, for a developing country, as Kuwait, to be almost technologically self-reliant, they have to acquire or plan to create (if possible)

technologies that are appropriate to their socio-economic and environment contexts and not merely to import technologies, per se, without any real assessment of the impacts of these technologies on the society, manpower development, economic growth, etc. Furthermore acquiring foreign technologies and turn key project execution for development might add to the modernization of the country, but nevertheless, they would not increase the self-reliant aspect, and would not allow the national manpower or institutions to be further developed due to their isolation from such activities and due to the fact that they are originated in the west and in their early stages were "foreigncentric" in their creations and applications.

Hence, the DC's have to be aware that most of their development thinking, technological advances, academic organisations, R & D institutions, industrial infrastructures are largely the products of the foreign industrialised countries, and thus, are outsider products of their indigenous development scheme. Such situation has allowed for "academic, industrial and technological imperialism" and it necessitates the DC's to review the applications of science & technology for development in terms of relevance to their socio-economic objectives and plan and not as an instrument to reproduce western values and organisational forms or as a means to catch up with or imitate the growth in the industrialised nations.

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## CHAPTER II

### THE SOCIO-ECONOMIC INFRASTRUCTURE AND POLITICAL SETTING OF KUWAIT

The objective of this chapter is to describe and analyse the socio-economic and political structures in Kuwait, an Arab nation which possesses a very special class of third world country. The chapter will also describe some of the specific problems that Kuwait faces in order to evaluate the extent of the effects of such social, demographic and economic problems on the application of science and technology for development of Kuwait (a country which has per capita income<sup>1</sup> of US\$.19818 in 1981).

In order to investigate the various problems that hinder or decrease the rate of national development, it is essential to study and analyse thoroughly various social, economic and demographic parameters, i.e., population structure and composition, socio-economic indicators, financial infrastructure, etc., that contribute to the overall national development.

#### 1) Geographical and Demographic Characteristics of Kuwait

Situated at the north-west tip of the Arabian Gulf, and bounded by Iraq and Saudi Arabia, Kuwait covers an area



FIG.2.1 MAP OF THE STATE OF KUWAIT

Source: Ministry of Information, Kuwait

of 17,818 sq. km. Most of this land is desert, and constantly flowing water is non-existent. There is little rainfall<sup>2</sup> and the climate is dry and hot<sup>3</sup> (temperature might rise to 50°C in the summer with occasional dust storm).

It is clear then, that Kuwait has ~~very extreme~~ climatic conditions and these pose several problems for the use of technology and also pose problems which rather advanced technology is required to solve, e.g., water supply, irrigation process, air conditioning, etc. These conditions severely hamper the efficiency and the life span of imported equipment and machinery and therefore, modifications are needed on these imported items to ensure better performance.

As for the demographic characteristic of Kuwait, the population composition imposes a dilemma. The 1980 Government Census revealed that Kuwait's population was 1,355,825, amongst which only 562,065 (41.5%) were Kuwaitis. Although the expatriates are undoubtedly needed to maintain a momentum of the economy, nevertheless the presence of multi-nationalities in Kuwait imports with it numerous social and cultural problems. The population growth is 5.8% per annum including Kuwaitis and foreigners<sup>4</sup>.

Statistics show<sup>5</sup> that Kuwaitis formed a low percentage of the workforce for three principal reasons: a) women are not encouraged to work; b) some of the population is not included in figures because they are classed as being

'of sufficient independent means'; and c) a large proportion are under 15. Kuwait realises that if these young people are educated properly, they could provide the answer to future labour problems - they could decrease the dependence on expatriates. (refer to Table 2.1).

The author believes that Kuwait should, in order to eliminate such problem, take step to re-evaluate her education system, ensuring an adequate supply of technicians and scientists and adopting measures to acquire capital intensive technology or else, increase the quota of naturalizations amongst foreigners.

## 2) General Socio-Economic Indicators of Kuwait

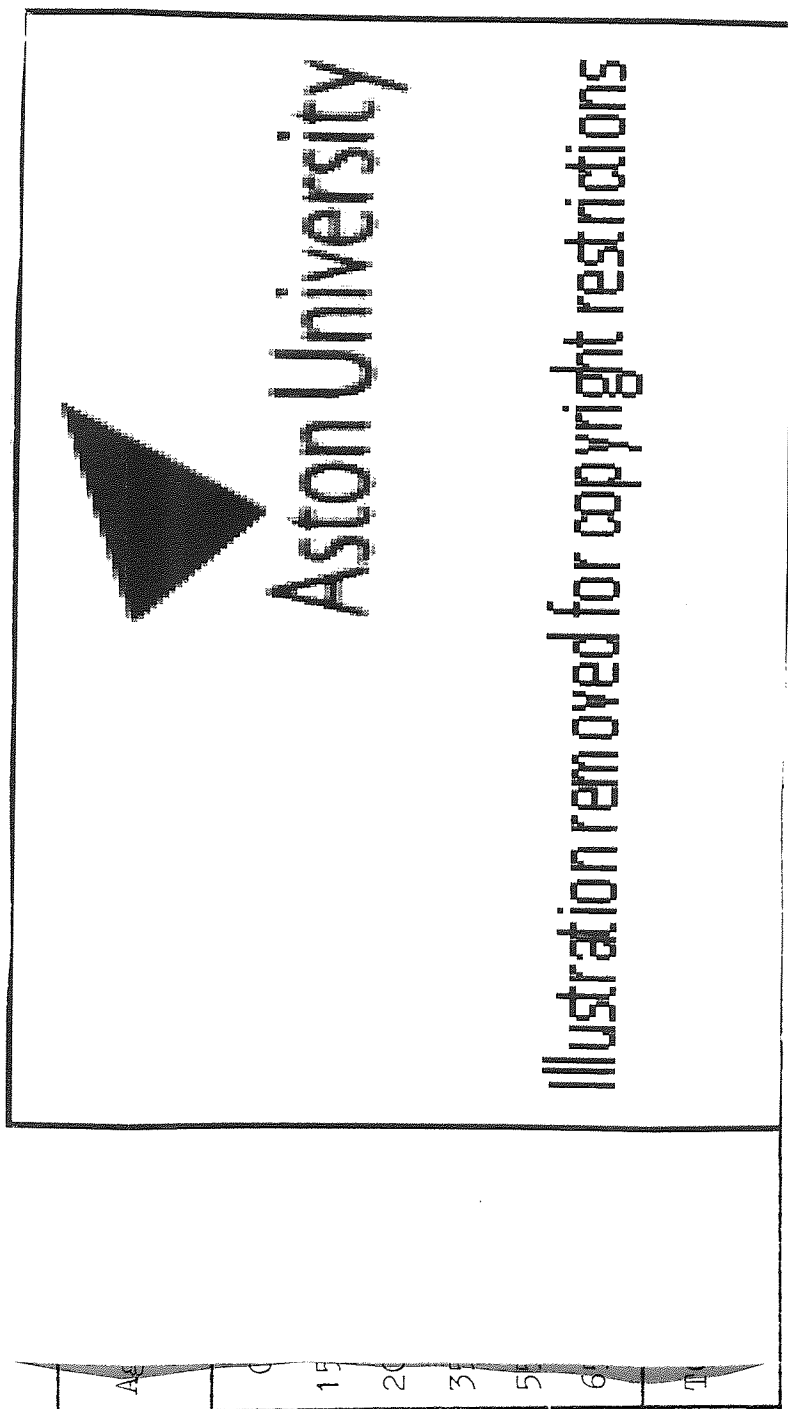
Kuwait was a poor and less developed country before the discovery of oil, nevertheless, there had been a traditional trading based on dates, pearls and building materials, and that tradition has been carried on in a different context with new oil wealth. The experience of Kuwaitis in trade was the foundation upon which, after their new found wealth, they were able to build a well-established trade and investment structures. Table 2.2 illustrates the economic indicators of Kuwait.

## 3) National Development Plans

The social development plans of Kuwait were



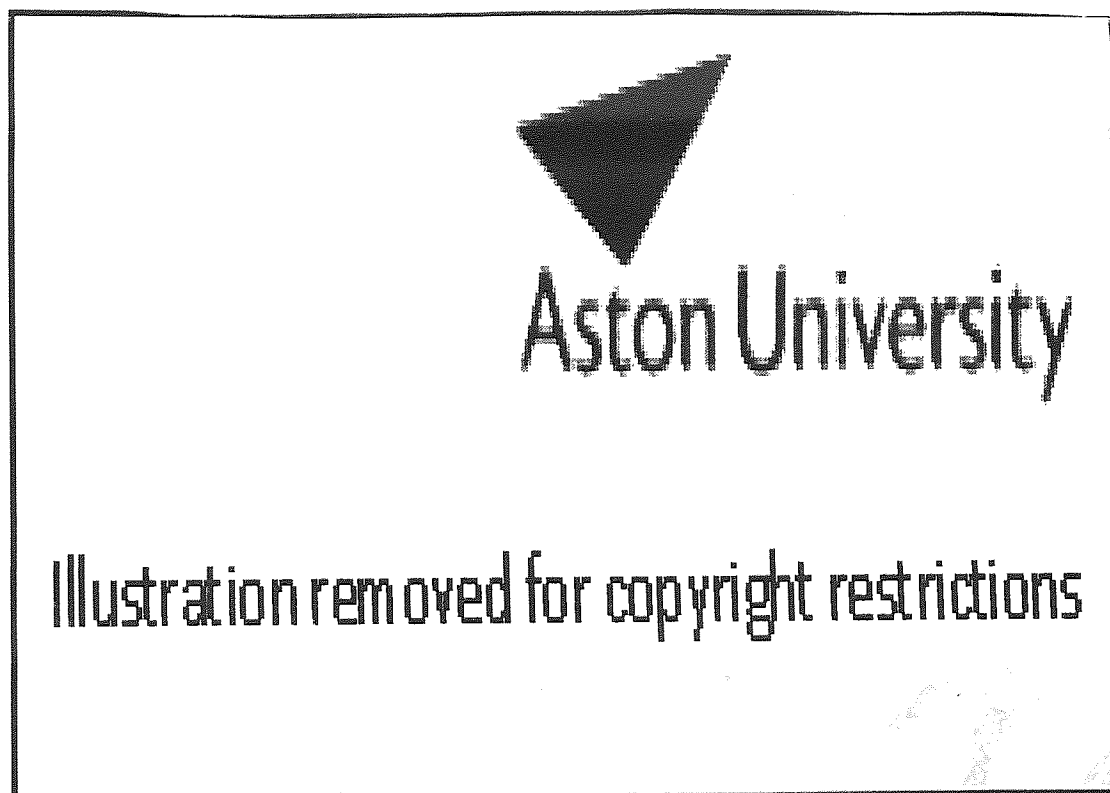
TABLE 2.1      Distribution of Population By Age Group : 1980



Age	
0-14	3.8
15-24	7.4
25-34	3.1
35-44	3.1
45-54	1.9
55-64	0.7
Total	00.

Source: "Central Statistical Office," Ministry of Planning, Kuwait.

TABLE 2.2: Economic Indicators of Kuwait



Source: "Annual Statistical Abstract - 1980", Ministry  
Planning, Kuwait.

Al-Anba News Paper, (Kuwait), No. 2440, 10.10.82,  
p. 2, In Arabic.

Al-Rai Al-Aam News Paper, (Kuwait), No.6987,  
30.4.1982, p. 8, In Arabic.

structured mainly to achieve the following objectives:<sup>6</sup>

- i) Raising the quality and standards of living of the individual, satisfying his social, spiritual and material needs, and enabling him to creatively associate with social environment. Thus, the economic growth witnessed by the State of Kuwait should be accompanied by social expansion, directly aiming at the satisfaction of the individual and society's needs.
- ii) Solving problems facing the individual which impede the development of his social progress, especially those problems connected with medical care, the family, youth, childhood, housing, social amenities, conservation of the environment, etc.
- iii) Ensuring an increase in man-power numbers in order to cope with the rapid development. The purpose of this objective is to maintain employment throughout the population, to lessen the burden on the social service institutions and to improve the standard of conduct and quality of work through the provision of an essential technical basis and the development of personal skills.
- iv) Co-ordinating the different public institutions working in the field of social development to avoid duplication, overlapping or contradiction and to integrate and to co-ordinate the total effect for the individual and for

the society as a whole.

- v) Broadening the scope of people's participation by using the information medium for social development.
- vi) Encouraging the interaction of the various social groups and the integration of the different social types in the total society, in order to create one identifiable local environment that would include all residents in the society.

To accomplish such development, Kuwait has developed several national development plan<sup>7-8</sup> as of 1966 which witnessed the first five-year plans. The various plans serve to explicitly states the national priorities, i.e., diversify the economy, to increase the ~~GDP~~, to increase the local population, to develop industrial base, to establish transport and communication systems, to conserve the environment, construct houses for populace, etc.

The author would like to emphasise that for undeclared official reasons, none of the five-year plans in Kuwait have been practically and officially implemented. Notwithstanding, the plans have been fulfilled in terms of building a diversified non-oil based economy and its infrastructure (industry, insurance, investment, shipping, etc.) ~~and~~ in terms of providing good health and medical system. The plans have failed, however, to increase the Kuwaiti

population to a majority. Moreover, none of the plans have indicated or included any attempt at planning for a science and technology policy, albeit Kuwait has been utilising science and technology for development and has established various ad-hoc scientific and technical infrastructures. This would seem to indicate that the policy and decision-makers are not aware of, or are putting less emphasis on, the role of organised scientific and technical endeavours and activities.

#### 4) The Economic and Financial Infrastructures

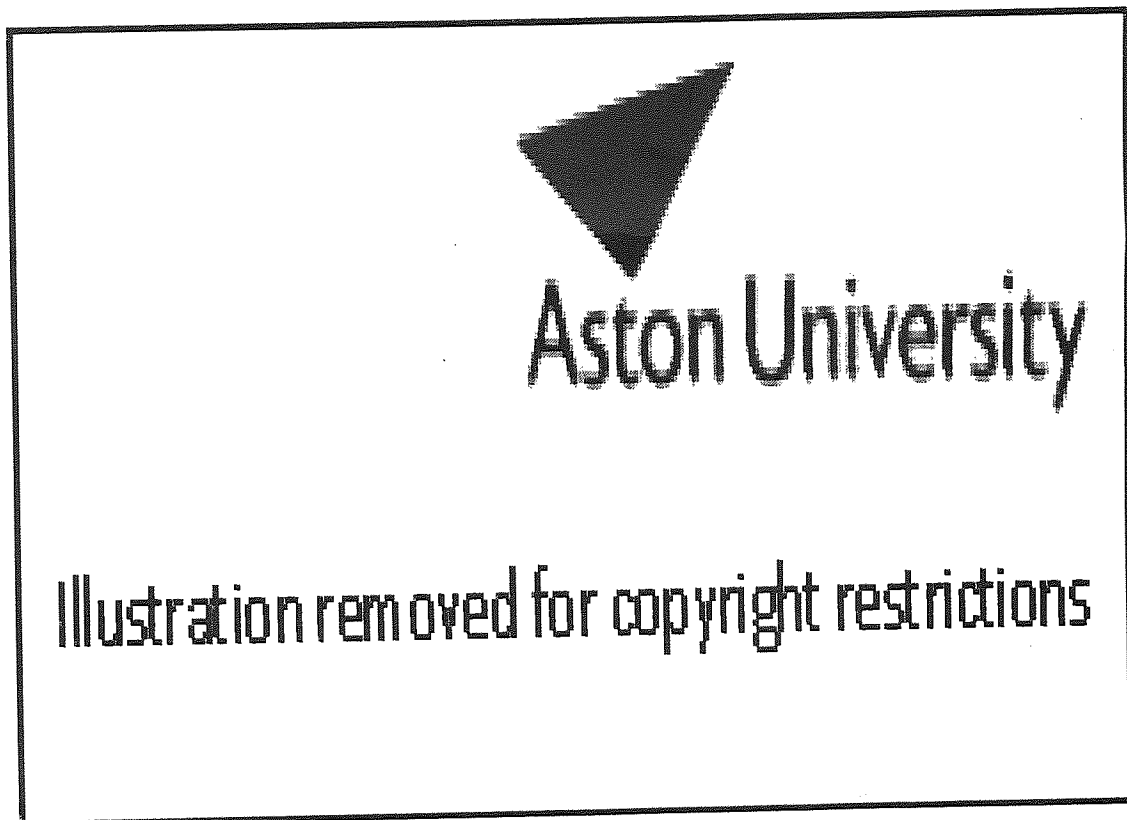
Kuwait is mainly dependent on oil. In 1979, the oil sector accounted for 72.3% of the GDP, 81% of public revenues and 93.7% of export earnings<sup>9</sup> (refer to Table 2.3). The oil industry (survey, extraction, refining, sale, etc.) is entirely owned and operated by the Government.

As a result of certain historical and social circumstances, the Government of Kuwait has encouraged the private sector to participate in developing the economy by initiating "mixed sector" in which the Government would establish multi-purpose companies and allowing the private sectors to participate in the shares and thus in the board of directors. Such trends would undoubtedly increase job opportunities, lessen the financial risk of the State, help both sides to become more efficient, and hence form a stronger, unified

TABLE 2.3:

Indicators of Kuwait Economy Dependence  
On Oil

YEARS	%	%	% Share Of Oil
	(Oil Exports/	(Oil Revenue/	



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Source: "Annual Statistical Abstract - 1980",  
Ministry of Planning, Kuwait.

economic structure. Table 2.4 illustrates various mixed ventures in Kuwait.

As for the economy, economic growth can only come about if output increases in all the major sectors of the economy. Care must be taken to ensure that this economic growth is achieved in an economic fashion, avoiding the too common danger of economic dualism, that is to say, concentrating on just one individual sector, and neglecting development in other sectors. In this way wealth diffuses through and various sectors and economic growth is sustained.

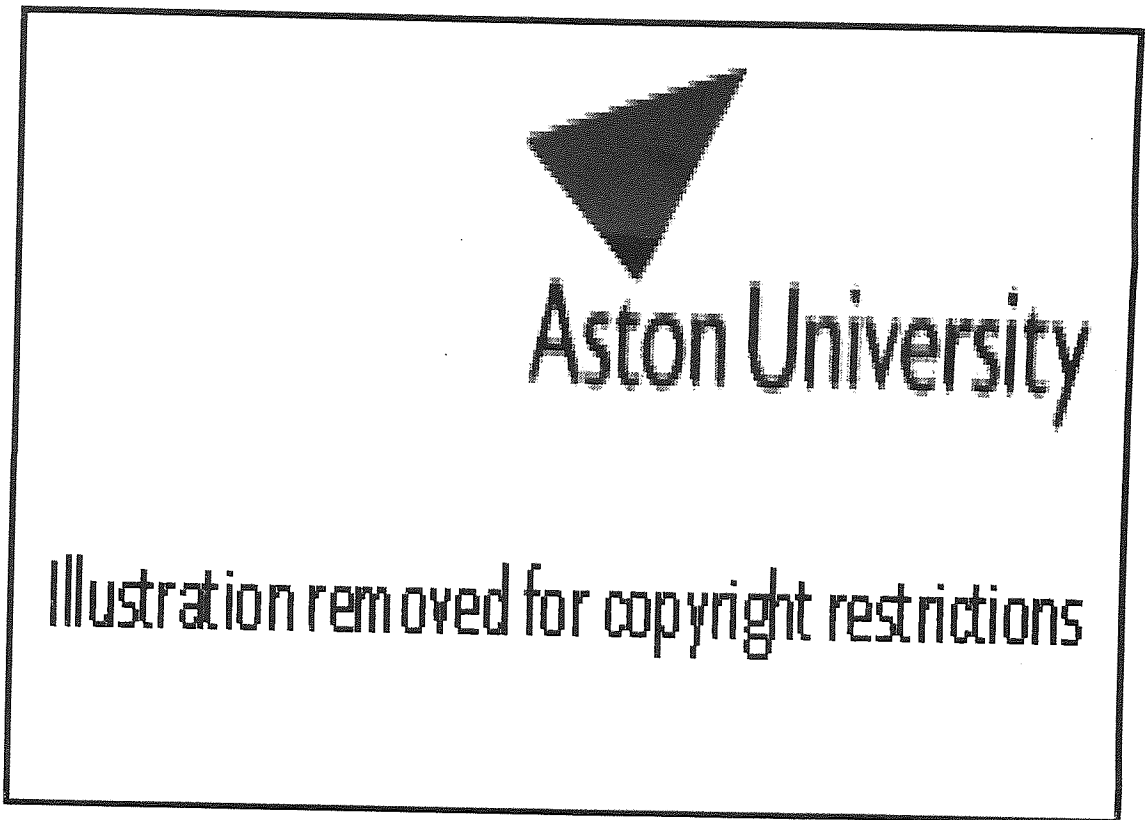
If economic dualism exists, then in Kuwait's case, the oil sector would remain the anchor of the economy. New wealth generated would be used to purchase finished goods from advanced countries, and the domestic economy would not benefit at all. Economies which do not enjoy sustained economic growth are usually economically unstable and often dependent on other countries. Another characteristic is a low productivity level or the neglect of productivity potential. An economy which enjoys growth in a number of sectors will also enjoy the benefit of wealth passing between various sectors, making it more stable.

The starting point for Kuwait is of course oil, but the government is investing in non-oil sectors, such as the petrochemical industry, food production, telecommunications,

TABLE 2.4:

Mixed Ventures (Private/Public)

			Year
--	--	--	------



Source: "Annual Statistical Abstract - 1980",  
Ministry of Planning, Kuwait.



transportation, social services, etc. Manpower training and technology transfer have further stimulated growth in non-strategic sectors of the economy.

Kuwait must then pay great attention to developing industry and stimulating agriculture and services. Investment increases lead to income increases, which lead to saving increases and full circle back to investment.

The future growth of the national income in Kuwait hinges on the following: the optimum rate and terms of converting petroleum to a flow of financial and other real assets, human capital formation, optimum sectoral and geographical allocation of investment assets, and optimum rate of savings out current income and reinvestment of earnings.

Of prime importance is the question of what Kuwait should invest in. Agriculture on a large scale is ruled out due to the harsh weather and the lack of qualified farmers. Industry would seem a better choice, as the capital of buying plants, etc., is available and Kuwait could use her raw materials to good effect and produce petrochemicals, fertilizers, etc. But there is a severe lack of domestic labour and therefore Kuwait has to rely on foreign workers, capital intensive technology and capital intensive plants. Then there is the question of Kuwait's small populace and consequently small market, placing it in the unenviable position of having

to compete with exports on the international market.

As mentioned earlier, related to sustained economic growth is increased overall production, something which Kuwait is managing. Kuwait is unique among Third World countries in that it has a capital surplus economy. Kuwait has sought to diversify the economy and broaden its production base by channelling capital surpluses into specific economic sectors.

This process has been aided by the transfer of modern technology to the domestic economy. This has been done however in an ad-hoc manner. Provision must be made to keep industry fully informed of new technology as it becomes available and co-ordinate the backward and forward linkages of new technology.

An area in which Kuwait has been singularly successful is in establishing a modern welfare state in the space of a single generation. This has been accomplished without having to resort to citizen taxes for funding.

Such achievements have been possible because revenues resulting from oil exports have been used in a sensible fashion. There is a limit to what a small market like Kuwait can absorb and consequently the government has made efforts to increase Kuwait's absorptive capacity and use some of the surplus funds.

The government has to find ways to use some of these surplus funds by investing in projects such as shifting total dependence from crude oil exports to downstream operations like refining, petrochemicals and reducing domestic consumption of energy resources by looking into solar energy, for example. Policies in these areas need to be clearly defined and funds given over to R & D increased. Moreover, Kuwait should plan to develop and widely encourage the emergence of creative and dynamic communities of scientists, technicians, engineers and their institutions to pave a scheme of mastering her economy by her capabilities.

Capital surpluses could also be channelled into food technology, reducing Kuwait's dependence on foreign sources, where at present, Kuwait depends almost entirely on imports to meet her requirements.

The last area in which capital surpluses should be channelled is automation and manpower training. Economic development has brought with it increased dependence on imported labour, placing considerable strains on public services. Kuwait should try to increase the labour force participation rate among Kuwaiti workers, increase labour productivity through automation and capital intensive production methods and orientate the manpower training for Kuwaitis in production areas which require an intensive use of technology.

Economic plans, by their very nature have certain objectives as their outcome. But these objectives must be realistic and not in conflict with each other. In the formulation of objectives, great care is required.

To achieve a successful and productive economic plan, a science and technology policy seems to be necessary, providing that it should be incorporated with economic plans, developed explicitly, and to be co-ordinated with and defined in terms of overall national planning (manpower, research activities, measures of technology transfers, etc.). Such collaboration will ensure the evolution of feed-back from the long-term science and technology policy planning to the short and medium-terms of socio-economic processes.

#### 5) Kuwait's Political System

After Kuwait gained its independence in 1961 via the 1899 Treaty with Great Britain, the Emir, Sheikh Abdullah Al-Salim Al-Sabah, expressed his intention to form a constitutional, democratic government. The Constitution, published in 1961, contains 183 Articles and is a blending together of both Western and Arab ideas. Main excerpts of the Constitution are cited in Appendix-I.

Legislative power is vested in a 50 member National Assembly and the ruler, whilst executive power rests solely with the ruler and his council of Ministers. The Assembly

ratifies any legislation that the Executive draws up. The Egyptian system forms the model for the Kuwaiti Judicial system. Criminal justice is meted out in Magistrate' courts, criminal assize courts and various appeal courts. Civil law goes through a general court to a high court appeal.

There are few parliamentary assemblies functioning in the Middle East like the Kuwait National Assembly. This freely elected Parliament means that Kuwait is generally considered the most liberal state in the Arabian peninsula.

Only Kuwaiti males over the age of 21 are allowed to sit on the Assembly. They must be Kuwaiti born or have 10 years' naturalisation. The first Assembly was elected in January, 1963. Since then there have been five different assemblies, the last one convened in 1981, although there was a gap of five years between 1976-81 when parliamentary life was dissolved.

Political parties such as those found in the West are banned, though groups do emerge within the Assembly like the Islamic Fundamentalists and Arab Nationalists. Family allegiances and personal concerns seem of more concern to the electorate than political beliefs. It should be stressed that election is free and those elected are not just a mouth-piece of the leader.

6) Kuwait: Developed or Developing Nation?

Having described the various characteristics specific to Kuwait, how does Kuwait stand with respect to other so called developing nations? Is Kuwait developing or developed nation? Developed and developing countries have been classified, over the years, in a number of ways:

A. Developed Countries: Such countries have been characterized by:

- i) High per capita income (US\$.1500 - 4000).
- ii) High energy consumption.
- iii) Low illiteracy rate.
- iv) High productivity and general consumption.
- v) Well established industrial organization.
- vi) Exporting of technology, machines, etc.
- vii) Well structured University and R & D Centres and Institutions.
- viii) Abundancy of skilled manpower.
- ix) Well established communications, media, informations and transport systems.
- x) Technological anciliary institutions (patent systems, finance foundations, scientific organizations, etc.).

B. Developing Countries

The parameters laid down to describe developing countries are however, far less clear and a number of

definitions<sup>10-12</sup> have been put forward by authorities on the subject. Jaskinski<sup>13</sup> has however offered the most rational definition:

- i) Nations which are rich in capital and raw materials and which are in great demand in the international market but lack the qualified manpower. These nations do not experience any complications in the acquiring and application of modern foreign technology. Their only problem is to absorb and diffuse the nascent technology socially. The rich Arab countries (oil producers) are examples of such a class.
- ii) Nations who are relatively rich in labour but experience slight shortage of capital to be utilized in development schemes and have basic raw materials. Mexico, Brazil, India and Argentina are illustrations of such a category.
- iii) Nations lacking capital, but possessing attractive raw materials (for local use and export), as well as a sufficient amount of qualified labour. Central African States, South and North Yemen are excellent examples of such groups.

But looking at Kuwait in the light of these definitions, she can be seen to take on characteristics of both developed and developing countries. In terms of developed

countries, Kuwait has a high per capita income, a high energy consumption, a low illiteracy rate and execution of well-planned and effective adult literacy and education programmes, is a consumer of luxurious commodities, has moderate R & D and higher education organizations, has limited industrial activities, has well-established communication, media and transport systems, has strong links with the world, has parliament and legislative power, a well-organized educational system, advanced health services and a matured economy.

But she also has features associated with developing countries, namely; weak industrial and technical infrastructures with respect to manpower, R & D, innovations, design and plan of technology, turnkey projects, etc., raw material deficiency, heavy reliance on skilled expatriates and technology, and technology components, spare parts, operations, etc., are almost entirely imported.

The above evidence would suggest that Kuwait should be allocated a class of its own as far as world development status is concerned in that she is neither in toto developed or in toto developing country. However, it must be admitted that such a distinctive class of world development might give rise to problems and queriers in the formulation of perspectives and the analysis of science and technology policies to be adopted by Kuwait.



Moreover, such distinctive class of world development does pose very special problems about the utility of much of the experience of the literature that has been written about the process of development in terms of its relevance to Kuwait's needs, as shall be discussed in the following chapters.

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## CHAPTER III

### PLANNING, POLICY AND DECISION-MAKING

#### PROCESSES IN KUWAIT

In recent years the trends in the world have been directed towards the planning of a development policy for various sectors within a country, e.g., manpower, science and technology, industry, in order to build up well established socio-economic structures in accordance to the countries' strategical and national objectives. In this context, Tinbergen<sup>1</sup> has discussed the origin of scientific planning and he considered these origins with respect to the development of certain characteristics of scientific planning which are: econometrics, social studies, psychological basis of economics.

In this chapter, the author aims to analyse the planning, policy and decision-making processes; and the existance of any form (if any) of the science and technology policy in Kuwait.

#### 1) Planning Processes

Planning is a vital function to be executed by establishing contacts with peers, outside institutions, technical experts and related representatives. Due to the wide range of contacts, the procedures to be adopted will depend on the

criteria applied to the quality of the plan, the time required and the structure of the problems to be solved, the state of the national economy and the economic policy itself. The Arab World's knowledge and understanding on these aspects is still in its infancy and considerable work has still to be done before a definitive and coherent process can be evolved to be adopted regionally and in the Arab World. During the planning process it must be emphasised that the key issue of planning is political management of the economy.

The Arab World including Kuwait being one of the world's most important economic regions, and keeping in mind their "finite resources" it is imperative that sophisticated techniques of adopting and constantly upgrading the planning of an economic policy with specific emphasis on a development policy be pursued. For Kuwait and the Arab World, what a given situation would most likely be at some future period, is an aspect that is becoming more and more of a challenge every day. Thus, "thinking ahead" known as forecasting based on a knowledge of the operations of social forces is in a nutshell what "Policy Planning" is all about.

Every effort must be made to integrate isolated parts of economic policy to bring about sound development, utilising the three chief elements of economic planning - looking ahead, coordination, and the attainment of given long-term goals.

Planning should be undertaken in the limited sense of the scientific mode of working - drawing up plans to

reproduce statistically the most desirable development. To achieve this, the nature of the subject and involvement should be thoroughly understood. Further, it should take into account a wide array of impediments characterising Kuwait and most of the Arab World. Appropriately, to translate the plan into concrete proposals, methods of planning should encompass a high quality of leadership, motivation and drive, modern-mindedness, innate capability and a broad Arab nationalist horizon embracing the whole Arab World.

However, the basic functions of this office should be the formulation of economic plans tailored to fit pre-determined viable policies of the country. As economic policy covers a very wide field, this office will have to work in consultation with several other agencies ~~such~~ as the office of statistics, public bodies, scientists, sociologists, and various ministries. The productive process of this office has also various other aspects, which may be grouped under the headings of function, method, procedure and organisation. For various proven reasons, Offices of Economic Planning in Kuwait and the Arab World should not be called upon to supervise the execution of the plan - rather, the planning office should act as advisors leaving the execution to the executive, in other words the ministries.

For Kuwait, the word organisation is the hierarchical relationships between those involved in planning and the rest of government bodies. The size of the internal organisation (within the planning body) for Kuwait depends

on the structure of the problems to be solved, the economic activities, the nature of industries and transformation in the socio-economic and political system. The challenge lies, however, in determining which authorities are empowered to give the planning office its commission and the manner in which contacts with various institutions or persons involved in the work are to be maintained.

The Ministry of Planning is responsible for initiating a socio-economic plan in Kuwait (refer to Appendix III). Privately, a senior officer in the Ministry informed the author that albeit the Ministry is in charge of socio-economic planning process, "bottlenecks" do occur due to haphazard coordination of other Ministries and bodies which adversely affects the role of the Ministry of Planning in the fulfillment of its obligations and the smooth execution of its socio-economic plans in Kuwait. Thus, this statement indicates that the planning process in Kuwait is an ad-hoc, unco-ordinated and haphazard, rather than, systematic process. This, indeed would hinder the design of any predetermined, scientifically-based socio-economic planning process. Furthermore, the officer add that the Government has neither endorsed and promulgated nor rejected any of the several Five-year Plans that have been proposed by the Ministry.

## 2) Policy-Making Procedure

Policy-making might be considered as a vital and challenging issue for the developing world, particularly for the fields of technology transfer where these nations

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have not the tools needed to control or master such process. Such issue would become more clear if we refer to Table 3.1 which illustrates the policy-making process. In this scheme the policy-making process undergoes through several steps, e.g., statement of policy formulation, legal advice, organizational structure and mechanism and then the effects of such process. The deficiencies in the DC's stem from the facts that they have either develop weak organizational structure and mechanism or that they lack the existence of such scheme. Moreover, many DC's do not have a legislative power to assist in promulgating and regulating the laws needed for the policy-making process.

Furthermore, the author believes that confusion persists amongst the DC's in terms of differentiating between explicit (clear and well defined) and implicit (not well specified but affecting the contextual issues), science and technology policies. To this extent, the author would illustrate the two sets of definitions, adopted by IDRC<sup>2</sup>, to distinguish between implicit and explicit policies. As for implicit policy, IDRC has evaluated it in terms of the following activities:

- i) Economic, ii) Manpower, iii) Culture,
- iv) Physio-ecology, v) Demography and Social aspects.

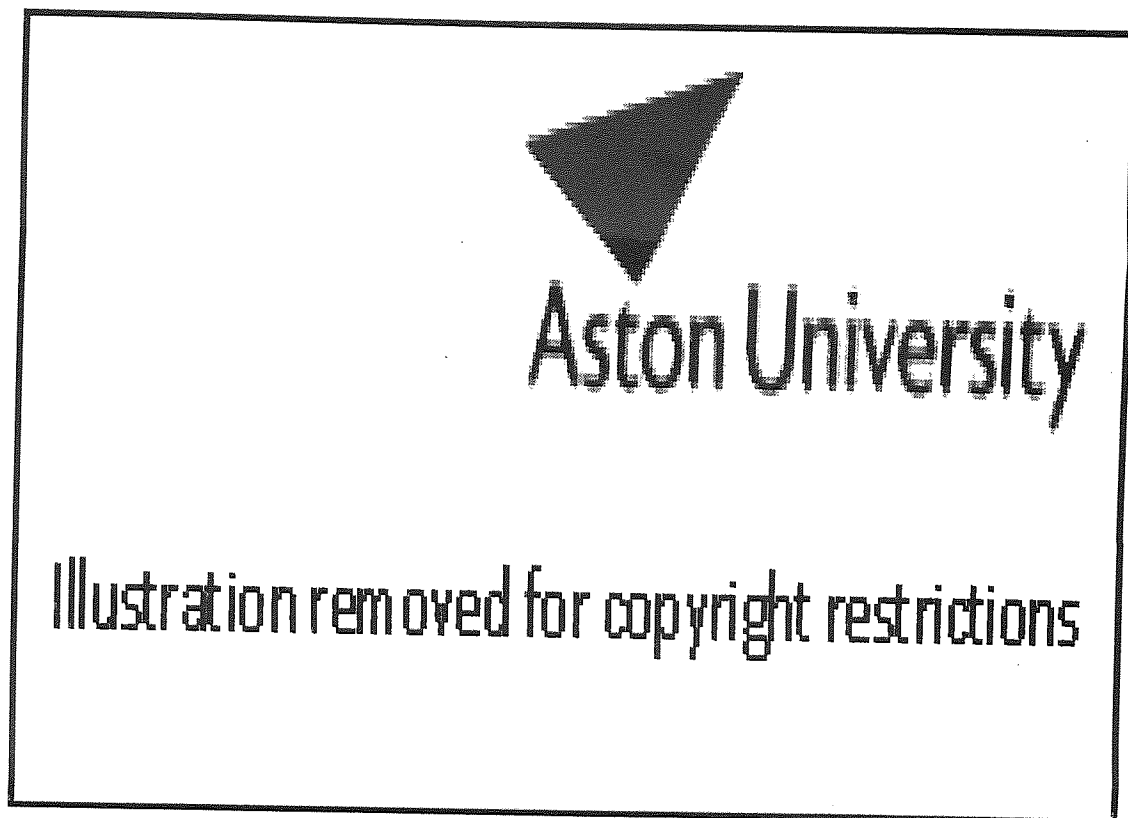
As for explicit policy, IDRC has defined such issue in terms of policy level and functions and activities affected by such level.



Table 3.1

Instruments of Policy-Making Process

Statement by high level



Source: "Science & Technology Policy Implementation In Less Developed Countries", (Canada: IDRC), 1976.

3) Policy And Decision-Making Processes In Kuwait

The policy and decision-making process in Kuwait, (a Parliamentary State, are resolved by debates and by thorough examination by the Government and Kuwait National Assembly (Parliament). Such a scheme of collaboration is governed by

the Kuwait Constitution which assigns the domain of authority to the executive, legislative and judicial power systems in the country as shown in Appendix II.

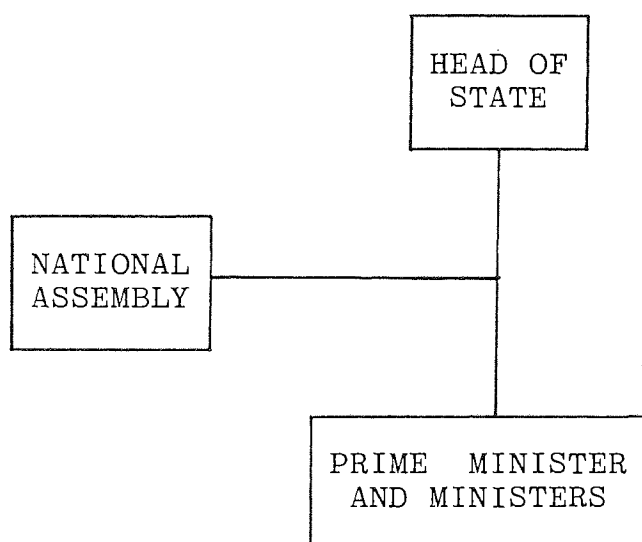
The Amir participates<sup>3</sup> with the Council of Ministers in establishing the general policy of the Country. The Amir also conducts part of the administrative responsibilities by promulgation of administrative ordinance, and appoints the military and civil officials. Furthermore, the Amir exercises his powers through his Ministers. The Prime Minister and the Ministers are collectively responsible to the Amir for the general policy of the State. Every Minister is individually responsible to the Amir for the affairs of his Ministry. In addition, the Council of Ministers have control over the Departments of the State, and is responsible for the formulation of the general policy of the Government, for pursuing its execution and supervising the conduct of work in Government departments. Every Minister supervises the affairs of his Ministry, executes the general policy of the Government, establishes directives for the Ministry and controls their execution.

Thus, the Head of State, the Council of Ministers, and the individual Ministers are responsible for the conduct of higher administrative affairs and the performance of executive power. The remaining officials of the executive power, e.g., undersecretaries, assistant undersecretaries, experts, directors, etc., are assigned the task of preparation of proposed laws, of establishing public utilities projects and

programmes, of performing the legal affairs of such programmes and of carrying out the administrative duties of technical affairs.

Appendix II provides the constitution's Articles that regulate the scope of authorities in Kuwait in terms of policy and decision-making processes.

Therefore, the policy and decision-making tree in Kuwait could be structured as follows:



To this extent, the author, as a major aim of this thesis, intends to investigate the possibility of existence of any form of science and technology policy by assessing IDRC methodology illustrated in section (2) above within the Amir, executive and legislative powers in Kuwait.

#### A. Head of State Office

A private communication with Mr. Abdulrazak Al-Mishari, the Assistant Undersecretary in the Amiri Dewan (The Amir's

official office) informed me that there exists no office, or any sort of organisational arrangement in the Head of State's office which is concerned with any science and technology policy, i.e., no organ in the Head of State Office has been established to be concerned with science and technology policy matters.

## B. The Parliament

As illustrated in Appendix II, no sub-committee exists within the boundary and authority of the Parliament which deals with Science and Technology policy issues. The National Assembly has not debated or discussed the topic of science and technology policy during its various sessions. Despite this fact, the Assembly has discussed matters related to education trends, higher education systems and research arrangements when discussing and reviewing the programmes of the Ministry of Education, University of Kuwait and Kuwait Institute for Scientific Research, respectively, to approve their annual budgets.<sup>4</sup>

Such trend has been expressed by the Deputy Chairman of the National Assembly as Follow<sup>5</sup>:

"Among the responsibilities of the National Assembly is the study of public policy within discussions of the General Budget of the various Ministries, Government agencies and organisations, or of the Government programme. The National Assembly does not interfere in the work of the Executive Authority unless the infeasibility of ongoing projects or policies becomes apparent to members of the Assembly, in which case the Assembly may restrict their continuation through appropriate legislation; similarly, the Assembly may encourage or expedite feasible projects and policies through legislation.



The National Assembly may play a more effective and influential role in the formulation of policies for Kuwait given greater co-operation with the Government."

At present, Parliamentarians collect their information in an ad-hoc manner from annual reports, meetings, interviews, personal contacts, etc. None of this is adequate for them to be fully informed in terms of political issues. This might be overcome by establishing a special committee which is delegated to deal with matters related to science and technology.

#### C) Council of Cabinet

The data provided by Appendix II indicates the absence of any Ministry or organisational structure responsible for science and technology. However, several authorities deal, in one form or another, with science and/or technology.

They are namely:

- i) Ministry of Education
- ii) Ministry of Public Works
- iii) Ministry of Finance
- iv) Ministry of Communications
- v) Ministry of Planning
- vi) Ministry of Public Health
- vii) Ministry of Housing
- viii) Ministry of Oil
- ix) Ministry of Electricity & Water
- x) Ministry of Commerce & Industry
- xi) Ministry of Social Affairs & Labour
- xii) Kuwait Petroleum Corporation
- xiii) Chamber of Commerce & Industry.

Analysis of the objectives and responsibilities of these authorities, as promulgated by the Decrees or Laws (refer to Appendix III), indicates that none of these establishments have been explicitly assigned the responsibilities of formulating, planning or implementing the national science

and technology policy. Moreover, these authorities do not have units within their domain to conduct such matters.

Therefore, it can be concluded that there exists no centralised or de-centralised explicit science and technology policy function, nor any authorities to deal with such issues. This conclusion would lead one to examine whether there exists an implicit science and technology policy in Kuwait.

As has been defined earlier by IDRC, the implicit science and technology policies which indirectly affect scientific and technological activities in various sectors of the nation. The author shall, next, evaluate such sectors and assess their implicit contribution to science and technology policy in Kuwait.

i) Economic Sector

Implicit science policy in terms of economic activities, as indentified by IDRC above, deals with finance, fiscal, external trade, internal trade, etc. Four Ministries, namely, Finance, Commerce and Industry, Social Affairs & Labour and Public Works (with respect to agriculture) according to their functions, should be assigned the policy implicit policy primarily directed to the fuctioning of the economic system. On analysis of the responsibilities of these Ministries, it was found that:

Ministry of Finance: deals with taxation and foreign investment;

Ministry of Commerce & Industry: the Amiri decree did not assign the Ministry the responsibilities for specific industrial policies, nevertheless, the Ministry is held responsible for organising the industrial activities and for protecting and supporting national industries.

Ministry of Social Affairs & Labour: the Ministry has not been assigned the responsibility for devising wages and labour compensation policies.

Ministry of Public Works: the Ministry is responsible for the supervision of agricultural resources, provision of agricultural services and allocation of agricultural lands. Nonetheless, the Ministry has not been given the authority to design specific agricultural policies.

Furthermore, no Ministry has been assigned the responsibility of formulation of policies toward regional development (Ministry of Planning has been assigned only the task of co-ordination and follow up of techno-economic affairs with Arab and foreign countries and organisations).

Thus, there exists an implicit science and technology policy with respect to the economic sector which deals only with taxation and foreign investment but not with labour or industrial policy.

## ii) Manpower Sector

Two Ministries engaged with manpower issues in

Kuwait are:

Ministry of Education: this Ministry has been assigned full responsibility for the general framework of educational plans and policies (literacy, primary and secondary education, etc.). Furthermore, the Minister of Education sits on the higher Board of the University.

Ministry of Social Affairs & Labour: the Ministry and Central Training Directorate (an organ within the Ministry domain), deal with vocational training issuing permits for immigrant labour and development of human resources.

In addition, the Civil Service Commission regulates, controls and encourages fellowship policies, management training, post-doctoral training, etc.

Therefore, there exists a well-defined implicit science policy with respect to the manpower sector.

### iii) Cultural Sector

No Ministry has been given the responsibility for popularisation of science and technology, for modernisation by technological change or modification of the general structures, attitudes, etc., including the position of women.

Therefore, there exists no implicit science policy with respect to the cultural sector.



iv) Physio-ecological Sector

The Ministry of oil has been given full responsibility to exploit and preserve natural resources. The Environmental Protection Council, which is a public agency presided over by the Ministry of Public Health, was established by an Amiri Decree in 1980 and has been assigned the tasks of environmental and pollution control.

Thus, a well-defined implicit science policy exists with respect to the physio-ecological sector.

v) Demographic and Social Sectors

The Ministry of Planning and the Ministry of Public Health have been charged with the responsibilities of providing medical care and demographic statistics. Furthermore, the Ministry of Social Affairs & Labour is responsible for providing social care services to various groups of people (youth, handicapped, sport activities, sponsoring widows and divorcees, etc.).

Therefore, a well-planned implicit science policy exists in terms of the demographic and social sectors.

To conclude, Kuwait has developed implicit policies in subsectors which are related to science and technology, notwithstanding, no such policies have been adopted to other subsectors which are involved with science and technology, e.g., labour, industrial, cultural.

#### 4) The Government of Kuwait Programme

In May 1981, the Government of Kuwait submitted to the Kuwait National Assembly its 5-year programme according to Article 98 of the Constitution. The programme consisted of two parts: Policies and Projects.<sup>6</sup> Each part will be outlined as follows:-

##### a) Part 1 : Policies

This part of the Programme illustrated the functions, responsibilities and performances of all government agencies. The programme did not explicitly or implicitly indicate any government preferences or plans to develop and formulate a national science and technology policy.

##### b) Part 2 : Projects

This part of the Programme dealt with projects that are under construction or under study and design for all Government authorities.

The Government Programme was criticised by Parliamentarians for<sup>7</sup>:

"being vague in context and content. It does not indicate explicit policies, lacks socio-economic indicators and does not define the Government Prime policies for oil, investment, immigration, population balance, internal and external policies."

Such criticism is in consonance with the author's conclusions as have been shown in this chapter and throughout the context of the thesis.

5) Conclusion

- a) Planning process in Kuwait is based on ad-hoc and uncoordinated trends.
- b) There exists no explicit science and technology policy in Kuwait.
- c) There exists implicit science and technology policy in some subsectors which are related to science and technology activities in Kuwait. *explor*
- d) The Kuwait National Assembly, as a Prime Organisation in Kuwait, does not include a standing committee to deal with science and technology policy issues, which are important for Kuwait's development.
- e) The Government of Kuwait's Programme does not indicate the future willingness in the Government to formulate a national science and technology policy.

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CHAPTER IV

SCIENTIFIC AND TECHNICAL MANPOWER IN KUWAIT:  
ISSUES & DEVELOPMENT

" . . . manpower is an asset which enables enterprise to distinguish itself in performance from other enterprises. Manpower is more than a mere current resource used in the Production Process. It has a long economic life which deserves the same planning attention given to other assets with long lives. Action taken today in the manpower area influences the quantity and quality of its future"<sup>1</sup>

1) Introduction

Manpower represents a major part of national resources, thus, it is important that it is adequately and promptly accounted for in any attempt to evaluate present needs and to plan for future requirements. Countries which can arrange for their people to be employed in ways which are socially, economically and personally rewarding, accomplish distinct benefits to their societies. Therefore, the considerable attention that has been given to manpower planning is one sign of the increasing awareness at all levels (in government and in private sectors) of the importance of the effective utilisation of human resources.

Several authors<sup>2-10</sup> have investigated and analysed

the integrated approach to manpower planning (Bartholomew, Bryant and Niehanus, and McBeath are some of the key-references on this topic). In addition, OECD has published valuable reviews on "manpower and social policies". In this series, OECD has examined the employment policy, the existing manpower status, the industrial relations and the education policies of several countries.<sup>11-25</sup>

National statistics and demography are naturally very important, forming the central core in manpower planning, i.e., resources available in relation to overall planning, development of skills, detailed career planning, recruitment drives and policy, etc. The access to adequate and up-to-date statistics would undoubtedly allow the manpower planners to formulate or design a better manpower scheme in keeping with the socio-economic structure of the country.

The content of this chapter would deal with a situation in which a small country, with a surplus of income but have a majority of foreign population, has great ambitions and aims to develop her socio-economic structures, many of which in order to be fulfilled require certain scientific and technical inputs. In order that these inputs are achieved in a way which is fertile in the future, appropriate manpower should be utilised and developed through a series of manpower planning programmes. The significance of manpower planning stems from the fact that it is of vital importance to a successful economic future. The available workforce must be channelled into making use of resources at hand and into

answering the requirements of society. The success of manpower planning depends upon the skill in which the individual or committee responsible for the actual plan is able to manage people. Such planning is a multidisciplinary affair taking into considerable psychology, sociology, social psychology, ergonomics, econometrics and statistics.

## 2) Manpower Status In Kuwait

As has been discussed in the above section and in chapter II that Kuwait, as a rich country with majority of foreign population, is striving to utilise science achievements and technical know-how in her socio-economic development faces a challenge of having more than 75% of her total as expatriates. Furthermore, the projections<sup>26</sup> indicate that foreign manpower will continue to be needed to sustain further growth and will increase at a rate more or less equivalent to that of indigenous manpower.

To assist in assessing this phenomena, the author postulates the following three alternative manpower and employment policies, each of which has advantages and implications, depending on the socio-political issues involved:

### a) Continuation to import expatriates

In most cases, any growth in economic activity requires an increase in the labour force, although this increase may differ from one sector to another, despite the effect of sophisticated techniques on production and

on minimising the reliance on manpower. The industrialisation process in Kuwait (a labour-shortage country) necessitates the recruitment of additional qualified labour. This is also true in many other economic activities such as medical care, agriculture, construction, social and domestic activities, etc. Therefore, in order to sustain such activities, more expatriates are imported to do jobs that the national manpower are either not capable or not willing to do.

The author believes that such policy has three major implications:

- i) Foreign labours, particularly non-Arabs, would introduce with them their social and cultural habits which are either improper or unacceptable by the Kuwaiti society, thus causing social rupture and disorder. This phenomena has been brought mainly by the Asian expatriates who came from non-restricted societies.
- ii) Constant relying on foreign labours would decrease the emphasis on the development and involvement of indigenous manpower.
- iii) Since many of those expatriates who possess skills and professional qualifications might feel that their long-term future in Kuwait is not clear and thus would look for other lands which might offer better security and a residential future, the application of science and technology for the



development of Kuwait would face problems stemming from more emigration of skilled expatriates. Given also, the relatively low number of scientific and technical Kuwaiti personnel, Kuwait is faced with major educational tasks to solve the shortage in manpower supply.

b) Development of national manpower

In order to increase the manpower self-reliant concept, Kuwait should adopt series of programmes for developing her own manpower. However several implications and issues would face this policy such as: What are the needed manpower? Are they technicians, researchers, medical doctors, skilled or semi-skilled? Who would develop the manpower and employment policy? How could be supplied and developed in terms of organisational infrastructure? How to provide the motivation and what to be done if financial incentives fail to attract national cadres? What are the alternatives? Can Kuwait, as a small country, ever meet the necessary manpower requirement for the infrastructure which would achieve the type of scientific and technical achievements and aims?

However, the complication of manpower planning in Kuwait was attributed, by Hashem<sup>27</sup>, to the absence of a comprehensive manpower planning scheme in Kuwait. Hashem further indicated that manpower activities in Kuwait lack the integration between manpower planning and the corporate planning

process on one hand and the lack of co-ordination between the industrial companies and the national manpower planning, on the other hand. In addition, the characteristic problems of indigenous manpower planning in Kuwait derive from the following factors:

- i) The predominance of expatriate labour. The rapid growth in Kuwait's economy has provided employment opportunities for them, with a demand that Kuwaitis were unable to supply. There is only 10-20% of the national manpower included in the total employment of scientists and technical personnel. This is due to the fact that the majority of nationals are below 15 years of age, that there is inadequate or even non-existent planning of national science and technology, vast and rapid economic development, in Kuwait.
- ii) The excess of social science graduates at the University and Secondary level in comparison to science and engineering.
- iii) The overemphasis on University degrees at the expense of vocational training.
- iv) The high illiteracy rate among the national work force.
- v) The mediocre standards of vocational and technical institute graduates and hence, the unwillingness of the industrial sector to hire or promote their graduates.
- vi) The low participation of women in the labour force due

to cultural, religious and other factors.

- vii) The refusal of the majority of Kuwaitis to be involved in manual work, favouring professional and governmental jobs.
- viii) The lack of explicit economic, science and technology policies which co-ordinate and formulate manpower needs, prospects and development.
- ix) Inadequate planning and forecasting of manpower needs for industry and other sectors. The Undersecretary for Labour Affairs in the Ministry of Social Affairs and Labour, His Excellency, Mohammed Al-Thamer, has informed the author in a private communication that various sectors in Kuwait which require manpower must consult the Ministry for guidance in this respect. No such guidance has been given or requested. Moreover, he added that the Ministry of Planning conducted a study of Manpower, forecasting needs for the coming five years. The Ministry of Planning did not consult or contact the Labour Affairs Department and the projected five-years' demand was met in a single year. This clearly illustrates that the Ministry of Planning has intentionally avoided all contact with the Ministry of Social Affairs and Labour - the authority in charge of manpower emigration and work-permission permits.
- x) The diversified responsibility for manpower policies is shared amongst a variety of authorities as follows:

- a) The Ministry of Planning, which conducts a population census every 5 years and carries out studies in conjunction with the Central Statistical Office.
- b) The Ministry of Social Affairs & Labour which is responsible for the registration and issue of work permits. It also conducts manpower-related studies and is responsible for some training schools.
- c) The Ministry of Education, in charge of education and vocational training.
- d) The Ministry of Interior, which issues entry visas for foreign workers, and deals with naturalisation and nationality.
- e) The Central Training Directorate, which co-ordinates various vocational programmes.
- f) The Kuwait Arab Planning Institute which conducts studies into the training of manpower at all levels.
- g) The Civil Service Commission which is responsible for employment in the Government Sector.
- h) Kuwait University by conducting various research studies in the field.
  
- xi) The absence of national measures to estimate future demand and supply of manpower, in accordance with national development plans.
  
- xii) The occupations which might develop in Kuwait which the educational system does not account for, viz; solar

energy specialists, technology assessors, environmentalists, etc.

Notwithstanding, the author, although encourages the self-reliant concept for Kuwait, believes that complete reliance on national manpower might not be fully accomplished because Kuwait lacks the availability of national manpower to perform certain jobs at a given time.

c) Integrating policy to develop national manpower and control the import of expatriates

This policy calls for the combination of the above two policies where an adequate planning for national manpower is required with a proper policy to control the import of foreign labours to meet to the socio-economic objectives and not on an ad-hoc basis.

Manpower Planning aims to improve the employment patterns in order to achieve a specific objective. It is closely tied to socio-economic and educational planning, and therefore, there are several basic components in manpower issues:

- i) the mobility of labour;
- ii) the accountancy framework;
- iii) the availability of manpower at a given time;
- iv) the types of manpower needed to execute a specific task;
- v) the availability of manpower to perform certain jobs;

- vi) the flexibility of the socio-political-economic structure of a country and its ability to absorb expatriates;
- vii) the degree of disturbance of the social structure of the host country by the influence of immigrant foreign cultures;
- viii) the flexibility of the host country with respect to foreign currency-exchange restrictions.

However, in order to appraise and evaluate the extent of the success of adopting any of these policies, several statistics and contemporary manpower development institutions should be examined and assessed.

### 3) Statistical Analysis

The data presented in Table 4.1 indicates that distribution of labour force according to major occupational groups shows that Kuwaitis are outnumbered in every occupation. However, two exceptions<sup>28</sup> to this pattern are commercial Flight Officers and Engineers (due to Kuwait Airways' policy of Kuwaitization) and legislators who outnumber their expatriate counterparts. Although Kuwaitization is a process favoured by almost every decision and policy-maker in Kuwait, nevertheless, the government has not issued a well defined and explicit policy for this process, not has it assigned a body to formulate, execute and monitor this trend. The author believes that a rapid and unplanned Kuwaitization process would give unfavourable results for society. The process should be implemented gradually by assigning Kuwaitis

Photocopy

Table 4.1:

Workforce Distribution by Nationalities  
Census - 1980



Source: Statistics were provided by MR. AHMAD AL-NAHED,  
The Director of Social Statistics Department,  
Ministry of Planning, Kuwait, July 1982.

to work and involving them with foreign counterparts until they have reached an adequate and proper level of training to allow them to take over the responsibilities. Foreign experts should be made aware (in the signed agreement) that one of their major tasks is to develop and train Kuwaiti associates.

In terms of educational attainment, statistics<sup>29</sup> has shown that Kuwaiti illiterates in the workforce was 51.6 in 1965; 44.7% in 1970 and 35.9% in 1975. These figures indicate a decrease in the number of illiterates in the workforce which is mainly attributable to the illiteracy eradication programme adopted by the Ministry of Education. Statistics also illustrates the shortage of high level Kuwait manpower holding university degrees. Whilst 20962 expatriates hold a university qualification only 3488 Kuwaitis do so.

#### 4) Manpower Development Institutions in Kuwait

The manpower training and development programme in Kuwait is being conducted by several establishments as follows:

##### A) Central Training Department

The department was established in 1976 under the supervision of the Ministry of Social Affairs & Labour to fulfil the following objectives<sup>30</sup>:

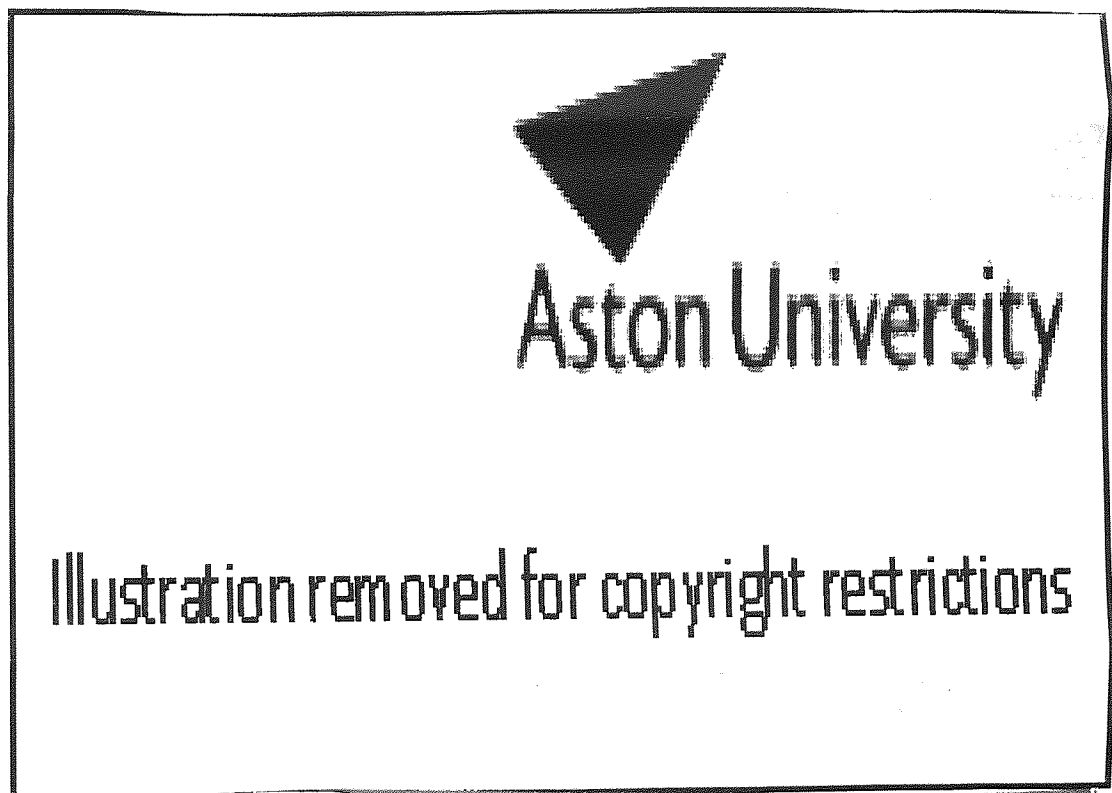
- i) To supervise all the government training centres which were under the responsibilities of various



ii) To implement the five year vocational training plans as proposed by the Ministry of Planning, striving to increase the volume of Kuwaiti manpower.

Details of activities, enrolment pattern and number of trainees are illustrated in Appendix IV.

However, the contrast to the fulfillment and to the conductance of the department's task in accordance to its specified duties has been expressed by MR. EISA AL-REFAI, the director of the department, during private communication as follows:



The above contradiction is a clear indication that the Government of Kuwait has promulgated several laws to support the performance of her Ministries and departments, whereas, other Government and Private bodies do not abide to the Government's plans and instructions. The author recommends

that the Council of Ministers should take more affirmative actions towards such negative attitudes.

B) Vocational & Technical Institutions

The Ministry of Education has established several vocational and technical institutions (refer to Appendix V), to develop human resources, improve their potential abilities and raise their productivity through planned education.

C) The Scientific Organisations and The Science & Natural History Museum

Scientific associations are usually established in a country (whether by government or privately, or both) to develop the national consciousness and to raise the standard of sporting, social, intellectual and artistic life of their members. Moreover, they should utilise the member's abilities to undertake activities which are beneficial to the country, encourage freedom of expression and to provide their members with facilities for relaxation and for social meetings and gatherings.

The Government of Kuwait, represented by the Ministry of Social Affairs & Labour has permitted the establishment of and sponsoring various multi-functional associations (See Appendix VI).

So far, we have concentrated on educational institutions per se, however, in establishing and developing

a national scientific infrastructure, an important role is played by specialised organisations, as seen in the advanced countries. To assess their performances, the author has spoken to, or interviewed, several members of scientific and technical organisations in Kuwait, so as to provide an overview and preliminary analysis of their effective roles in society. One of the means used to measure their effectiveness was to compare their declared objectives with their actual achievements to deduce any discrepancy. The comparison revealed that the majority of these organisations have fulfilled their objectives.

As for the Museum, it was established in 1972 to disseminate scientific information, to assist in illustrating the educational curricula, to sustain and preserve the history and heritage of the Kuwaiti environment and to exhibit to the public the latest scientific outputs.

#### 5) An Overview of Manpower Development In Kuwait

Employment opportunities became available in Kuwait from 1946, or even earlier, as a result of the discovery of oil. Since this discovery, a correlation has prevailed between the rate of immigration and the volume of job opportunities. Since then, workers in other economic activities increased consistently in number.

Kuwait's reliance on immigrants, both quantitatively and qualitatively is crucial, as has been indicated in section 3 above. On the other hand, without dependence on expatriates,

Kuwait would still have an undeveloped economy. Their participation and contribution is essential in the national economy of Kuwait. However, their future status within Kuwaiti society is hard to define and, would force Kuwait to adopt either of the following alternatives:

- i) To distinguish between the Kuwait and foreigners in socio-economic-political terms, and to ensure that the foreigners consider Kuwait as a temporary place of residence. This alternative might make the foreign expatriates less efficient, less motivated or careless about their work and might encourage them to seek opportunities in other countries, particularly the competitive neighbouring Gulf States.
- ii) The differentiation between Kuwaitis and long-term Arab residents in Kuwait will be emphasised and could act against the interest of the Kuwaiti society. To minimise this, the liberalisation of Kuwait's nationality laws and the revision of residents permission must be reconsidered. This alternative might make the Kuwaitis feel that they would lose control of their socio-political structure if it fell into the control of foreigners.

The author believes that the discussion and statistics presented in this chapter and in chapter II reflect the fact that Kuwait, as an oil producing country, would employ all the available resources to develop her economy. Since Kuwait has insufficient national manpower to execute and perform the required jobs and tasks, then reliance on

expatriates would continue for a longer period. Thus, the author believes that the third postulation presented in section (2) above is the most apt one. To this hypothesis, the author adumbrates that the Government should control the import of foreign labours, and should promulgate laws to regulate such import. Simultaneously, the Government should emphasise a great deal on the planning and development of indigenous manpower. The planning methodology should be based on investigation and research of the available and on the future demand of manpower. The challenge facing Kuwait would be to draw up policies, measures and criteria to develop the local manpower.

It is clear that the social, political and economic strength of Kuwait cannot be attained without change in attitudes and educational and training programmes - only then will the demand for labour be met. Which programme to choose for education depends on how Kuwait wishes to develop, being flexible and adapting to changes in the country's circumstances and not just expanding or changing school buildings, but what is actually taught in them.

At present<sup>31</sup> in primary, intermediate and secondary schools 70% of studies is "humanities", whilst 30% is sciences, tending to be theoretical and irrelevant, producing low quality graduates which evinced that Kuwait's education system is hardly adequate for a country facing a manpower shortage and application of technical know-how.

Furthermore, the existing policies of the training and vocational institutions discussed above should be revamped so that they are geared for producing certain types of training. At present there are both duplications and gaps and as a result, poorly educated workers are turned out, which is of no help to either the government or to industry. Such unplanned system is reflected by the enrolment statistics of the vocational institutions (See Appendix V), where it shows that:

- i) During (1976-80), the enrolment has increased annually for teachers, business and applied technology institutes.
- ii) The enrolment in the health institute was fluctuating and decreasing for much of the same period. This phenomenon might be attributed to the social structure which does not favour women to work in this sector.
- iii) The enrolment in the Applied Technology Institute, which is one of the key establishments to provide the country with technicians and qualified manpower needed for the industrial sector, is almost 1/3 the enrolment in the Business Institute and far below the enrolment in the Teachers Institute.

Moreover, the pattern of enrolment is not consistent or uniform, e.g., there were 565 trainees enrolled in 1981 in Wire & Wireless Institute Vs. 25 trainees enrolled in Shuwaikh Industrial Training Centre where the mostly needed jobs are within the training domain of this institute such as: furniture & carpentry, electrical connections & maintenance,

air conditioning, tools, lathe, car maintenance, etc.

In this area of education, there is room for improvement at all levels and within all sectors. Ways of improving this situation are to employ only those who will respond and have the capacity to develop, and want to improve themselves. Each agency should run an induction programme for its new members of staff to acquaint them with the aims of the agency, the way it is run, etc. In-house training should be conducted by people who are familiar with new ideas and who are skilled in extracting the most from their recruits. Staff discussions can often provide solutions and bring people close together. Those who would benefit from a period of training abroad should be sent to high-powered conferences, seminars, etc. This will introduce fresh thinking into agencies and spread ideas. People should be encouraged to change jobs within organisations to provide them with fresh experiences and to make them more adaptable. En-route they may discover their true vocation. Experience can also be gained from working within a different sector, whether within or outside the country. Part-time Masters degrees at Kuwait University would be of immense help. Once the Institute of Executive Management is set up, employees should be sent on courses and to attend seminars there. In-house training programmes should be designed specifically to serve the needs of a certain industry or body; courses should be run for the Civil Services; employees should join societies and associations, both within Kuwait and abroad and should subscribe to journals, magazines, etc. It should be up to Staff

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Manpower planning is a long term factor so educational planners should be looking to the future now and drawing up their strategies. The focus should be on the higher educational institutes of Kuwait. The main centres involved in supplying public-sector needs are teacher-training institutes, business schools, applied technology and health institutes - all under the care of the Ministry of Education, nursing and health programmes - under the care of the Ministry of Health and the Medicine Faculty of the University, the Central Training Department and agricultural institutions - under the Ministry of Public Works. Individual Ministries also sponsor specialised programmes for people like police, firemen, etc., and some oil companies run their own training centres. Kuwait also supplies the public sector with personnel.

Socio-demographic and economic factors should also be borne in mind, though it is unlikely for some time yet that supply will exceed demand. Planning will help decide how many more foreigners are needed, and in what direction, education should be expanded. Bureaucracy must be minimised. Mutual co-operation in the field of science and technology must be encouraged on a regional, Arab and international level. This will introduce an exchange of experts, technology programmes and by inviting experts to deliver seminars and lectures aim to train and develop manpower in the sectors concerned.

The author believes that the indigenous manpower could be further developed by adopting viable measures such as:

- a) To establish an authority which is responsible for



developing and supplying the indigenous manpower in accordance with Kuwait's plans and objectives.

- b) Feasibility studies and a rationale of the need and supply of manpower for any projects should be carried out and the extent of local involvement and the necessary improvement of indigenous capabilities estimated. Studies should be based on: the level of production sector, the level of economic activities and the national level.
- c) The need for the mergence of a scientific approach to manpower planning to integrate these plans with other national development plans should be taken into account.
- d) Trends of growth in education should be adapted to the trends of labour market requirements. Furthermore, an industrial and technical consciousness must be developed among students and other sectors of the population.
- e) The formulation of a manpower policy must emerge from a proper understanding of the socio-economic structure of Kuwait and not from an imported source.
- f) Incentives and other encouragements must be given by the government and industry to hire and develop vocational schools graduates.

To sum up, manpower planning needs to be re-assessed. The sectors requiring input need to be identified, whether

technical, private, public, etc. A new and clear-cut grading system should be introduced in all sectors, including the Civil Service Commission. When people are categorised it is easier to locate gaps. When this has been completed, then an education and training programme should be drawn up. All sectors should be looked at, drop-out rates calculated, and projections made on the figures obtained.

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## CHAPTER V

### RESEARCH AND DEVELOPMENT INSTITUTIONS

#### 1) Preface

Scientific research activities are indispensable means for rapid socio-economic and industrial development of any country, particularly the developing countries which desire to reach a higher level of industrialisation, diversify their economy, solve their problems and improve the output and efficiency of their manpower. The R & D centres usually consists of institutions, equipment and manpower; therefore, the extent of the success of performance of such centres depends on the availability of financial resources, trained professional manpower and the industrial base in the country. Research and development centres may be developed on the basis of demands and requirements of industry, notwithstanding, national industries in DC's tends to obtain technological advise and consultancy from abroad, rather than from local R & D centres. Therefore, not only financial sources allocated for R & D institutions are the indicators for the success of these centres, but a great deal of effort is required to create links and establish trusts between the industrial sector and R & D institutions and to adopt programmes leading to gradual increase of the quality and quantity of indigenous manpower

available for these institutions.

Since R & D institutions are the dynamic factor and thriving indicator for the overall economic progress in a country, they should aim to conduct the following tasks:<sup>1,2</sup>

- i) To perform fundamental and applied research.
- ii) To promote better know-how, innovative products and processes.
- iii) To disseminate the know-how to the concerned sectors.
- iv) To provide technical consultancy, techno-economic studies and routine services.
- v) To carry out operational studies and manpower training.
- vi) To assist in adapting and selecting available scientific and technological knowledge according to national demand.

As for Kuwait, a wealthy country with shortage of qualified manpower, the assessment of the performance and efficiencies of her R & D institutions should be based on several criteria, such as: What are the objectives and problems facing these institutions? Could these institutions give a kind of input to the achievement of envisaged national goals? Could these institutions give us any clue that science and technology could solve problems facing Kuwaiti society and her economy? Are the declared objectives of these institutions sensible and in conformity to the overall development plan? What should these institutions offer to Kuwait after the depletion of oil?

Therefore the aim of this chapter is to identify major R & D institutions in Kuwait and to analyse their tasks in the contextual framework of the above argument.

To assist in developing her socio-economic and industrial structure, the Government of Kuwait has established three types of R & D activities:

- i) Autonomous institutions which are under the supervision of a Minister. Kuwait Institute for Scientific Research (KISR) and the Environment Protection Council are examples of such centres.
- ii) Institutions which are under complete supervision of a Ministry, but have independent physical locations, e.g., the Roads Research Centre (Ministry of Public Works) and Water Resources Development Centre (Ministry of Electricity & Water). Refer to Appendix VII for detailed activities of the water resources development centre.
- iii) Centres to conduct activities within their establishments, e.g., centres in oil companies to study the problems related to the field.

Since KISR is the largest, most experienced and autonomous institution which perform diversified R & D activities in Kuwait, the author has chosen this institution as the case study for the framework of this chapter.

## 2) Kuwait Institute For Scientific Research (KISR)

The author is an employee of KISR, thus he is aware



that he is linked and involved with the Institute and thus, must try, to be analytically unbiased and detached from his involvement with KISR when discussing, criticising and analysing the content of this Chapter.

#### A. Historical Background

Kuwait Institute for Scientific Research was established in February 1967 by the Arabian Oil Co. Ltd. (Japan) in carrying out its obligations under the oil concession agreement with the Government of Kuwait. Article 28 (B) of the Agreement of 1958 had stated that:<sup>3</sup>

"When the Company's production of crude petroleum in any one day shall exceed 30,000 barrels, the Company shall forthwith establish and maintain a Research Institute in Kuwait with staff and facilities for the study and survey of the natural resources, improvements of water supply, insect control, plant life, wind erosion, climate conditions, etc., in Kuwait. The types of research to be undertaken by such an institute shall be agreed from time to time".

The first division to start preliminary research activities was the Arid Zone Agriculture Division, begun in April 1967; it was soon followed by the Marine Biology and Fishery Division in October, 1968. The Petroleum Research Division started in April, 1969.

The author is convinced that the above agreement reflects two main facts:

- i) The decision-makers in Kuwait have realised the importance of role played by r & d activities in the development of Kuwait and hence, stipulated the

establishment of R & D centres in return to the utilisation of her depleted source. This statement is supported by the Government act to take over the institution in July, 1973. Furthermore, KISR was granted independence in 1981.

- ii) The institution's scientific activities and administration were based on foreign (Japanese) structure. Such trend would have directed the institute officials not to formulate its scientific activities in consonance to Kuwait's needs. This postulation has been confirmed to the author by a Government officials who stated that although the Japanese has initiated arid zone, marine biology and petroleum research divisions, nevertheless, they had established marginal research in the arid zone and petroleum divisions and concentrated mainly on research topics, in marine biology and fishery divisions, which are relevant to the Japanese environment.

In February 1981, an Amiri Decree-Law was issued to reorganise the Kuwait Institute for Scientific Research. The promulgating Decree-Law defined the objectives of KISR as follows:<sup>4</sup>

- i) To carry out scientific research and studies which concern the progress of national industry and also the studies which facilitate the preservation of the environment, in co-ordination with relevant bodies.

- ii) To encourage Kuwaitis to practice scientific research and nourish the spirit of research in the younger generation.
- iii) To explore and study natural resources and ways of exploiting them, energy and water resources and to improve methods of agriculture and the development of aquatic resources in co-ordination with concerned.
- iv) To render scientific, technological and research consultation services to Government and national establishments in accordance with regulations passed by the Board of Trustees.
- v) To follow up the development of scientific and technological progress, to adapt it in a way that conforms with the local environment and provide Government institutions, departments and industrial organisations with industrial and scientific data.
- vi) To establish and foster relations, carry out mutual research with higher education institutes, technological and scientific sectors in Kuwait and various parts of the World and exchange expertise and data with them in order to achieve wider co-operation locally and World-wide.
- vii) To participate in the study of means of ascertaining resources of national economy by investing industrially the results of scientific and technological research and directing it in the service of the State's economic and social development goals in

co-ordination with other relevant bodies and institutes.

viii) To conduct studies, prepare research, and to offer consultation and applicable expertise in all fields related to the aims of the Institute and referred to it by concerned bodies. The Institute may render its services in the fields of research, technological and scientific consultations for the purpose of serving development goals in the Gulf region and the Arab World.

Details of the Articles of the Decree-Law are provided in Appendix VIII.

Policy-making in the field of scientific research, as in any other field of public policy, depends on dissemination of quantitative and qualitative scientific information to the concerned sectors; integrating of their policies and projects with other policies, particularly, the industrial, economic and manpower policies in conformity with the country's overall development strategies; development of human resources and offer consultation and applicable expertise whenever needed. Based on such trend, the author believes that the declared objectives of KISR are sensible to the aims and goals of the national development plans and strategies of Kuwait providing that KISR conduct its activities according to such objectives.

## B. Scientific Research, Services and Administration

### Divisions in KISR

The following are the main R & D services and administration divisions in KISR:<sup>5</sup>

#### Food Resources Division:

The division consists of three departments: Agro Production; Bio-Technology and Marine Culture & Fisheries.

#### Petroleum, Petrochemical & Materials Division:

The division embraces the following departments: Petroleum Technology, Material Technology.

#### Environmental & Earth Sciences Division:

The division contains the following departments: Environmental Sciences, Hydraulic and Coastal Engineering, and Earth Sciences.

#### Engineering Division:

The division supervises the following departments: Energy, Electronics and Civil Engineering & Building.

#### Techno-Economics Division.

#### Technical Support Division:

The division consists of the following departments: Central Analytical Laboratory, Technical Workshops and Computer Centre.

National Scientific & Technical Information Centre:

The Centre embraces the following departments:  
Technical Services, Automated Information Systems,  
Information Service.

Directorate of Policy & Planning:

The directorate consists of the following offices:  
Office of Programme Planning, Office of Physical Planning,  
Office of Budget & Management Planning.

Directorate of Development.

Office of Project Management.

Office of Training.

Administration, Finance & General Services.

Details of objectives and activities of these divisions are provided in Appendix IX.

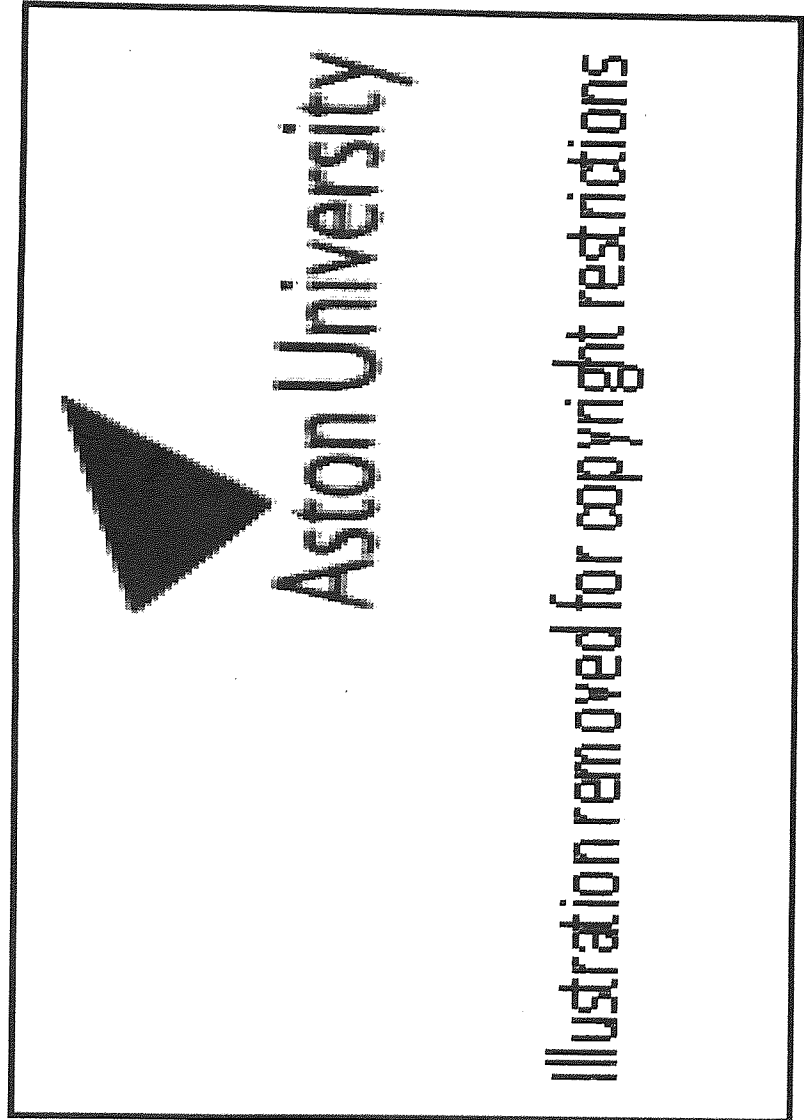
C. KISR's Organisational Structures

The organisational hierarchy of KISR has been changed or modified five times during the period of 1976-82, which reflects an average of almost one alteration or revision of the structure per year. Figure 5.1 illustrates the structure as of July 1980, whereas, Appendix XI contains the other structures.

The significant changes of the structure were:

Figure 5.1

KISR's Organisation Chart - July 1982



Source: Kuwait Institute For Scientific Research, Kuwait.

- i) Creation of four posts for Deputies to the Director.
- ii) Creation of a Finance Division by disassociating it from the Division of Administration.
- iii) Creation of four Departments within the Finance Division: Accounting, Budget & Costing, Business Representative Programme and Financial System & Data Base Operation.
- iv) Integration of the National Scientific & Technical Information Centre in the Division of Technical Services.
- v) Creation of the Office of Records Management within the Authority of the Directorate of Policy & Planning.
- vi) The Directorates of Policy & Planning and Development have been moved from the administrative authority of the Director General to be under the responsibility of the Deputy Director General for Planning & Development.
- vii) Creation of a post for Legal Advisor under the authority of the Deputy Director for General Administration, Finance and Supporting Services.
- viii) Creation of a post for Senior Advisor to replace the old post of Chief Scientific Advisor.
- ix) Creation of three offices under the authority of the Division of Training, namely the Office of Career



Development, the Office of Training Programme Development and the Office of Special Programmes.

Scientific research is sought to be an individualistic activity which is reflected in its ideology and its ideology and its institution. The research groups usually consist of an informed level of establishment which integrate research activities functioning over a long period on a single outlined task. Their discipline, performances and activities are designed by a hierarchal system. Undoubtedly, alternating the organisational structure almost once a year would cause disturbance and uneasiness for both the management and the employees and hence decrease the output and activities of their research due to the constant changes in their leadership and to their engagement with "Merry-go-round" organisational structures. Such alternation also indicates that the management is neither secure nor stable in their output or duties (although KISR's officials might justify the constant changes to meet the rapid expansion of KISR's activities and staff).

#### D. The Budget of KISR

The budget of KISR for 1977-82 are as follows:<sup>6</sup>

YEAR	K.D. (Millions)	% INCREASE
1977/78	6.424	-
1978/79	9.707	+51.1%
1979/80	11.673	+20.3%
1980/81	13.032	+11.6%
1981/82	14.402	+10.5%

The above figures illustrate that KISR has not been allocated a fixed budget as a percentage of GNP, but rather an ad-hoc budget according to the programme that KISR proposes to the National Assembly for approval. The budget indicated a large increase in 1978/79, and then it had witnessed 20.0% and about 11.0% for the following years.

The Director General of KISR envisaged the budget as follows:

"The approved budget of the Institute reflects in every year the research programmes planned for that year..... In addition, there exist certain limits for the capability of every establishment to consume allocations and expenses that cannot be ignored when presenting its annual budget. Despite the increase of the Institute's budget over the past years, there is an important aspect, namely the reduced level of Government support to the operational budget, as a result of increase of the revenues of the contractual projects."

However, KISR proposed budget for 1982/83 was exposed to severe criticism and attack by several educated and knowledgeable members of the National Assembly and was almost rejected. The author has interviewed some of these members to investigate the reasons for their negative attitudes towards KISR. They confided to the author that KISR is considered as one of the salient features of Kuwait and that they would have asked for its establishment if it did not exist. Nevertheless, evidences have been submitted to them for the resignation of several Kuwaitis, that Kuwaitis are not being developed or involved in KISR's activities, the allocation of higher salaries to secretaries. They also added that most of

the projects executed by KISR did not produce any positive impacts on the society or the economy.

Furthermore, MR. FAISAL AL-QHADEBI, an educated and knowledgeable member of the National Assembly, has proposed a bill<sup>7</sup> in 1982 to integrate KISR with Kuwait Foundation For The Advancement Of Sciences as one establishment. He justified such bill as follows:

- i) The duplication of their objectives.
- ii) KISR has failed, up to now, to show any significant results from its research endeavours.

The author, nevertheless, doesnot agree with this proposition because:

- The Honourable Member did not illustrate what is meant by significant results, e.g., in terms of manpower development, publications, project executions, etc.
- KISR is a public institute, subject to the supervision of the legislative power and is part of the executive power.
- KFAS is a private foundation which does not fall within the supervision and administration of the legislative or the executive powers.
- KISR is a R & D institution which was established to conduct research, training, etc., on its premises.
- KFAS is a funding foundation which has a legal and

hierarchal structure that differ completely from KISR.

- Each of the organisations has distinct objectives assigned to it.

Thus, the author advises and strongly recommends that these institutions remain separate, but develop a high degree of co-operation and would advise the National Assembly to seek alternative measures to reform and evaluate KISR's management and output.

However, the author's intention in discussing the above statement by the Director General and the attack by the member of the National Assembly is to emphasis that either KISR is performing its activities in ivory tower or by sophisticated means that are not distinct and clear to the public, as represented by the National Assembly, or that KISR activities are not being conducting according to the socio-economic plans and ambitions, and hence receiving severe criticism from the public.

However, the author believes that assessing the projects (which is the major activity) of KISR by evaluating their contribution and achievements to the overall national development plans might support either KISR's policy or rather defend the criticism given by the National Assembly.

#### E. Analysis of Projects Executed In KISR

Project priorities and selection are a cumbersome

and challenging issues facing the DC's. Sidhu<sup>8</sup>, as a very experienced laboratory manager in India has indicated that no two R & D centres can be evaluated in the same terms because differences might arise, even between research conducting in two departments of the same institute. For example, the results of one project being conducted may be more easily calculated than for another. One, as an example, an engineering project may be based on established methods and information aiming for a commercial market, whereas another, e.g., a molecular biological project, is feeling its way along in the dark, with little concrete knowledge to support it. Sidhu has added that proposed project should be reviewed by experts to prepare a report, in the form of a qualitative judgement, upon which the project is adopted or rejected according to its socio-economic and technical returns. A project should, however, be sponsored in terms of staff, equipment, materials and facilities. The monitoring of an ongoing project forms part of the total process of evaluation. Careful monitoring helps to indentify causes of divergence and delays and to introduce corrections to the plan when required.

From an institute's point of view, a successful project should be used as a basis for other projects according to the declared objectives. Administrative staff should aim for effectiveness, i.e., measuring how well the work is done and how near it has come to its initial objective, but management should look to see if a given input has achieved a maximum output. Efficiency is no good to R & D management

if priorities are wrong. They should therefore strive first of all for correct priorities then try to achieve them.

The magnitude and criteria for project selection adopted by KISR has been expressed by its Director General to the author as follows:



The criteria as has been expressed above by the Director General, is in conformity with the criteria expressed, to the author, by His Excellency FOUAD HOSSEIN, the Undersecretary of Ministry of Planning and Member of Board of Trustees of KISR.

The magnitude of the success or failure of project selection and priorities criteria, as expressed by KISR's two officials above, is shown by analysing (165) projects, which has been executed or in the process of execution for

the period 1976-March 1982. Details of these projects are provided in Appendix XI.

The summary of these projects are illustrated in Table 5.1.

The author proposes the following criteria to be evaluated in terms of the validity, utility and effectiveness of scientific research and activities of KISR, to the national socio-economic development plans:

i) The Macro-Objectives:

To compare the allocations and distributions of funds to projects with the main sectors contributing to the GDP.

ii) The Micro-Objectives:

To compare the funded scientific endeavours with the objectives of the Institutes.

iii) Manpower:

To assess the involvement and development of manpower, particularly Kuwaitis, in scientific activities funded by the Institutes.

iv) External Evaluation

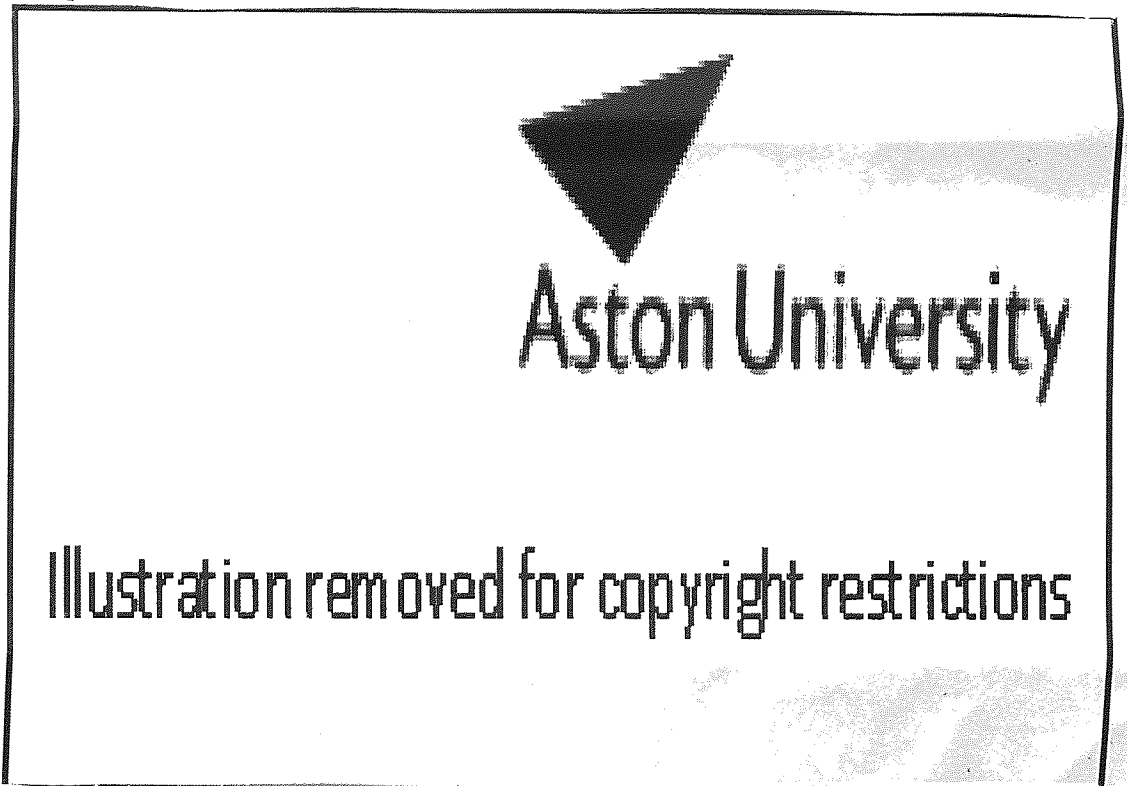
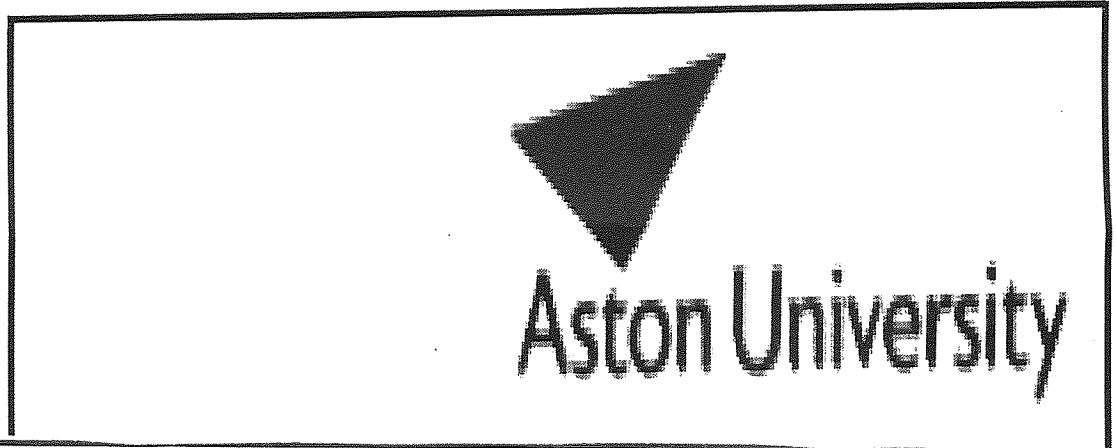
v) Others:

The impacts of funded scientific activities on mental and scientific thought of the society, the encouragements and support of various sectors in the country, the utility of the Project in the



TABLE 5.1:

Summary Of R & D Activities In KISR (1976-82)



Note: 1) Projects of 1982 are upto March 1982.

2) Techno-economics projects are sponsored by the Division's Budget and thus, are not declared in the data.



setting up of a Research and Science Policy in Kuwait, etc.

The author would like to emphasize two limitations to the above methodology:

- i) The Government of Kuwait has not endorsed officially the several proposed 5-year plans, nevertheless, an official in the Ministry of Planning has told the author that these unendorsed plans are taken as guidelines.
- ii) Thorough assessment of manpower involvement in projects could be better achieved by conducting interviews or sending questionnaires to the employees. A task that has not been fulfilled due to administrative formalities and to the long time required to do such task.

The analysis of KISR technical activities would be then performed as follows:

#### The Macro-Objectives

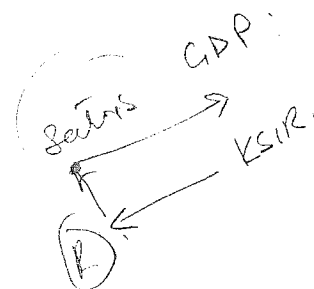
The analysis of the Macro-objective will investigate the following sectors:

(Oil & Petrochemicals Sectors)

As we have discussed earlier, these sectors are the pillars of the entire economy and economic activities in Kuwait. Statistics<sup>9,10</sup> have shown that the percentage contributions of

these sectors to the GDP were as follows:

YEAR	% Contribution of Oil & Petrochemical Sectors to GDP.
1976	70.2%
1977	64.7%
1978	65.0%
1979	73.5%
1980	71.0%
1981	63.0%



Comparing the above statistics with KISR accomplishments in these sectors we can conclude that:

i) KISR has allocated only 16.1% of its total funds to develop the oil and petrochemical sectors, a percentage that does not compare with the percentage contribution of these sectors to GDP (over 60.0%). The vital nature of these sectors to the economy necessitates the allocation of more funds, in comparison with their contributions to the GDP, to further develop the output and performance of these sectors. KISR's officials should re-assess these criteria and, if necessary, acquire more funds from various sources, e.g., the Ministry of Oil, KFAS, SABAH AL-SALEM's Endowment, etc.

ii) KISR has not developed or sponsored important

projects needed to improve the oil and petro-chemical sectors such as:

- Fuel Blending;
- Lube Oil Production;
- Tertiary Recovery, etc.

iii) KISR has not conducted any studies concerning the assessment of the oil as main natural resources. Such tasks would include seismic studies, definition of the availability and quantity of the resource, the outline of utilisation of such resource in terms of exportation or local processing. The lack of such projects contradicts strongly the statements mentioned earlier by the two officials of KISR who expressed its main duty as to assess the foundation of natural resources.

Thus, although the Petroleum, Petrochemical and Materials Division was one of the oldest divisions in KISR, nevertheless, KISR has not diversified its R & D activities in this division to develop projects needed for the National Socio-Economic Development Plans, both in terms of quantity, quality or funds allocated. Such a trend is in contrast to Parts (i) & (iii) of KISR's objectives as stated earlier.

- Food Resources & Agricultural Development Sectors:

The following table illustrates the quantity of sea-food and fruits (orange, dates, pomegranates, etc.) sold

16.11

in the Kuwaiti market:<sup>11,12</sup>

YEAR	SHRIMP (TONS)	% INCREASE	FISH (TONS)	% INCREASE	FRUITS (TONS)	% INCREASE
1976	384,000	-	1145,000	-	1027.1	-
1977	397,000	3.5%	2435,000	112.7%	1033.7	0.60%
1978	469,000	18.0%	1922,000	- 21.1%	1052.6	1.80%
1979	350,000	-25.4%	1918,000	- 2.0%	1070.8	1.70%

The contribution of Agriculture and Fishing to the GDP is illustrated as follows:<sup>13</sup>

YEAR	% Contribution of Agriculture & Fishing To GDP
1976	0.28%
1977	0.33%
1978	0.32%
1979	0.23%

From the above statistics, the following conclusions are drawn.

- i) The contribution of the agriculture and fishing sector to the GDP is almost constant for the period of 1976-79, averaging a value of 0.29%. Nevertheless, as it could be seen from Table 5.1, KISR has allocated 27.60% of its

R & D funds to a sector which contributes about 0.29% to GDP. Although the R & D activities in this sector should be encouraged to increase Kuwait's self-reliance on food and agricultural production, nevertheless, this sector should not be allocated a fund which is significantly higher than the fund allocated to the most vital sector in the economy, namely, oil and petrochemicals. This trend reflects the absence of any priority scheme in R & D activities in KISR.

ii) Some KISR's projects in the sea-food sector lack the basic foundation of any research activities. For example, in the fish and shrimp cultivation projects, the following points have not been pre-evaluated before conducting the projects, which hindered the success of the projects:

- The pattern of seasonal migration of fish and shrimp has not been established in the Gulf.
- Fish and shrimp do not stay in Kuwaiti water only, but rather migrate throughout the Gulf.
- KISR's research vessel, due to political reasons, is not allowed to enter and collect data in areas belong to other countries.
- Kuwait air is usually dusty with a lot of spores suspended in it. Spores would come back to life when they reach water in the tanks prepared for fish and shrimp cultivations. Such micro-organism are pathogenic and would destroy the sea food by

causing skin diseases. KISR, thus, should have sponsored research project to investigate such phenomena by adding authorities or other means to the sea food feed rather than start the cultivation project.

iii) The shrimp, fish and fruit trees production indicate a slow increase in the production of fruit trees averaging 1.4%, a large increase in 1977 and then a decrease in 1977-78 for fish production and slow increase and a sharp increase in shrimp production for the same period.

Albeit, KISR has conducted an extensive research programme for agriculture, shrimp and fish development, nevertheless, KISR has failed to fulfill or employ its programme for the development and improvement of production in these sectors in comparison with the large funds (27.6% of the total funds) allocated to them. The decline of food production during 1976-82 might indicate mainly that:

- i) KISR has not developed a problem-oriented or mission-development programme in these sectors, and is therefore, giving the wrong priorities to R & D activities; or,
- ii) The quality and efficiency in conducting R & D activities does not have excellent standards, is not applicable to the Kuwaiti environment, or that KISR is lacking the comprehension and appreciation of developing R & D programmes which conform to Kuwait's environment and needs.

iii) KISR's innovation and R & D outputs are good but have not been applied and used due to industrial and governmental acts, or that KISR has not found mechanism to transfer its scientific resultants.

- Materials, Construction & Manufacturing Sectors:

The contribution of these sectors to GDP are as follows:<sup>14</sup>

YEAR	% CONTRIBUTION
1976	5.2%
1977	6.7%
1978	6.8%
1979	4.9%

These sectors have contributed an average of 5.9% to GDP. KISR has allocated 5.3% of its total R & D fund to develop these sectors, a figure which is very closely comparable to the activities and contributions of the sector to the national activity. However, the budget indicates the importance of such research, but it doesnot indicate anything about the quality of the research.

- Electricity & Water Sectors:

The contribution of these sectors to GDP are as follows:<sup>15</sup>

YEAR	% Contribution of Electricity & Water Sectors to GDP
1976	0.43%
1977	0.48%
1978	0.51%
1979	0.39%

These sectors have averaged a contribution of 0.45% to GDP. In return, KISR has allocated 16.21% of its budget to develop these sectors. Although KISR has sponsored several projects to develop these sectors, particularly the water resources, which are an essential feature of Kuwait's socio-economic plans, nevertheless, the allocation of funds to various sectors should either be comparable to the sectors' contributions to GDP or should not significantly exceed the allocation of funds to the major GDP contributor, the oil and petrochemical sectors, i.e., it should not have the priority of funds allocation designed in a reverse manner.

- Environment & Earth Sciences:

KISR has allocated 12.9% of its R & D budget to finance projects relating to the environment, earth sciences and pollution programmes as specified by its objectives. Notwithstanding, the author believes that this sector has been assigned an exaggerated budget which is almost comparable to the oil and petrochemical sector's budget and is 14 times



more than the industrial sector's allocation, which indicates the absence of any R & D priority pattern.

- Industry:

As has been discussed in Chapter II and will be discussed in a later chapter, it was strongly emphasised that, as an alternative support to the economy, Kuwait should strengthen and diversify its industrial sector to be the main contributing sector to the economy after the oil and petrochemical sectors. To the author's surprise, it was found that KISR has only allocated less than 1.0% of its R & D budget (0.91%) to the industry and industrial problems in Kuwait. However, three questions might arise in evaluating such discrepancy:

- i) Are the results produced or the research topics conducting by KISR of interest or utilisation to the industrial sector?
- ii) Would devoting resources for industry be the best use of KISR budget?
- iii) Are the project leaders and researchers in KISR aware of the nature of the socio-economic plans and of the industrial sector in Kuwait?

The author is convinced that whatever policy is being adopted by KISR regarding the industrial sector is not an appropriate policy since it contradicts the objectives of KISR as stated in section (A) above, which emphasis on conducting R & D studies that concern the progress of the national industry, to adapt technological progress which

conforms industrial organisation and to invest industrially in the R & D results.

In this context, the author would like to discuss the Solar Energy Programme, which is one of the main projects in KISR. The programme has gone through three stages as follows:

1976-79: This stage included activities in many areas ranging from feasibility studies to contacting of foreign institutions for turn-key installation systems. Few employees from KISR were involved or aware of the programme. The phase came to an abrupt conclusion: only a few projects were concluded and fewer staff were trained in the field.

1979-81: This stage focused on building an infrastructure for the programme, development of local expertise and projects. Specific projects concluded successfully, amongst which are: design, installation and operation of 30-ton solar air conditioning unit in a school and of 10,000 litre solar multistage flash desalination plant solar green house design for hot environment.

1981-Present date: Although in its second year of implementation, appears to lack a clear sense of direction. Except for a number of minor experiments, no new projects or strategy seem to be in the run.

The apparent state of stagnation presently prevailing raises a question about the viability of the solar energy research programme in its present state. This is particularly

peculiar in view of the record established during its second stage (1979-81). Except for the Solar Thermal Power Plant, most of the activities seem to have come to a standstill while the staff is the largest in the Programme's history.

In addition, DR. IBRAHIM AL-SHEREDH, of College of Engineering & Petroleum in Kuwait University has declared<sup>16</sup> that the success of solar energy programme in KISR is doubtful due to the following reasons:

- i) Only two specialists and five researchers are working in the programme (almost part time).
- ii) The severity of the environment; high temperature, humidity, dust collection, wind carrying particles, would effect the performance of the instruments.
- iii) Lack of qualified manpower.
- iv) Lack of local integrated industry.
- v) Lack of maintenance team.
- vi) The need to allocate large land for the programme.

The author believes that the history of solar energy and the justification proposed by DR. AL-SHEREDH, as a person who has knowledge in the fields, indicate that the solar energy programme in KISR is not a successful project irrespective of the large fund allocated to it and hence, the author recommends that the fund should be diverted to a better utilised project.

The micro-objective criteria discussed above is not

an indicator of the quality of the projects executed in KISR, but rather relates the methodology of project selection and priorities in relation to the importance of various sectors to GDP.

The imbalance in the allocation of funds (according to GDP contributions) by KISR to the oil and petrochemical and the industrial sectors, illustrates the fact that R & D priorities in KISR seemed to be on an ad-hoc and unrelated scheme, rather than a well formulated research policy in accordance with the national socio-economic plans. Such trend is in contradiction to Sidhu's point of view as discussed above, "efficiency is no good to R & D management if priorities are wrong" and to the Members of Board of Trustees of KISR and to the Director General of KISR who stated that "...the institute carried out activities which deals in matters of interest to the State, i.e., assessment of natural resources and to the extent of their contribution to the socio-economic development of Kuwait...."

The national goals as stated by Kuwait's 1966-1982 plans (refer to Chapter II) emphasised on the following targets:

- i) Building a diversified self-sustaining economy of sectors other than oil (industry, agriculture, shipping, etc.).
- ii) Development of Kuwait Manpower.
- iii) Developing of Mining and Quarrying including oil.
- iv) Increasing the domestic production of agriculture

and fishing products.

To compare the fulfillment of these national ambitions with KISR performances, we can conclude (for the Macro-objectives) that:

- i) KISR failed to promote and execute sufficient projects needed to develop the oil, petrochemical and quarrying sectors quantitatively (by allocating insufficient funds) and qualitatively (by failure to perform the required R & D activities to improve these sectors).
- ii) KISR has not formulated and executed R & D activities which aim to develop the industrial sector in Kuwait as a counter to the oil sector.
- iii) Manpower development is not in accordance with the declared objectives as will be shown in the following section.
- iv) Although KISR has allocated a large portion of its R & D budget to agriculture and fishery, nevertheless, such efforts have failed to increase appreciably the domestic production of agriculture and fish products.

The author believes that there must be reasons and justifications for this mis-match between the national goals, the declared objectives and R & D activities of KISR. Such justifications have not been announced or discussed publicly by KISR's officials. The author assumes that their

justification for insufficient activities in the oil and petrochemical sectors is the fact that they envisage that oil is a depletable resource and that they should concentrate on the agriculture and fish sectors (which did not prove to be sufficient and proper either) to ensure a secure food supply for Kuwait's future.

### The Micro-Objectives

By comparison of the objectives of the R & D divisions (refer to Appendix XIX), and the R & D activities (refer to Appendix XI), it could be concluded that these divisions have conducted their objectives as assigned to them but as has been discussed above and will be discussed under others that some of these activities did not produce positive impacts for Kuwait.

#### - Manpower

The composition of manpower in KISR is as follows:<sup>17</sup>

Number of specialists in Engineering Sciences holding B.Sc. Degree or higher	:	131
Number of specialists in all branches of Sciences with B.Sc. Degree or higher	:	379
Number of Technicians holding qualifications less than University Degree	:	104
% of Kuwaitis in administration Sector	:	28.8%
% of Kuwaitis in technical sector	:	33.7%

The percentage of Kuwaitis in KISR's workforce is higher than the average percentage of Kuwaitis in the overall manpower. However, the following analysis aims to investigate the extent of success of KISR to retain and further develop the indigenous manpower in accordance with part (ii) of the declared objectives of KISR as indicated in section (A) above "to encourage Kuwaitis to practice scientific research and to nourish the spirit of research in younger generation."

Confidential statistics have been given to the author showed that (87) Kuwaitis have be resigned over the period (1976 - March 1983), which indicates an average of (12) Kuwaiti employees resigned annually. The same source has also confied to the author that the Director General of KISR declared that the average turnover of Kuwaitis is 12% annually, which is considered one of the highest turnover ratio in Kuwait. This phenomena contradicts the following statement of the Director General in response to the author's questionnaire (full answer to the author's questionnaire is provided in Appendix X):

".... In the Institute's endeavours to implement the declared goals, the administration of the Institute proposed a comprehensive plan for the development of the Kuwaiti labour force, based on the Institute's five-year plan, which comprises a programme for the development of the Kuwaiti labour force to reach 60% in the fields of research over the coming 5 - 10 years."

The above contradictory argument enviced that albeit KISR has been promulgated sensible objectives, notwih- standing, it does not perform its tasks accordingly.

However, the author has succeeded to interview (30) resigned employees to investigate the reasoning for their resignations. Three main reasons were confied to the author as follows:

- i) The failure of KISR's officials to formulate explicit programmes to develop them or to improve their capabilities.
- ii) The refusal of the non-Kuwaiti directors to involve, encourage or develop Kuwaitis working with them and would either ignore them or assign them with marginal tasks.
- iii) The inappropriateness of the working hours (7:30 - 4:30) to them, particularly females.

Furthermore, as analysis of the objectives of (165) projects conducted by KISR, as indicated in their synopses, show that only one project (0.60% of total projects) has explicitly emphasised on training of Kuwaiti manpower by involving them in scientific analysis, (Project No. 3 of Appendix XI). Such trends reflect the fact that project leaders might not be aware of including such objective (training of national manpower) rather than that they are ignoring the issue. In any case, KISR's management is responsible for such inclusion. Thus, the author recommends strongly that KISR should study and assess this issue. In addition, KISR has allocated a moderate fund (0.02% of total fund), to survey the needs of technical manpower. KISR should allocate more funds to conduct research and development of Kuwaiti



technical manpower and qualified scientists and engineers.

- External Evaluation

There are a variety of means of assessing scientific research institutions. Martin & Irvine<sup>18</sup> were one of the key assessors in this respect. In this study we have not had the resources to carry the overall assessment of the type they have recommended, and in any case, the author is aware that an official evaluation assessment committee would be appraising KISR prior to June 1983, according to recommendation passed last year by the National Assembly, when KISR's budget was approved:

"... A neutral Committee should be formed to evaluate KISR's projects which reflect the inadequacy of KISR... KISR has over-looked the study of, and did not propose solutions to, important topics for Kuwait, e.g., sewages, drains, corrosion in drinking water tanks... KISR has funded projects which are not vital to Kuwait such as that concerning solar energy. Priorities should be given to R & D activities needed in Kuwait's society, and emphasis placed on the environment, particularly marine plants."

However, as a quick and ultimately restricted assessment, the author has examined the extent at which KISR publications have been cited by the science citation index. The pros and cons of this approach has been summarised by Garfield.<sup>20</sup> Briefly, the extent of citation cannot be held as a direct indication of the quality of publication, although there is evidence that highly cited papers and institutions tend to be of high quality (see reference 20), however, it is an indication of impact and visibility of saying something about the

way an author or institute is perceived by the outside world. Table 5.2 illustrate the citation of KISR for the period of 1976-82. The data indicates that KISR was first cited in 1977, the number of citation has been doubled 10 times in 1978 and started to increase up to 20 times in 1982. The Environment and Earth Science department was the most active one, followed by Petroleum and Petrochemical department. The Agro-production department was cited only one.

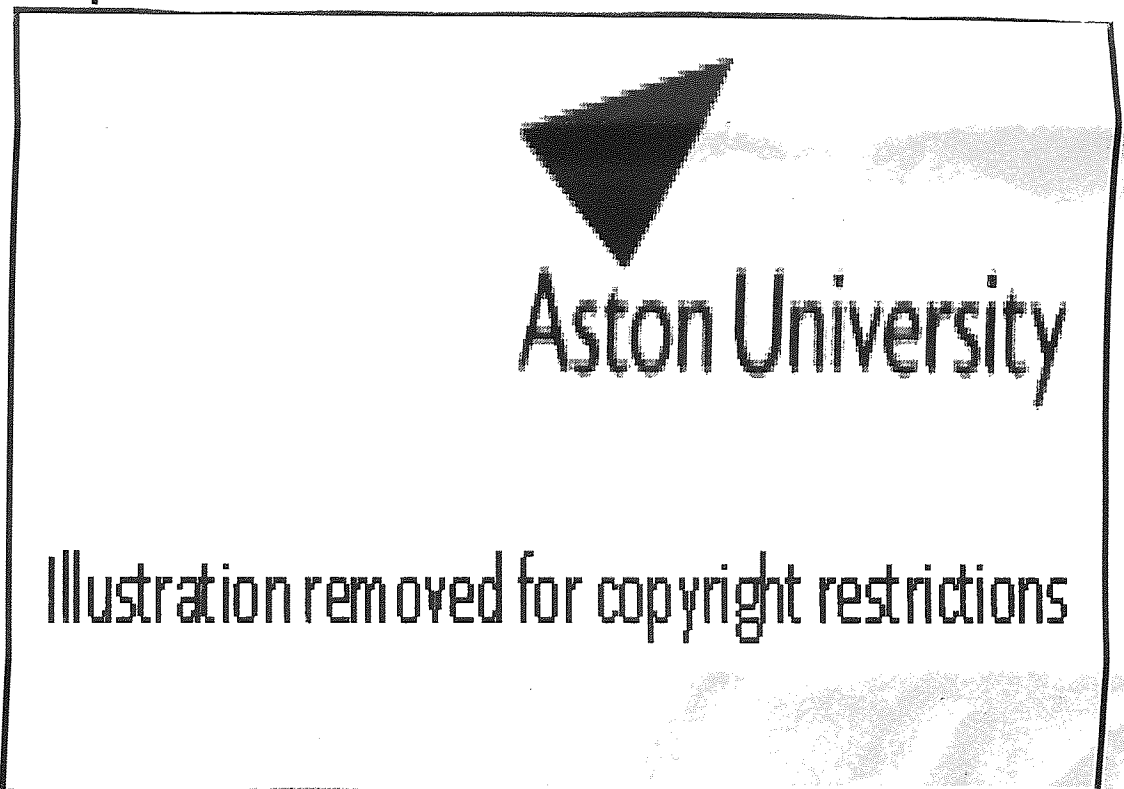
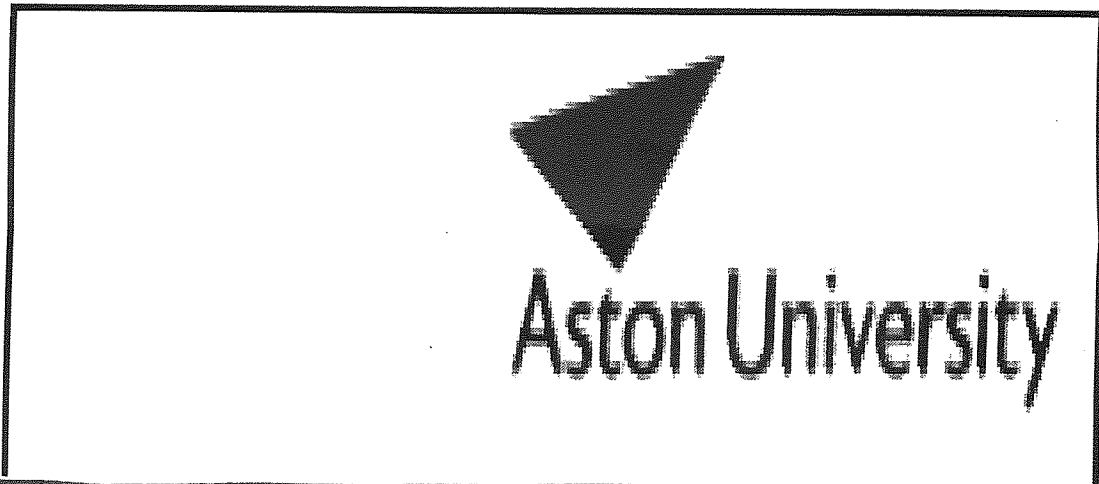
The above external citation reflects discrepancy in that the Engineering and Food divisions which have been allocated the highest funds portion in KISR has each less publications than the divisions with lowest portion of funds, e.g., petroleum and environment. One might expect that the division which has more fund is expected to be more active and produce more scientific publications and technical reports, particularly, as the case with the food and engineering divisions which do not conduct secret or confidential projects.

- Others

From the above discussion, it has been shown that a difference and lack of co-ordination persist in KISR's budget allocation to sectors according to Kuwait's socio-economic development plans. One reason for such mismatch might be due to the fact that R & D activities in KISR are more determined by external (to Kuwait) factors rather than specifically Kuwaiti factors, e.g., only six projects from (165) sponsored projects (3.6%) were proposed and chaired by Kuwaitis. The remaining projects were proposed by non-Kuwaitis who perhaps

TABLE 5.2:

KISR Source Articles By Department (1976 - 82)



Source: "Science Citation Index", (U.S.A. : Institute For Scientific Information Inc.), 1976 - 82.

lack or not aware of, the societal needs, problems and ambitions of Kuwait. Appendix XI indicates that projects chosen by Kuwaitis are better related to Kuwait's development objectives.

How can KISR select project which is related to the socio-economic needs or priorities as described by Sidhu above. Firstly, the general approach adopted in KISR has to be assessed and then specific examples of projects have to be analysed. Based on the discussion the author had with various project leaders, it would be concluded that it is uncommon for a research project to be selected by the following procedure: the individual researcher choose an area which interests them personally, paying little heed to what is available locally in terms of skilled manpower, resources, etc. The effect of this is that when the research programme has been completed, there is no one qualified, or interest in, putting the results to good use. For an example of this trend see project (16) of Appendix XI which dealt with conducting research aiming to evaluate the extent of plastics and polymer degradation in Kuwait, to establish stability conditions of polymers in industrial applications. KISR's management, prior to the approval of this project, should have known that this is an academic-oriented project and its results could not be applied in Kuwait, simply because the polymers and plastics were manufactured abroad. Kuwait has no polymer plants and the results of this project could not be imposed on the foreign manufacturers.

The development of projects of personal interest

was described to the author in confidence by some research workers in KISR. They told him that they merely propose several research topics to achieve the approval of the management and to compete with others in terms of quantity and not quality. They do not propose problem-oriented projects, simply because they are not aware of Kuwait's needs.

Further examples of unassessed or inappropriate projects to Kuwait conducted by KISR are as follows:

#### Kuwait Clay Evaluation

(Project 19 of Appendix XI): which did not emphasise any environmental impact in that removal of mud from the sea would eventually destroy the breeding and growth of fish and other creatures and thus would induce high negative environment and economic impacts.

#### Production of Fire-resistant Polymerised Sulphur

(Project 20 of Appendix XI): This project has no industrial application in Kuwait and is merely an academic task with no priority.

#### Improvement of Filing Polymers Reaction By Catalysts

(Project 23 of Appendix XI): Since there exists no polymer industry in Kuwait, the Kuwait is not in the race to produce a better plastic. If the process innovation is being established then who would be the potential user in Kuwait? A non-priority endeavour!

## Single Cell Protein

(Project 24 of Appendix XI): This project is considered of priority if it could prove to be applicable in Kuwait (experiences in Europe were not encouraging and U.S.A. did not venture to build up a plant for it). Furthermore, having a residual substrate or reducing nucleic acid in the cell might pose a problem and therefore it cannot be allowed to be used as a feed. Thus it is an advanced research that cannot be handled by one microbiologist and one nutrition expert as is the case in KISR.

Given the broad scope of project selection, it is not the author's capacity to produce general evaluation of KISR. However, the author has taken the opportunity to express the trends of mismatch in KISR's projects selection and priorities. KISR has, nevertheless, executed some projects which might bring positive impacts and results, e.g., crude oil assay, fish health management, micro-organisms cultivation, etc. In this respect, the author would like to emphasise the following points:

- i) Contractual research might bring undesirable effects on promoting R&D and thus should be conducted on more constraint manner with focus in programme objectives according to Kuwait's problems and needs.
- ii) The rapid growth of KISR has led to widen barriers between departments and decision-makers.
- iii) Publications in international journals are limited

and this would reduce KISR's publicity internationally.

- iv) KISR's project selection should emphasise on major concentrated programme relevant to Kuwait development, i.e., petroleum & petrochemicals, water resources, food resources, industrial sectors, etc.

There is within Kuwait today a dissatisfaction concerning the performance (objectively or from a biased viewpoint) of KISR and the output of its R & D endeavours. According to these views: there is "no match of resources allocation", "discouragement of Kuwaitis which caused internal brain-drain", "KISR's activities are inappropriate and scandalous", "the lack of a scheme to solve persisting pollution problems", "there is a need for the formation of a committee to evaluate and assess KISR's projects", "KISR's R & D activities proved to be inadequate and not relevant to the societal development goals".

The author is faced with the problem-free structure and activities of KISR as stated by its Director General above and by the various views expressed by the public and some members of the National Assembly. To this extent, and as a rational and unbiased judgement, the author would support any analytical and scientific conclusions which might emanate from evaluating KISR's performance. Careful analysis, as shown in the preceeding sections, indicated that there are divergences (or mismatch) of certain criteria between R & D funds allocation and ineffectiveness of the executed projects



in relation to the declared national objectives and the absence of proper employment policy which support the rational criticisms implied by various concerned populace in Kuwait.

The author is ambitious and optimistic in hoping to foresee that KISR will be established with well planned R & D activities to serve the socio-economic plans of Kuwait and to envisage KISR as one of the leading R & D institutions in the Arab World. He would make several recommendations in the following sections which aim to improve KISR's reputation and performance.

#### F. Recommendations

Scientific research can no longer be viewed as an isolated activity of individual scientists but forms a major area of government responsibility and as such requires careful planning. The tactical planning of research, i.e., the conduct of particular investigations can be left to the scientists concerned, using the familiar scientific methods. However, science has also a long-term strategic aspect which affects the whole process of social transformation and which therefore requires governments to take responsibility for a national science policy.

A major distinction has to be made between research in the context of business enterprises in the private sector and research done in State scientific institutions. Objectives will be different, being profit-oriented in the private sector but directed to social goals in the public sector.



In the government sector some rather different problems obtain, requiring an emphasis on planning and administration. "Particular planning" refers to the problems of an individual project and comprises the determination of objectives, budgeting, scheduling and reviewing results. It should then be possible to compare the output of the project with the inputs expended on it. "General planning" occurs at the level of the government's whole scientific research effort. How are social objectives to be integrated with scientific research? What is an appropriate allocation of resources between organisations and between scientific disciplines? This allocation problem will have to be guided by the overall political and economic objectives of the government such as its emphasis on industrialisation or an agricultural development. Within that framework it will be necessary to choose between particular projects proposed and this should be done by accurately evaluating the costs and the possible economic benefits. However, it will be important also to retain a balance between fundamental and applied research and between different specialisms.

Finally, the activity of planning scientific research will require reliable statistics, just as economic statistics are needed for planning the economy. Statistics on the expenditure made on research can be aggregated to give a Gross National Expenditure made on Research figure, which can be compared with Gross National Product. A target for GNER as a percentage of GNP should be indentified. Manpower statistics for research would also be useful. A breakdown by qualifications

and specialism would allow an evaluation of the cost effectiveness of staff at different institutions to be made.<sup>21</sup>

The author strongly believes that although KISR did not formulate a research policy in terms of priorities or the socio-economic needs for Kuwait, KISR has the potential and set-up to base its R & D activities in accordance with Kuwait's development plans and to be one of the most active R & D institutions in the Arab World, providing its present policies and performance instruments are re-assessed. Thus, the author would, on the basis of the above analysis, propose the following recommendations which he hopes would further develop KISR's status and output.

#### Image & Ideals

The image and ideals of KISR are not appreciated within large sectors of the population as has been seen earlier in the statements by the National Assembly and other writers.

The following<sup>22</sup> is other examples of a lack of respect for KISR achievements:

"Money has been wasted on this failing establishment. KISR has not, despite all the hopes built on it, produced any practical achievements....

KISR should be closed if it exists as a ruin bearing only its name without any output or any scientific discoveries, and hence its budget should be directed towards more productive projects.....

It seems that there are hidden hands which do not favour, in Kuwait, or in the Arab World, any inventions or any developmen- of our capabilities to work and participate in inventive or innovative activities.....

The officials are asked to evaluate KISR's present status and conduct a thorough assessment of its activities, so that either it would be productive, as it should be, or not as is evident from the contemporary output..."

Thus, KISR's management should formulate a research policy plan that would be productive to erase these attitudes from the populace.

### Manpower Development

1. KISR's management should formulate a programme to involve and encourage the Kuwaitis in attending various seminars, participate in project formulation and publish technical and scientific reports. In the summer of 1981, one of the Public Relations Division employees in charge of issuing travelling tickets, confirmed to the author that not more than 20% of the scientific trips were allocated to Kuwaitis. This low figure is indicative of the erroneous policy adopted by KISR towards Kuwaitis' participation in seminars.
2. Within any research organisation, there are defined policies regarding the freedom of publications. In a public and Government-owned organisation such as KISR a policy should be formulated and implemented to encourage publication as a means for scientific development. Therefore, to what extent should there be freedom of academic publication in KISR? How much autonomy should the researchers have to publish their academic results and scientific findings? In practice, permission

for a researcher to publish is subject to the approval of his/or her Division's Director who in many cases impose the inclusion of their names in works they knew nothing of. The impact of such a procedure on the researcher is ambiguous. On the one hand it might be deemed a valuable means of ensuring a peer judgement of good quality. On the other hand it might create, in certain cases, a sensitive situation. There is not a priori set of rules that can ensure equity on this matter. However, it would be worth examining possible institutional means of ensuring a fair appeal by either situation of conflict regarding such an issue. In any case the ideal policy would be one which both encourages, provides support and aids the confidence of researchers whilst ensuring good quality.

3. A flexible working timetable has been adopted by many R & D Centres to encourage the enrolment of the national cadres in order to increase their creativity in accordance to their cultural values and social orders. KISR's working hours (8.00 a.m. - 4.30 p.m., including one hour lunch break), is not appropriate to the social structure and customs of Kuwait's society. The author has experienced the resignations of several Kuwaitis, particularly female, due to the working hours. The author believes that if KISR's

management is willing to attract more Kuwaitis (in accordance with its objectives), they should alter the working hours, i.e., (7.00 a.m. - 2.00 p.m.) without any lunch break.

4. KISR should provide opportunities for Kuwaitis to keep up-to-date, with any scientific and technical advances, by attendance at conferences and educational courses, both inside and outside Kuwait.

5. KISR could improve its manpower output by implementing the following measures:<sup>23</sup>

- The organisation should lay emphasis more on the increased responsibility and the nature of that responsibility than on authority and power relevant to it. More precisely organisational hierarchy should be looked upon by employees as an increase in responsibility, rather than an increase in power, authority and dominance. This can be achieved by any of the following or a combination of them:

Decrease the authoritative power associated with increased hierarchical positions;

Increase the rights of the subordinates in a way that they feel they are more secure.

- The organisation should give new employees

(graduates especially) as well as the old employees, challenging jobs to allow them to express their talents. Traditionally, new graduates were assigned simple routine jobs soon after they joined the organisation. In this case the results could be to the disadvantage of both the organisation and the individual. One of the difficulties with such an approach is that it could lead to a situation in which a new employee might find it more than necessary difficult to develop and exercise their talent.

- Upper level managers as well as other level managers should have written job descriptions and verbal instructions from their superiors. These job descriptions and instructions should be revised and updated by a general Committee in order that employees as well as managers could still function effectively when the policies of the organisation do change from time to time. Operative managers as well as lower managers should be given a chance to participate in the nature of the jobs by forming Committees which they are members of and giving the Committees the power to make the decisions within the various departments of the organisation. This tends to increase their total satisfaction with regard to actually participating in the discussions as well as the decisions.

Concurrently, although a general world wide concern emerged to employ science and technology to the development of nations and although the DC's are in great demand to apply scientific institutions to enable them to make the best use of science and technology in their development plans, nevertheless, the issues and concepts relating to science and technology might not be clear and distinguishable for many of the policy-makers, parliamentarians or the public in the DC's. As in Kuwait, the author has discussed the issue of R & D in activities with several populace, most of which who believe that, as in trade, they should see the R & D results as soon as possible and most of which donot acknowledge what is called long-term research. This in fact reflects socio-political factors which are operating in the society and which might induce criticism for any R & D activities that do not produce immediate results.

~~Determining~~ Determining priorities is sometimes a political act, and sometimes a technical one. The priority setting of national goals pertain rather to a political act and is therefore essentially subjective. Deviation of KISR to sponsor projects in accordance with the national plans (as has been seen earlier), caused KISR to receive severe criticism from the public. Therefore, the author suggests the following proposals regarding research policy in KISR:

- 1) KISR should assess, as a science policy, the socio-political-cultural factors of the populace and their trends



towards R & D activities in order to adopt policy which might produce satisfactory results.

- 2) KISR should formulate a research policy in keeping with the needs of the socio-economic-industrial sectors of Kuwait and to have priorities oriented according to the national goals rather than ad-hoc or academic based projects.
- 3) KISR should formulate a goal-oriented programme to analyse the effective means to transfer and generate technology in Kuwait.
- 4) Research institutes need a long-term policy for selecting suitable programmes, involving current and future technical and market needs. Flexibility is very important so that changes on the market and in technology can be responded to. They should be ready to take advice and be prepared for their projects to be subjected to reviews.

Decision-makers in research centres have to have a plan to meet Governmental and industrial needs. They should also try to solve day to day problems. The correct balance must be achieved. Good, central management is essential.

- 5) KISR should introduce and incorporate technology assessment concepts particularly the environmental and economic impact of their pre-proposed projects.
- 6) KISR can study the use of materials in Kuwait, suggest



new uses of resources, make specifications for new industrial plants to satisfy environmental, social and economic conditions in Kuwait and use applied research to modify and transfer technical know-how from abroad.

Has KISR achieved the above realistic goal of technology transfer and modifications? In some areas, there has been some success, e.g., environment, materials, whereas in others, e.g., solar energy, laser, electronics, according to some of the interviewees, progress has been less rapid than they had initially hoped to see. With appropriate management of R & D in research areas, project priorities, research topics, control of research processes and the follow-up of results, one can anticipate further improvement in KISR's performance.

- 7) The idea of establishing an Institute for Scientific Research is a very important one. It has a vital role to play in laying the foundations for education and research within the country. It would contribute greatly to all areas of development.

By seeking to use scientific and technological advances, the country would be raising its own status, both nationally and internationally.

In Kuwait, there are few bodies, whether public, private or Governmental, with the facilities for

adapting technological methods or researching into them. This is where KISR can help, being a Centre of education, research and consultation. It should be closely linked to the University and should be able to draw on whatever resources the University can offer.

Highly skilled workers must be recruited to fulfill these functions and they must be provided with an attractive environment in which to work.

- 8) KISR's field of R & D activities should be subjected to constant and periodic review to define objectives and thus help the Government or any other sectors to maintain an interest in their value of research.
- 9) KISR's activities in applied research should be extended so that various sectors, particularly industry, can be supplied with the essential information needed to solve their problems.
- 10) The Institute should formulate R & D activities on topics of broad public interest.
- 11) Ensure the dissemination and application of KISR's R & D activities.
- 12) Design R & D endeavours for various sectors, particularly industry, that lack an adequate technical background, or for topics that are common to more than one industry.

- 13) KISR should re-assess its research programmes to assure that sectors such as oil and petrochemicals should be allocated the highest proportion of its R & D budget due to the importance of the sector to the Kuwaiti economy, and that their funded projects would have applications within Kuwait.

The following is a list of projects that should be adopted by KISR due to their importance to Kuwait Development Plans:

Heavy Petroleum Cuts Upgrading: to improve the quality of raw materials by getting more useful cuts. It could be achieved by hydro-desulfurisation, cracking, etc.

Pilot Plant Processing: Any refinery is composed of several processes. However, apart from catalytic reforming in KISR, no pilot plant has been established to either train Kuwaiti manpower or improve certain processes.

Fuel Blending: to optimise fuel quality by blending various grades of fuel at times of refinery production.

Lube Oil Production: no research has been done in Kuwait to study the topic of lube oil additives.

Two Phase Flow: in the refinery production process, there is a tendency to have a separation of phases when the pressure is reduced which causes an oil transportation problem.

Thermodynamic studies are required to prevent separation from occurring in the pipe and to improve separation in the storage tanks.

Tertiary Recovery: to study the injection of reservoirs by polymeric materials to increase the production of the oil-wells.

Miscellar Fluid: to select chemical fluid to produce proper oil production from the rocks.

Cathodic Production: to study the electrochemical techniques needed to reduce corrosion in steel structures and buried pipelines.

Crude Oil Desalting & Dehydration: to remove salt and water from crude oil.

Development of Desert Plants Preferred by Animals

Technology Assessment of Dumping Building Materials and Waste In the Coastal Lines

Conservation of Energy

Water Resources Development & Assessment

Development of Food, Animal & Agricultural Products

Analysis of the Cause of Degradation of Building Materials

Field Water Use and Productive Efficiency of Selected Crops in Kuwait

Field Investigation On the Effects of Different Water Application Rates to Soil Salinity & Crops

An Assessment of Fish Production

A Study of the Dynamics of Energy Utilisation

## General

1. A well defined policy must be drawn in terms of national, regional and international co-operation in scientific and technical fields.
2. The National Scientific & Technical Information Centre in KISR should incorporate the following within its objectives:
  - To study and utilise the Arabic terminology in Science and Technology in collaboration with the concerned and specialised organisations.
  - Development of a translation service into Arabic and English from World languages.
3. As for experts utilisation in Kuwait, KISR was criticised<sup>24</sup> for having a deficiency in its policy which does not allow experts a free hand to use and develop the acquired technical know-how, to adopt them to local environment so as to solve Kuwait's technological problems. Such trends should be re-evaluated in KISR.
4. We have already, on p. 147, touched upon some aspects of publications policy. Certainly this is an important issue for any institution, particularly dealing with R & D, especially when there are sometimes conflicting pressures for quantity and for quality of publications. How can this be resolved? Perhaps

it is a task best left to a committee of research scientists rather than any single administrator within the institution.

5. Most laboratories carry out work which is of interest to industry. Industry has problems which laboratories could sort out. Close links are required between the two. In some cases work has been exploited, but in others, when no particularly relevant research seemed to be forthcoming, the industry severed its links. It must be admitted that not all laboratories have made a great effort to accommodate industry, and some industries are also guilty of not making the effort. No industry can afford to turn its back on the possibilities that research can open up for it.

6. As a result of several interviews with senior officials within KISR, the author feels bound to make some comments which express a general summary of their views and feelings which deserve to be clarified:

- Commitments of key-personnel in KISR are partial, either they are academic, do not have the urge to train Kuwaitis or have no feeling for, or serious involvement with, KISR or Kuwait.

- New employees are not introduced to each other professionally to assure full co-operation, collaboration and mutual confidence.
- Problems are solved in a back-handed way rather than facing them.
- Formulation of excess of indoor committees (around 20) which are time consuming and decrease the time allocated to research.
- Training abroad (mostly in summer for 2-4 weeks) in highly specialised systems is unrealistic, not taken seriously and will bring no positive impact.
- Rotational appointments of Kuwaitis in KISR makes no sense (a chemist from petroleum division goes to purchasing department. An electrical engineer with an M.Sc. from techno-economic division to training office; a holder of an M.Sc. in Science management, to public relations division and so forth), and will hinder the technical progress of the institute.
- The division Directors do not consult with their personnel in forward planning, but rather refer to outside persons to discuss with them the various issues related to their divisions.
- KISR does not formulate any professional assessment of the executed projects.



*Saukhi?*

KISR has presented to UNCSTD in Austria, in August 1979, a national paper on the status of science and technology for development in Kuwait. The paper aimed to be a good guide and reflected Kuwait's status with science and technology. Nevertheless, Zahlan<sup>25</sup> has criticised the paper as follows:

- i) The Paper was neither of uniform quality nor internally consistent, i.e., the statistics of Kuwait University were out dated where statistics were for 1975 rather than for 1977-78, or better still for 1978-79; also manpower data was from the 1970 census which would be no longer relevant.
- ii) The Paper was of poor quality. Data of manpower composition did not indicate the number of scientists, engineers, technicians, etc., which are an important indicator of the technical manpower. Furthermore, the Paper was descriptive in that it did not estimate the future demands of technical and scientific manpower. As for the technology transfer field, the Paper indicated that "... the Government has given its support in a variety of ways ..." and then did not describe these ways and did not propose solutions for technology transfer problems facing the various sectors.

In trade and finance, the Paper did not point out the percentage of Kuwaitis in the field, the availability of



a programme to develop Kuwaitis, the utilisation (or not) of R & D activities, etc.

As for the housing and petrochemical sectors, the Paper failed to indicate the nationalities of the companies which executed tenders and the extent of participation of Kuwaiti companies.

- iii) The Paper, despite its title, did not necessarily reflect a National Policy.
- iv) The Paper discussed the considerable technological dependence of Kuwait and did not propose explicit solutions for the problem.
- v) No attempt was made to identify subsets of developmental strategies that have exhibited particularly beneficial repercussions on science and technology in Kuwait.

As for Kuwaiti involvement in the National Paper preparation, KISR's management assigned this task to non-Kuwaitis. KISR's Paper was very simple and involved only subjects such as historical evaluation, KISR's Programme, Organisation of Research, etc. This work could have been done by Kuwaitis, or at least be co-authored by a Kuwaiti. Nevertheless, KISR's management did not encourage this. Furthermore, KISR's delegation to the Conference consisted, beside the Director General, of three non-Kuwaitis, some of whom did not have any background on science and technology

policy and development issues. Again, KISR's management did not invite any Kuwaitis to join the delegation. The author was informed in July, 1982, by a member of this delegation that upon their return from the Conference they were not asked by the management to hold workshops to illustrate to KISR's employees, particularly Kuwaitis, all the issues and matters that were discussed during the Conference and how to use these concepts to develop themselves. Based on this lack of encouragement, the delegates did not bother to spend any efforts to deliver their experiences to the Kuwaiti employees.

The author believes that this shows clearly that KISR's management in sending non-Kuwaiti delegates and in failing to discuss the Conference, not only discouraged the participation of Kuwaitis and hence failed to encourage their self-development, but also violated a main part of its objectives to train Kuwaitis as is specified by the Amiri Decree. A status that should be investigated by the Board of Trustees.

#### G. Suggestions For Further Studies

Several case studies could be conducted to appraise the effectiveness and performance of KISR, amongst which the author would adumbrate the following:

1. To assess the objectives of the executed projects as achieved within a given time schedule and to analyse thoroughly the reasons for any delay (if any) for the

completion of projects in the specified time.

2. A questionnaire could be designed and submitted to the professional Kuwaitis engaged in R & D activities, to assess the benefits, impacts and effectiveness resulting from their participation; the trends and needs of the project leaders to train them; senior-junior scientist relationships; their own assessment on the validity of the project to Kuwait, etc.
3. There seems to be some evidence to indicate that some members of the Board of Trustees are suffering from an overload of work and might not, due to their many engagements, be able to participate effectively and efficiently in the meetings and activities of their Board, hence, a study is recommended to be conducted on all of the Board's Minutes of Meetings to assess the following:
  - The background of the various issues discussed in the meetings, particularly ones dealing with the research trends, i.e., were the matters brought up and suggested by Members of the Board, The Director General or outsiders?
  - The main policy issues discussed in the meetings, i.e., projects priorities, manpower development, Kuwaiti resignations, trends of research activities, etc.
4. An assessment of the knowledge of the projects leaders

of the socio-economic-industrial problems and needs.

### 3) Research & Development Budget In Kuwait

Most countries give a clear indication of the provision made in their budget for scientific and technological activities. Some however show how the money is allocated in terms of Ministries to whom money has been given, so it is therefore a difficult task to work out what is actually being spent on particular activities. People were aware of the problems associated with budget descriptions of this nature long before the question of science and technology budgeting arose, and it is a problem encountered by both developed and developing countries. The old type of budget is of little use when drawing up a National Development Plan, so many countries have a traditional-style and annual financial budget, sometimes known as a programme budget.

By setting out science and technology spending as a separate component within the functional budget, it is easier to see what is being spent on what in the national budget as a whole, and it avoids the danger of dispensing money on a whim. Instead of just increasing or decreasing funding with a particular Ministry as a whole, adjustment can be made to the particular section requiring such adjustment. Moreover, it is easier to put projects requiring funding in order of priority. R & D work can be detrimentally affected if funding is available one year, but because of an arbitrary decision, is reduced the next.

One of the greatest achievements of national development policies in development and some developing countries has been to produce a clear budget balance sheet for R & D and science and technology, indicating how the money is allocated and from whence it came. Such a budget should not, however, be prepared by just one Ministry. All the Ministries involved in science and technology should present their activities in terms of the part they have played in national development. Such a presentation would make for greater co-ordination between the various Ministries and would allow the Government to see as a whole what science and technology activities are well in progress and what are needed, in relation to the percentage of the national budget they could afford to allocate.

Although there is no well established connection between R & D budget and the GNP, nevertheless, U.N. studies often recommend that for DC's (1-2%) of GNP of a country should be allocated for R & D activities. If such a policy is not adopted in a country, then it will continue to rely on budgetary analysis and statistics, taken from periodic national reviews of scientific activity, which is far from satisfactory and will cause R & D expenditure to be badly distributed among the various centres of scientific activities.

As for Kuwait, the R & D budget is not allocated beforehand, but rather is estimated "post-facto" from actual (or proposed) budgets assigned to several establishments engaged in R & D. Table 5.3 illustrates the total ad-hoc

TABLE 5.3:

Total Ad-hoc Intra-Mural R & D Expenditure  
By Sector In Kuwait (1977-82)

	1977/78	1978/79	1979/80	1980/81	1981/82
KISR	6424000	9707050	11672440	13031330	14401720
Government Testing Station & Laboratories	N.A.	362051	580082	662026	949750
Road Research Centre	450000	800000	900000	900000	1000000
TOTAL	6874000	10869101	13152522	14593356	16351470

- Note: 1) The Water Resources Development Centre and Metrological Department Budgets are not included because they are incorporated within the general budget of the Ministry of Electricity & Water and the Civil Aviation Directorate, respectively.
- 2) The above table does not account for any R & D budget allocated with the Oil & Petrochemical sectors or the Industrial sector, due to the lack of such information.

Sources: KISR's Budget Was Furnished By The Budget And Costing Department, KISR.

The Government Testing Station & Laboratories' Budget Was Provided By The Budget Department, Ministry of Finance.

Road Research Centre's Budget Was Given By DR. HANI GUIRGUIS, The Director Of The Centre.

intra-mural R & D expenditure by sector of performance.

The data in the table show that expenditure on R & D activities has been increasing for the period 1977-82. Nevertheless, it is hard to say that there is a functional state budget for R & D as a part of a definite science and technology policy, for the following reasons:

- a) Budget of integrated and not-integrated R & D centres are prepared in an ad-hoc manner every year. Some of these centres have an independent budget as KISR, whereas the other centres have their budget incorporated in the General Budget of their Ministries or establishments. This fact, however, imposes difficulties in estimating the R & D budget as a percentage of GNP or as a fixed amount per capita.
- b) The budget allocated by the Government, after the approval of the National Assembly, refers to the one fiscal year system of budgeting research establishments, and any unused money at the end of the year returns to the State Budget. Thus, although resources are formally available for R & D activities, they may actually be withdrawn, for reasons which may have nothing to do with the effectiveness or success of R & D endeavours. (At this stage, the author recommends that the extra, or unused money should be withheld in the accounts of the establishment to be employed later to further support their R & D activities).



c) A statement to the author by His Excellency, ABDULLATIF AL-HAMAD, the Minister of Finance, declared that:

"The Government does not allocate a specific percentage of its budget for Research and Development, but it has founded KISR and it funds its annual budget from public revenue."

Thus, if, for example, it is assumed that the declared budget in Table 5.3 is the total R & D budget, then, e.g., for 1980/81, the R & D budget would amount to 0.19 of GNP, a figure which is far too low compared with the UNESCO suggested figure of 1 - 2.5% of total GNP. The R & D budget for 1979 would amount to K.D.10.8 per capita, expenditure.

The above argument shows that a co-ordinated policy for R & D is lacking, as a result of the absence of a SPMB which would organise and plan funds as a percentage of GNP for such activities. R & D endeavours are essential to Kuwait's socio-economic development since it is one of the major tools used to solve industrial and social problems, produce innovative and inventive activities and to promote the industrial sector and growth in Kuwait. Since it is imperative to remedy such a trend in the near future, the author suggests that a SPMB or similar system be established to ensure that a given percentage of the State's budget is allocated in an ad-hoc manner and that the budget should increase annually along with the increase in the activities and tempo of R & D in Kuwait.



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CHAPTER VI

HIGHER EDUCATION ESTABLISHMENTS

1) Preface

The application of Science Policy is concerned mainly with education, the stock of knowledge, its availability and utilisation and research and development. Education, largely but not exclusively involves the transfer of systematic and formulated knowledge and thus is a scientific-type activity. Such transmission of knowledge forms the foundation for scientific and technological advance and a basis for practical use and aids pass on the culture and values of society.<sup>1</sup>

The emphasis on education as an important factor in the supply of science and technology was stated by Carter & Williams<sup>2</sup> as "the supply of people capable of using science and of adding to it by research depends on education and similarly, the supply of people capable of using technology and of adding to it by design and development work depends on education. They also argued that R & D grow out of education, development grows out of research, innovation grows out of development.

The above argument illustrates the emphasis on higher education establishments, i.e., universities in

conducting dual functions, e.g., research and teaching. Such functions will enable the universities not only to perform R & D, but to provide maintained scientific standards, skilled manpower and diffuse new techniques (computers, testing of equipments) into the economy. Thus, in this context, universities would lead rather lag industry in the use of new techniques and play a valuable role in building up a team of experts and expertise for a new industry before the industry become commercially viable.

Several propositions<sup>3</sup> have been suggested regarding the method of collaboration between universities and industry in terms of the activities mentioned above. An example of such propositions is the report<sup>4</sup> undertaken by "The British Advisory Council For Applied Research & Development" which adumbrated two principle ways for such collaboration. The first is a government-initiated fund to be used to build up the infrastructure needed for effective co-operation with industry in those higher education establishments that lack it. The second principle is an industrial seed corn fund to act as a further incentive to institute that already collaborate fruitfully with industry.

The author believes that a formula of funds should be worked out between industry and universities to allocate mutual funds for problem-oriented research rather than having the fund to be allocated by one party, e.g., industry or universities. The reasons for such mutual fund rising are:

- i) Allocation of fund by one party only would increase

the financial burden on this party.

- ii) Allocation of mutual fund would force all parties to participate and co-operate.
- iii) Certain projects may be collaborately chosen and this will increase the exchange of experiences between both parties.
- iv) Mutual co-operation may develop contacts and help to create potentially successful research topics.
- v) In many countries, particularly the DC's, there is a lack of indigenous specialists in technical fields, thus, collaboration between industry and universities would decrease the extent of this issue.

The aim of this chapter is to investigate the effectiveness of Kuwait University to gear higher education and research for the development of Kuwait, and the extent of utilisation of scientific outputs to develop the performance of the University.

The author has chosen Kuwait University as an integral part of the thesis for the following reasons:

- i) The University is considered to be an obviously suitable institution on which to base any scientific, industrial and technological infrastructure. It is also recognised for its valuable contribution in many other aspects of society.

- ii) Education is now advancing rapidly and the University has a vital role in identifying and reflecting today's standards and national attitudes.
- iii) The University is leading light in scientific, educational and intellectual creativity in society for it embraces scientific research, seminars, consultation, intellectual communication, and above all the supply of educated manpower to raise the status of society.

## 2) Kuwait University (K.U.)

### A. Introduction:

The need to Kuwaitis to travel abroad to Arab states, U.S.A., Europe, Eastern or Western Hemisphere for university education has been almost abated (for Bachelor level) by the establishment of Kuwait University by an Amiri Decree in 1966.

The increase in numbers of school students, the impact of diversified specialisation, and the need for university graduates to participate in the socio-economic development of Kuwait led the Ministry of Education to form, in 1960, a committee from three experts from Egypt, Lebanon and U.K. to evaluate the possibility of establishing university in Kuwait.

In 1961, a temporary Board was formed in the University aiming to prepare for the starting of university

education in September 1964. Difficulties arose to obstruct such plans, and more appraisals and evaluations were needed. Nevertheless, the university began its first academic year in September 1966, with the faculty of Science, Arts and Education (for men only), and a girl's college with similar syllabus. The faculty of Arts and Education was the focus of the majority of students and offered courses in Arabic and English Languages, Literature, History, Geography, Philosophy, Psychology, Education and Sociology, and Social Sciences.<sup>6</sup>

In April 1966, a law concerning "Organisation of Higher Education"<sup>7</sup> was promulgated to establish a Government financially supported university under the supervision of the Minister of Education. The author could understand the political status given to the university by allowing it to function under the supervision of a member of the Government, e.g., the Minister of Education, notwithstanding he believes for the university to conduct its objectives promptly should be given entire autonomy or if the Government, for political reasons would prefer to monitor its activities, should be then placed under the supervision of a specialised body, e.g., SPMB. Such fact illustrates the needs and urgency to establish SPMB in Kuwait.

#### B. The University's Objectives

The objectives of the University were outlined as follows:<sup>8</sup>

- i) Preparation and supplying of cadres in all the scientific and technical sectors of the society.



To prepare the thoughtful youth of the country to express its thoughts, both scientifically and practically, to feel and appreciate the heritage, thoughts and ethics of society, to understand the international challenges and impediments and to be able to contribute to the needed changes.

- ii) Follow-up of technical progress in all branches of knowledge and to participate in such progress via scientific research as a means to expand the scope of human lore to solve the societal obstacles and to develop it economically, socially and culturally.
- iii) Concentration on Islamic & Arabic civilisation studies and also on the Arabian Peninsula and the Arabian Gulf.

The above declared objectives illustrate the trends and policies to be followed by Kuwait University in conducting its duties. The author is in agreement with the specified objectives, providing that they have been executed promptly for a country which is striving to propagate and enhance scientific and educational activities and building up specialized manpower. The author realises the extent of involvement of the university in the third objective by issuing a periodical journal, in Arabic, which deals with Arabian Peninsula and Arabia Gulf studies. Moreover, the author found out that the declared objectives of Kuwait University conform<sup>9</sup> with declared objectives of many European Universities, which illustrates the fact that a Kuwaiti establishment, which is a less developed than the European countries envisaged universities objectives in the same context. There is, however, deviation to conducting these objectives as would be discussed in the section dealing with the colleges of the university.

### C. The University Colleges And Centres:

Kuwait University encompasses at present ten colleges, two centres and four campus institutions with approximately 9,500 students. Academically, standards are high with all faculty members required to have a doctorate degree and all work at graduate level rigorously monitored, which gives rise to the college of graduate studies which vets all research projects. The Rector of Kuwait University has the rank and powers of a minister over his institution. He is usually nominated by the University Council (which is presided over by the Minister of Education) and is appointed by an Amiri Decree. This reflects the political status attached to the Rector. The appointments of the Assistants to the Rector, the Dean of Colleges and their Assistants also come from the University Council upon the nomination of the Rector.

University and Faculty Councils are charged with approving the University policy, granting degrees and supervising teaching, staff promotions, co-ordinating departmental activities and plans, approving curricula where necessary and recommending appointments of teaching staff.

The admission process usually begins with the colleges and faculties fixing the number of students to be admitted in the following year according to the places available and teacher/student ratio. Admission to Kuwait University is based on the completion of secondary education sanctioned by government examinations leading to the granting of a

certificate of secondary education. Students holding a certificate from Teachers College or the Commercial Institutes are allowed to join the University providing they possess the requirements specified by the University.

Apart from Law, Arts and Commerce, teaching at the University is in English and English Language Units have been attached to each of the colleges to provide both specific and general English courses.

Since 1975, following a Pilot Project in the College of Commerce, Economic and Political Sciences, the course unit system has been in use. It is strongly felt that the credit system of compulsory and electives courses allows more flexibility and adaptability and better motivates students.<sup>10</sup>

Kuwait University consists of the following colleges:

- |                |   |
|----------------|---|
| i) Arts        | ii) Commerce, Economic & Political Sciences |
| iii) Education | iv) Engineering & Petroleum                 |
| v) Girls       | vi) Higher Education                        |
| vii) Law       | viii) Medicine                              |
| ix) Sciences   | x) Sharia & Islamic Studies.                |

Details of colleges and other affiliated centres in terms of faculties, facilities, curricula, student enrolment, research activities are provided in Appendix XII.

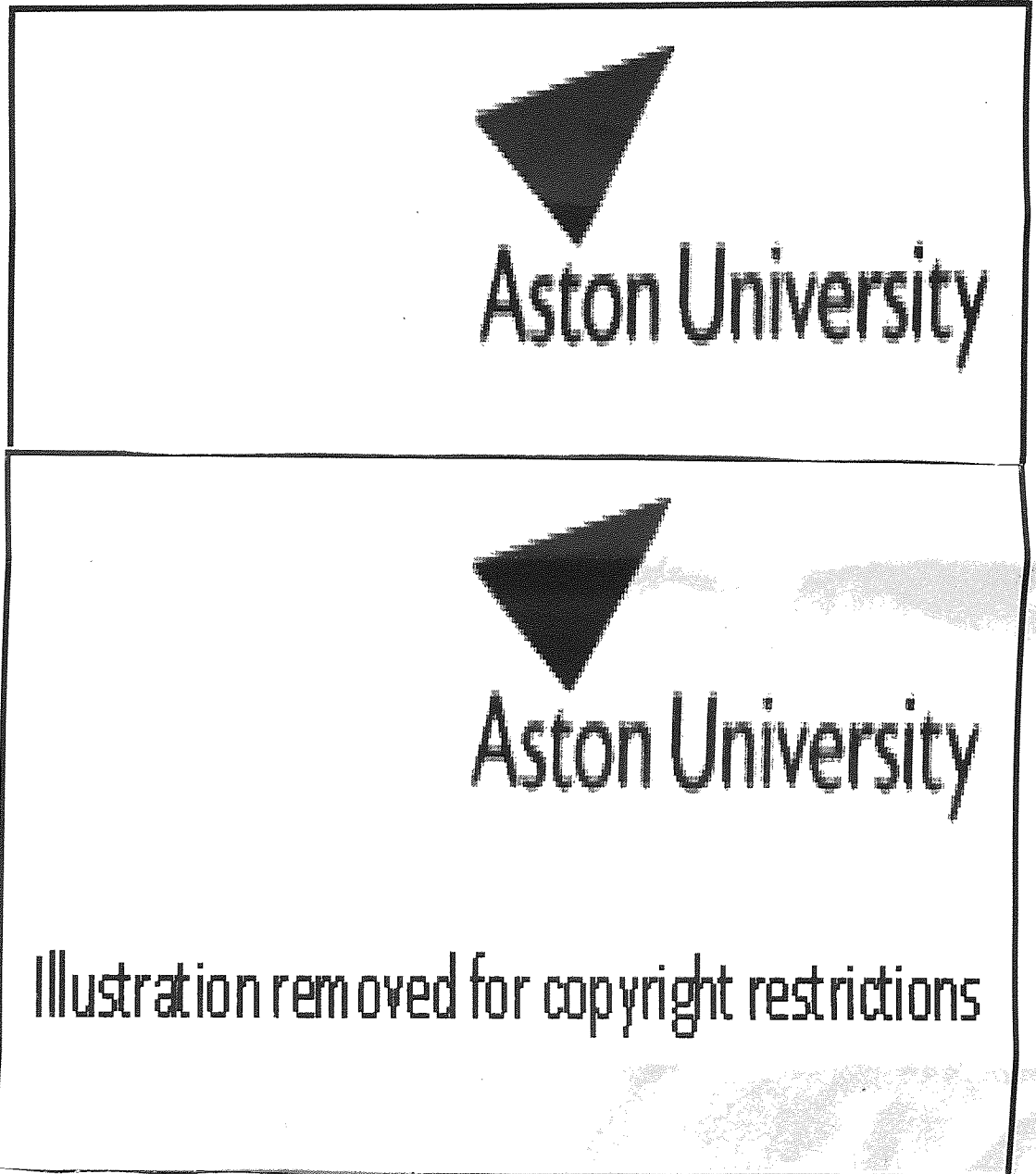
Table 6.1 illustrates student enrolment in Kuwait University for 1982/83. The data reflects the following facts:

- i) The non-Kuwaiti students represent 18.1% of total students.

TABLE 6.1:

Students Enrolment In The University  
Of Kuwait For The First Session Of  
1982/83

College	No. Of	No. Of	%
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Source: AL-RAI AL-AAM Newspaper (KUWAIT), No. 6730,  
August 11, 1982, P.2. In Arabic.

- ii) The Kuwaiti Students are over-numbered only in the Ancillary Medicine.
- iii) The numbers of Kuwaiti students are higher in the College of Arts followed by the College of Sciences.

For the context of this thesis, the author would analyse in more details the status of the colleges of Engineering & Petroleum, Medicine and Sciences.

#### College of Engineering & Petroleum

The college was established in 1975 and encompasses the following Departments:

- Civil Engineering
- Mechanical Engineering
- Chemical Engineering
- Electrical Engineering

The college enrolled in 1982/83, 1000 students, amongst which 58.7% are male and 52% are female.

The high percentage of foreign students enrolling in the college (48.0%) could be attributed to the factors:

- i) Kuwaitis are unwilling to join the college due to the high standards and learning efforts required or to the inappropriateness in terms of jobs and field work to the female.
- ii) Foreign students are anxious to obtain a secure future by studying exact specifications which are in high demand in Kuwait and the Gulf Region.
- iii) The tendency of some Kuwaitis to seek, for family

or social reasons, jobs associated with financial and social merits, e.g., banking, insurance, trade, law, etc.

The author wishes to emphasize that although, as has been mentioned throughout the context of this thesis, Kuwait is one of the World's major oil exporters and possesses petrochemical industries inside and outside Kuwait; nevertheless, the decision and policy-makers have established ten colleges, including engineering and have never given any priority to the endowment of a College of Petroleum (except in name) which would provide specialised national manpower, and develop the petroleum infrastructure.

In a country so dependent on petroleum and its products there is outstanding need for a College which could provide the specialised manpower required and could develop the petroleum infrastructure which Kuwait so desperately needs for its future economy.

As would be discussed in this thesis, there is a shortage of manpower in the oil and petrochemical sector, but for reasons that are not declared or justified, the policy and decision-makers are helping to increase this shortage. In fact, this contradicts the Government declared policy. Similarly, Kuwait has, for the last two decades, witnessed a large expansion in construction and architecture, but the decision and policy-makers have not bothered to establish an architectural department.

In a press interview<sup>11</sup> with DR. ABBAS MARAFI, the Head of the Electrical Engineering Department, he stated that there are several impediments to hinder the performance of the department. He pointed out the following obstacles:

- i) The decrease in the budget of the division by the National Assembly, where the department had formulated a programme to acquire equipment and to build new laboratories. The existing laboratories are overcrowded with students which would not allow the student to understand thoroughly his practical assignment. (The author believes that there exists a lack of communication between the National Assembly and the higher education system in Kuwait due to the absence of an explicit National Science and Technology Policy. Therefore, and until such policy and SPMB are formed, a joint Committee between the Assembly and K.U. should be established to enlighten the Assembly concerning the important role of K.U. in general and its scientific and technical colleges in particular in developing the socio-economic-industrial structure in Kuwait).
- ii) The workshop needs larger space to accommodate its duties. The author believes that solving the previous problem would immediately solve the space or any other facilities problems.

The research projects which have executed or under studies in the college are listed in Appendix XII.



The author would like to mention that although the college has conducted appreciable numbers of basic and applied research, notwithstanding, it failed to perform or sponsor research topics in important sector, such as:

- The absence of any oil and petrochemical-related research, viz., recovery enhancements, sulphur contents, improvement of octane numbers, problems and issues related to the petrochemical industries, all of which could be studied within the Chemical Engineering Department.
- The absence of any environment and pollution studies.
- The absence of any collaboration within, or outside, the University to study such problems as drainage, sewage, the long-term impact of traffic on bridges, etc.

The author is criticising such trends for two main reasons, firstly is that the university R & D activities should be concerned in topics which are very important to the socio-economic development of Kuwait by investigating and solving problems facing the progress of these sectors and secondly, part (ii) of the declared objectives of the university as discussed in section (B) above indicate that one of the university duties is to apply R & D to solve societal obstacles and to develop it economically, socially and culturally. The following trends of R & D activities in the college do not conform with the declared objectives or



the national development plans.

Therefore, the author recommends that the college's officials should re-evaluate and restructure their projects according to more specific problem-oriented programmes. Furthermore, the author recommends that the college, in collaboration with various concerned bodies, should offer courses in technology assessment, technology transfer, impact evaluation, etc.

### College of Medicine

It was not until 1976/77 that the first students were accepted for the University's College of Medicine. It was wisely decided to wait until the development situation was ripe for the opening of a Medical College with academic staff of the highest level from such countries as the United States, Great Britain, Sweden, etc.

Although candidate entry is strictly regulated, entry to nationals is obviously favoured with a 75% minimum pass in their High School Certificate, compared with 80% for non-Kuwaitis. However, due to the number of places allotted to non-Kuwaitis, 10% out of the 60% available, a candidate chosen usually has over the 90% mark. This policy illustrates the criteria stipulated by the college to select only students who could be real candidates for such specialisation.

Kuwaiti (50) places are divided equally between male and female, but with such attractive business opportunities open to the Kuwaiti male, the Medical profession does

not appear to be attractive, which gives rise to very high female competition for places. The bachelor degree in medicine is offered after the end of seven year course with a residential training programme.

The research work carried out at the college, specifically on tissue grouping, has enabled more than 100 kidney transplants to be done in Kuwait. A list of approved projects conducted by the College is provided in Appendix XIII. Analysis of these projects indicate that the College has formulated an excellent research policy in investigating and conducting research related to Kuwaitis and to the sort of diseases which are related to the Kuwaiti environment.

#### College of Sciences

The College was established in 1966 and it encompasses the following Departments:

- Botany & Microbiology;
- Chemistry;
- Mathematics;
- Physics.
- Biochemistry;
- Zoology;
- Geology;

This is the only College at the University currently offering Masters' Degrees and is the key-college conducting research. To help facilitate the publication of research papers in the region, the College produces the Journal of Kuwait University (Science). Plans are now in process to introduce post-graduate courses in 1982/83 in the Department of Zoology, Geology and Biochemistry.

In 1981/82, the College enrolled 1600 students (66% were Kuwaiti and 66% of the total were female), and employed 166 academics.

The College, in collaboration with KISR and KFAS has undertaken several research projects of local concern and organises seminars. The College also provides consultation for the Ministry of Education in the preparation of science text-books, for schools and in curricula development. Furthermore, it undertakes some Faculty work, on a part-time basis and advises the Ministry of Health, Department of Agriculture, Ministry of Commerce and Industry and the Crime and Research Institute of the Ministry of Interior. Appendix XIV provides the list of research projects approved for the college as of July 1981.

The author expected that the research topics in the Department of Chemistry would be engaged mainly with problem-oriented projects, to analyse and solve various environmental problems, (pollution, dust, etc.), or problems associated with the industrial and petrochemical sectors. The Department only dealt with one research topic concerning corrosion and only one topic concerning the oil sector, (Paraffinic Hydrocarbons).

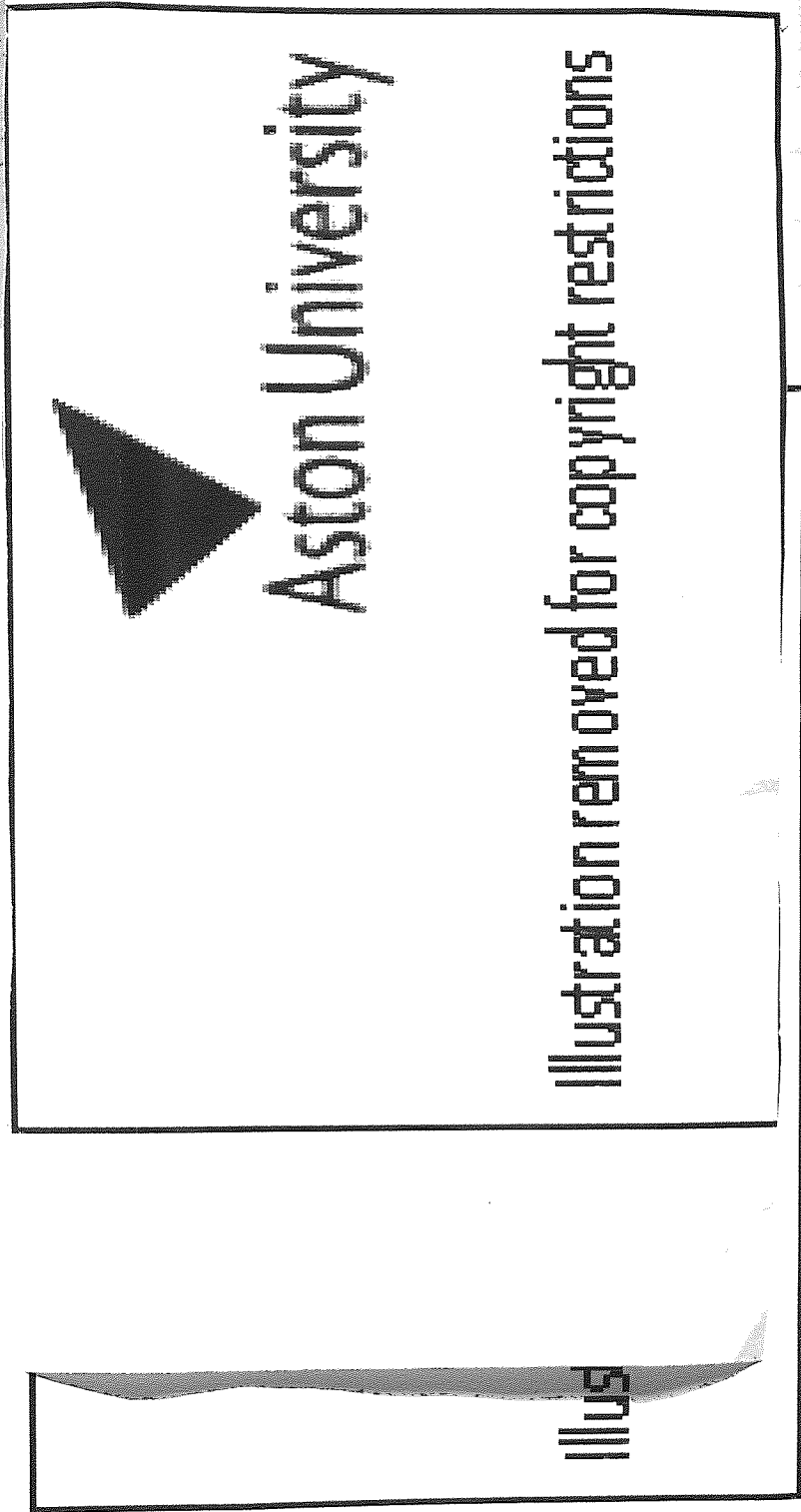
In a discussion with a senior Arab professor in the Department, he confirmed to the author that the reason for not performing sufficient research topics in the oil and petrochemical sectors was due to the fact that the university was established as a "carbon copy" of the Egyptian universities

which do not emphasise heavily on such topics. The author, although trusts the sincerity of the professor, believes that the policy-makers of the university should have interfered and change that trend. However, the college is currently administered by Kuwaiti dean, in addition, a Kuwaiti doctor is in charge of the chemistry department and there are (44) Kuwaiti Ph.D. holders employed in the college. This fact indicates that the absence of explicit science policy in Kuwait and the absence of clear research policy in the university, to the contract of its objectives, are the cause of choosing wrong priorities for R & D activities in the college and not the mere copying of the Egyptian universities. Figure 6.1 reflects the pattern of Kuwaitis enrolment in Science in Kuwait University for the period of 1969 - 1980. The pattern indicates a smooth exponential increase over the period, but not enough to supply the needs for Kuwait as we have been throughout the thesis.

#### D. Enrolment In Humanities Vs. Sciences

In Kuwait University, as in almost all Arab States, the enrolment in humanities (including economics and social sciences) far outnumber the enrolment in sciences (Table 6.2). This situation does not conform to the requirements of Kuwait's socio-economic development plans which necessitate the needs for scientists and engineers. Therefore, Kuwait should adopt a policy of encouraging entry into the scientific and technological fields and of limiting admission into the humanities, in order to eliminate or minimise the discrepancy shown in the average of 21.7% of the total students enrolled in sciences.

Fig. 6.1: KUWAIT/ SCIENCES GRADUATES FROM KUWAIT UNIVERSITY:1969-81



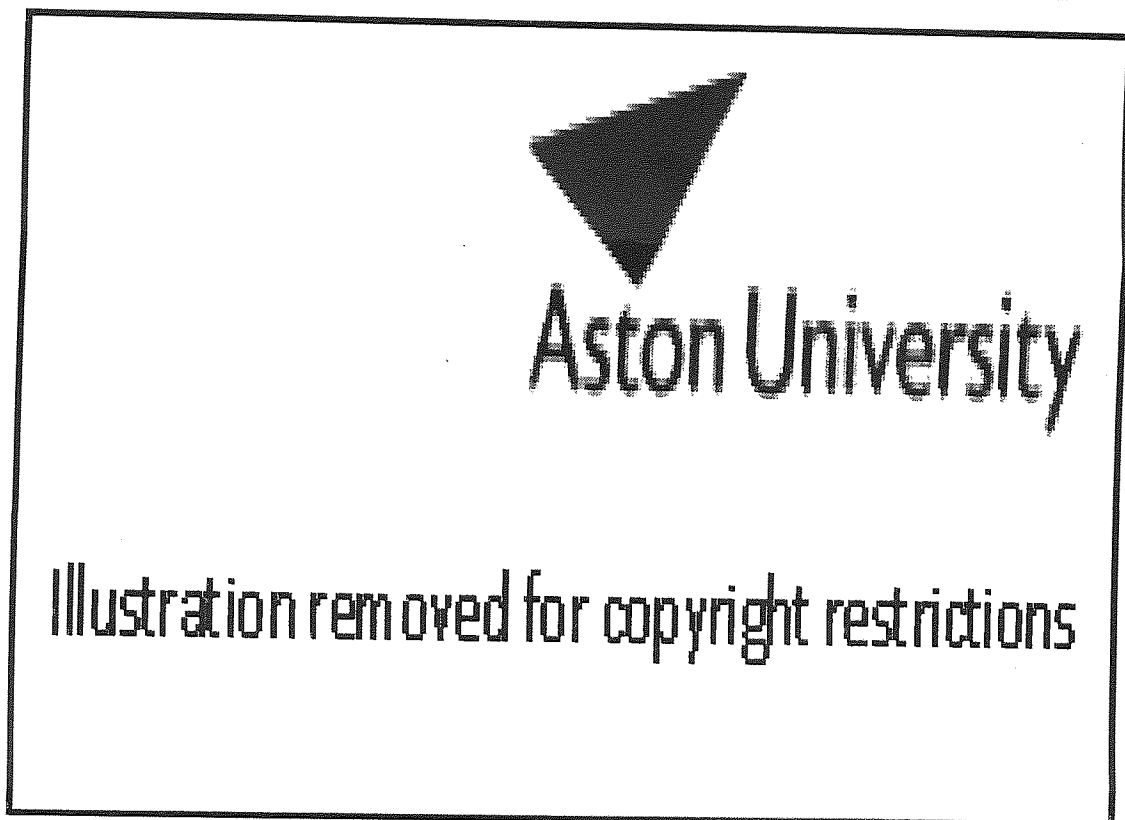
76/77 77/78 78/79 79/80 80/81  
YEARS

Source: "University of Kuwait", Kuwait.

TABLE 6.2:

Number And Percentage Of Students  
Enrolment In Humanities Vs.  
Sciences In Kuwait University  
(1969 - 80)

---



Economic & Political Science.

Source: "Annual Statistical Abstract: 1980", The Ministry  
Of Planning, Kuwait.

## E. Academic Standards

The increase in academic staff, class-rooms, laboratories and other facilities in Kuwait University has not kept pace with the expansion of student enrolment, particularly in humanities, consequently, academic standards might have suffered.

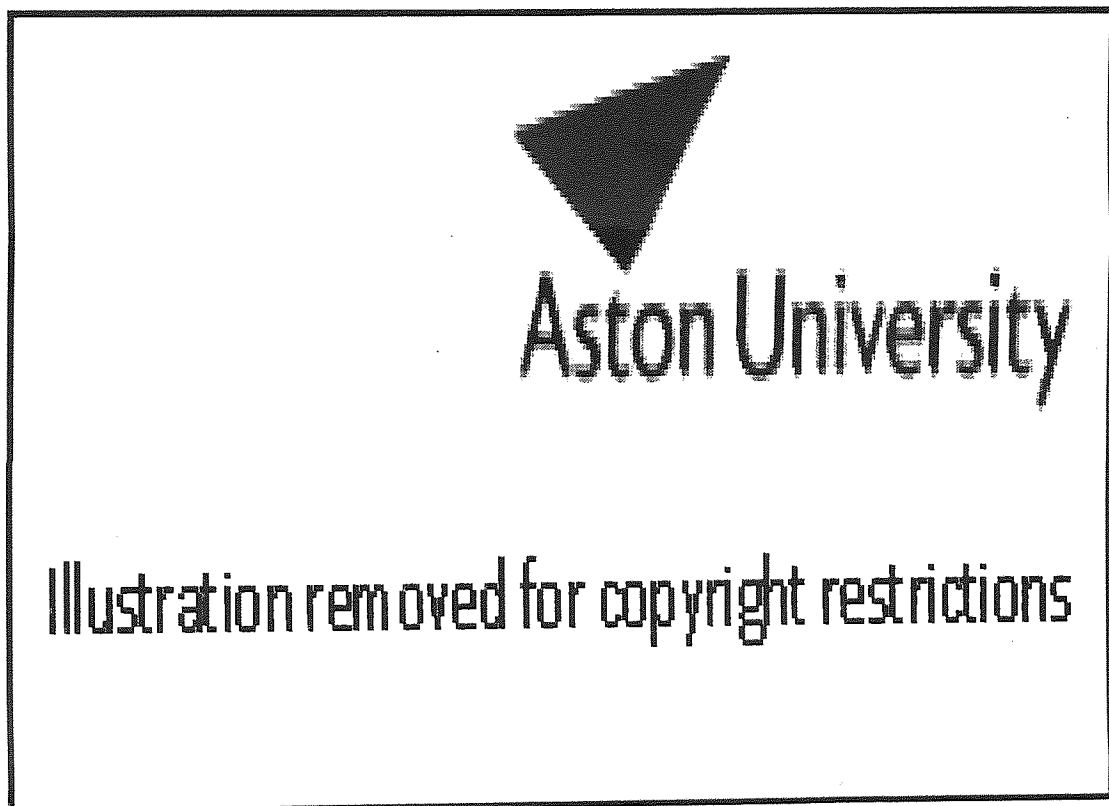
Table 6.3 illustrates student/teacher ratio in Kuwait University which averages 18 to 1 for the period of 1966 - 1981. These ratios do not take into account the demonstrators and assistant teachers. The ratio could be improved by several approaches; the author would recommend that a variety of educational options are created, starting with intermediate levels, and that the educational structures and their contents are re-evaluated and re-organised accordingly.

Table 6.4 provides the composition of Kuwaiti academic staff in the University as of June 1982. Analysis of the data indicates that at present there are 164 Kuwaiti Ph.D. holders which comprises 27.0% of the total academic staff of 608. The table also indicates that the majority of the Kuwaiti staff are in Sciences and Arts with lower numbers in Law and Sharia & Islamic studies.

DR. ABDUL AL-RIFFAE, the Secretary General of the University emphasised the difficulty of acquiring more Kuwaiti academic staff as follows:<sup>12</sup>

TABLE 6.3:

Number of Academic Staff, Enroled Students,  
Graduated Students and Students/Teachers in  
Kuwait University (1966 - 1981)



Source: "University Of Kuwait"



TABLE 6.4:

Composition Of Kuwaiti Academic Staff  
In Kuwait University (June 1982)



Aston University

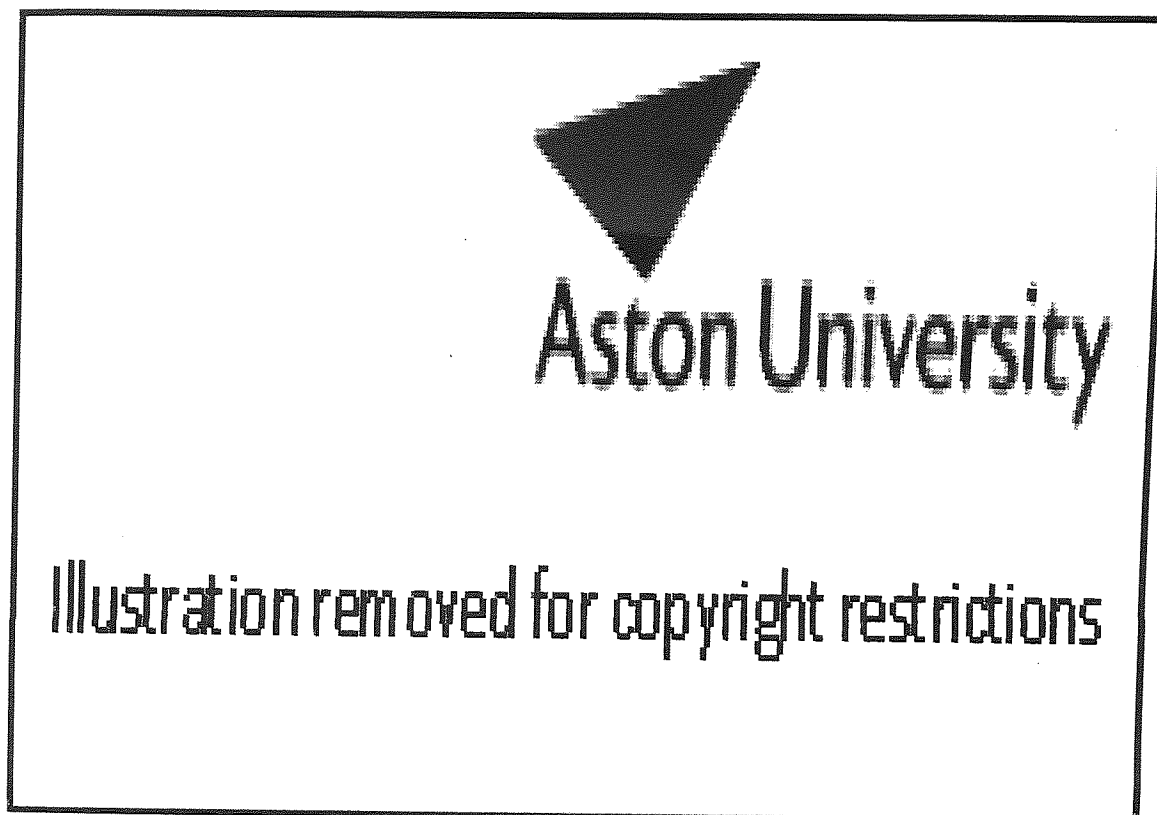
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Aston University

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TABLE 6.4: Continued/-



Source: Data was provided by MR. MOHAMMED AL-ASFOUR,  
The Assistant Secretary-General, University  
of Kuwait.

"It is sometimes difficult to persuade Kuwaitis to teach at the University, living as we do in a society which offers so many chances to earn large amounts of money in business and commerce."

Furthermore, DR. HAMED AL-QAISI<sup>13</sup> has emphasised the difficulties facing Kuwait University which must be resolved if it is to prevail as a beacon of knowledge in Kuwait and the Arabian Gulf:

- i) Kuwait University's environment presently is neither conducive to attracting new staff, nor to the retention of present staff, e.g., there is no security, stability, respect and peace of mind.
- ii) The Arab staff in the university are viewed as something akin to untrustworthy mercenaries by not given long-term contracts.
- iii) The textbook utilised at present are foreign books and are not the work of professors themselves, where these books, particularly humanities, were designed for different societies. The professor's abstention from writing textbooks emanates from the university administration's failure to accord such publications their due or not to be taken into consideration during promotions. The author believes that the university—due to financial engagement might have laxity in the area of funding textbooks publications, but it has been confirmed to him that these publications are taken into consideration for promotion, if their standards and quality permit so.

iv) The university lacks facilities and students might be turned back from attending lecture. The author believes that such gravest situation persists and further action should be taken by the university's officials to resolve it. The phenomena applies to the teaching staff as well.

The following section would discuss the status and problems facing Kuwait University in its present status and discussed throughtout this chapter and then the author would propose some recommendations aiming to participate in the development of the State and performance of the University of Kuwait.

#### F. External Citation

The principles of citation indexing and matters related to external citation have been discussed in chapter V. The following is a source articles citation for Kuwait University:<sup>14</sup>

<u>Year</u>	<u>No. of Citation</u>
1976	23
1977	29
1978	36
1979	49
1980	61
1981	85
	<hr/>
	128

The above data indicates that the publications

activities of K.U. have been increasing annually and the author feels that the number of citation of K.U. might be an appreciable numbers for non-industrialised country.

### 3) Suggestions & Recommendations

In a surprisingly short period of time, Kuwait University has developed Facilities, and found students and its future plans seem even more exciting. The foundation has been laid for a high standard of teaching.

Whilst establishing courses and research is undoubtedly important, what is even more important is setting up programmes which will produce graduates who will be of use to their country. Manpower has to be trained for certain areas, both within the private and the public sector. Part-time facilities for studying are especially necessary for public administration workers, though until these facilities are established, the country should continue to send students abroad for areas where they are most urgently needed.

The University Council President and Officers should be allowed the necessary degree of authority so that they are empowered to meet and tackle challenges. If necessary, some of the present, more restricting regulations of the University should be abolished.

In terms of intellect, economy and culture, Kuwait University has an important role to play in the future. It will become the core of the education system, guiding Citizens to find new knowledge, reach new personal heights and generally

better themselves. It will supply the community with more workers and set standards for professions. It should be in a position to be able to guarantee the right amount of trained people for the future needs of the country. It is not sufficient just to be content with turning out graduates of any discipline - this must be monitored and controlled.

Kuwait University was based on Cairo University which in turn was modelled on English Universities. It is only recently that it has turned its attention to future manpower requirements. It realises that it must now update itself. There is a need to strengthen the Engineering & Medicine Faculties and innovate new undergraduate courses, particularly in nursing, health, social welfare, para-medical, engineering and teacher training.

The plans to develop the College of Higher Studies will greatly enhance the reputation of the University, but the areas to be offered must be chosen carefully.

The University officialdom is aware of the dangers of choosing unsuitable courses. Unless it sets itself high standards, and is able to produce postgraduates of high intellect and training, then the money to be invested would be better spent on sending students abroad. Areas to centre on are public and business administration, education, physical sciences, mathematics, economics and statistics. These are the areas crying out for manpower. Graduates already employed in these sectors should be encouraged to continue their studies on a part-time basis. The Ministry of Planning should

enquire of consumers what areas manpower is needed for. If the University can establish such a graduate school, it will acquire great standing in the Arab World, but such a reputation will take a long time to achieve.

The difference between education for academic disciplines and education for specific professions must be noted. A student of physics, mathematics or biology, for example, is being trained to embark upon a career of research into a specific area within that discipline. When one is trained in a profession, one is being trained to work. This training usually covers several disciplines - business administration is a good example, as it involves statistics, management, economics, marketing, etc. Public administration covers a broad spectrum of subjects too - law, engineering, sociology, psychology, political science and management. Kuwait has got muddled over the differences between disciplines and professions.

In the Faculties of Arts and Education of Kuwait University there are six discipline departments, one professional and one mixed. The Faculty of Commerce, Economy and Political Sciences contains three discipline departments and two professional ones. It must try and get itself sorted out if it is to gain a good reputation. Why put sociology and geography together in one Faculty and then put economics and political science into another?

A postgraduate facility is particularly important for improving manpower in Kuwait, particularly within the

Government. What is needed is a multidisciplinary, intensive, thorough programme which will turn out capable professionals. What is currently entitles public administration is not. Public Administration Courses should include teaching in the following areas:

- Proficiency in two languages;
- Understanding of quantitative tools and methodology;
- Understanding of legal, economic, social and political institutions;
- Familiarisation with bureaucratic ways;
- Management and administration, especially planning, finance and personnel;
- Drawing up, analysing and making operational policies;
- Leadership qualities;
- Problem solving ability;
- Planning and organisational ability;
- The ability to indentify and remedy managerial and organisational shortcomings.
- The ability to research and assess the value of programmes.

Courses in public administration should also cover economic and social development, urban planning and development, international administration, finance administration, personnel administration, infrastructure planning, health administration and social welfare administration.

Research is vital for producing highly qualified



teachers and for the development of knowledge. It should concentrate on the solution of practical problems. Public administration teachers should be involved in research programmes, and should be in close contact with government bodies so that they know what is needed in terms of manpower. They could also provide the Government with material for solving problems. There is plenty of room for research in all sorts of areas of public administration.

The Faculty of Public Administration at Kuwait University could carry out research into the following areas:

- The development of teaching materials;
- Whether information from Government operations would be of use in solving administrative and developmental problems;
- Whether students should be trained specifically for research;
- Ways of up-dating and increasing teachers' knowledge;
- How to create a better understanding of Government and administrative problems and difficulties;
- Studying specific areas or problems as requested by the Government.

Research should aim to develop analytical capabilities and administrative know-how in students. Course work should be intensive and extensive use made of case studies. Advanced students should work alongside teachers on particular research projects, though should be capable of producing their own work.

Facilities should be made available for teachers to work on a part-time basis in drawing up training courses and to undertake courses on developing organisational and management techniques. If a lot of their time is taken up in such a way, a pecuniary award should be given. Care should be taken not to neglect main areas of responsibility.

It is a fallacy to assume that training in business administration qualifies an individual to work in all areas of administration. There are of course some common areas such as analytical methodologies, personnel management techniques, human behaviour studies and motivation, but it is in the political and economic environment of business and public administration that the real differences lie, and areas such as budgeting, accounting, and financial management. All administrators should know what the practical aspects of the environment are and what the work entails, e.g., a hospital administrator needs to understand the workings of a hospital. An international administrator must have knowledge of foreign affairs, social and economic policies, etc. Students should seek the right courses to meet their special requirements.

For these reasons public and business administration is usually separated. It is possible to include them within one Faculty, but they should be taught within separate departments by competent staff.

What this is really advocating is for special courses to be run for public works administrators, for hospital administrators providing the demand is there. If

necessary, two Faculties should be involved, e.g., public works planning and management should be taught in conjunction with the Faculties of engineering and public administration.

Some courses should only be run at Master's level, but if there is a bright enough undergraduate, he should be admitted to the core part of this course.

Part-time graduate study is strongly recommended and it is up to Government to encourage such part-time study, especially among younger employees.

The development of such courses needs close cooperation between the University, the Ministries of Planning, of State for Legal and Administrative Affairs, public enterprises and the proposed Institute of Executive Management.

The University Council and President must be empowered to bring about such changes as may be necessary, including the introduction of new courses. They will be responding to social and economic needs and changes and at the same time helping society develop. At present the laws governing Universities are too cumbersome. Changes are required and new laws are recommended. The University of Kuwait should be treated as an important enterprise. Treating it as a branch of the Civil Service merely deters recruitment of the right sort of staff who will serve as a backup to the academics carrying out such vital work.

Furthermore, the following recommendations are put

forward by the author:

- 1) The University should improve its system to attract and retain highly qualified academic staff by offering competitive financial resources, a system of control, academic leadership, immunity from external manipulation, freedom of contracts, etc.
- 2) The University must constantly revamp its policies and curricula to ensure that its graduates are equipped to face the critical intellectual social problems and that its Faculty contributes meaningful problem-oriented research.
- 3) The University should establish liaison officers to contact various sectors, particularly the industrial sector to make these sectors utilise the advantages and facilities available in the University and to discuss and evaluate their problems.
- 4) The University should establish explicit criteria and measures for appointing top officials in the University and its colleges, rather than having the Kuwaitis fighting and spending time to attain such posts.
- 5) The credit-hour system adopted by the University has proved to be a failure and improper in some Colleges, (i.e., the Law and Sharia & Islamic Studies), and thus, it should be re-evaluated.
- 6) To face the rate of expansion in enrolment, the

University should build new buildings, facilities and laboratories to ensure the provision of adequate spaces for graduate students with good qualities in the Scientific and Technical Colleges.

- 7) The University should strengthen the consultation process by initiating strong and frequent contacts with various economic-industrial-scientific sectors in Kuwait.
- 8) To minimise the administrative authority's dominance over the academics and to constantly develop the administrative cadres.
- 9) The need to establish a legal affairs department in the University to handle and propose various legal measures.
- 10) To further foster environmental and societal based research, viz., oil and petrochemical, pollution, sanitary and waste and marine studies.
- 11) The University should establish the College of Petroleum as soon as possible and also offer courses in Architecture.
- 12) The University should establish an explicit enrolment policy in accordance with the socio-economic development plans.
- 13) The University should develop and provide the libraries and other affiliated activities with all the up-dated

- materials, equipment and references necessary,
- 14) The University should publish and disseminate the research findings of its Faculty.
  - 15) The Decision and Policy-makers should form a Committee with members from the Colleges of Engineering & Petroleum, Sciences, Commerce, Economic & Political Sciences, Industries and other concerned parties to study the possibility of offering courses in Technology Assessment, Patents and Aspects of Technology Transfer for the undergraduate and/or Graduate levels, due to the importance of such topics to technology transfer issues in Kuwait.
  - 16) The University (in collaboration with KFAS) should publish and make available to the public all of the Kuwaiti Ph.D. Theses and any other Theses relevant to Kuwait.
  - 17) Kuwait is a business oriented society, therefore, the author suggests that the College of Commerce, Economics & Political Sciences should update the curriculum of the Business Administration Department to reflect the changing needs of the society and should incorporate new programmes such as management information, theory and practices of stock markets, banking, insurances, utilisation of technological information, management studies, economic policy and diversifications.

18) The author would like to emphasise that wide differences exist between the various English Language Units in the colleges. An example of this is that while the Engineering Unit is a good one, the Commerce Unit is not admittedly investigating the real needs of the Commerce students, either regarding their academic studies or their future occupational profiles.

To avoid such incidents, the Language Centre should constantly call for students to evaluate the content of their instructors. The testing and Measurement Unit should be evaluated to ensure that instead of concerning itself with validating exciting assessment ideas, investigating communicative test format and establishing profiles of the performance of students across Units and across intakes, it seems to be pursuing a policy of constraining the teaching staff to placement test format. The Centre should show more interest in the wider educational environment of the University, more concern with the students as people and as learners and more work in the traditional applied linguistic fields of error and contractive analysis.

The Centre should, however, increase its contacts with comparable organisations regionally and internationally. The author would recommend that the officials of

University should establish an explicit policy to:

- i) Set up the function and performance of the Centre.
- ii) Indicate levels and standards to be achieved by students in the colleges.
- iii) Emphasise the necessities, needs and bases to teach foreign languages in different colleges, and the academic standards to teach these languages.
- iv) Diminish the academic status discrimination against the Centre teachers.
- v) Evaluate and review the quality and performance programme and systems of the Centre.
- vi) Consult and involve the Centre staff in matters relating to the quality and performance of the Centre.



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## CHAPTER VII

### SCIENCE-BASED SERVICE ESTABLISHMENTS

The state of science-based service establishments, e.g., agricultural departments, testing stations, etc., and their progress in Kuwait have not been fully described or assessed for the past decade. Some establishments have produced no reports at all. The author believes that these establishments are important because they form an integral part of Kuwait's scientific infrastructure and because their activities are based on scientific and technical principles.

As little information has recently been available, some research or evaluation studies are necessary in order to assess the value of their performance in relation to the socio-economic objectives and individual social needs in Kuwait. This chapter aims to evaluate how well are these service-establishments functioning? and to what extent are they successfully incorporating science and technology in developing the services they offer? The science-based service-establishments to be discussed in this chapter are:

- 1) The Agricultural Department.
- 2) The Government Testing Station and Laboratories.
- 3) The Standardisations and Specifications Department.

4) The Patents and Trademarks Department.

5) The Meteorological Department.

1) Agricultural Development And The Agricultural Department  
In Kuwait.

A. Introduction

Kuwait consists mainly of flat desert, sloping from west to east with rising hills in between. Extending from these softly rising hills are plains, dry, small valleys with no streams or rivers running amongst them (refer to Chapter II for more detailed analysis of Kuwait's topography and climate). In the harsh climate prevailing in Kuwait, the production of crops and raising of animals are restricted and costly. Water is scarce and was originally available by manual effort, being drawn from shallow wells supplied by rainfall. Eventually, due to the increased presence of salt and drying up of these wells, farmers gave up the uncultivable land and moved to new sites only to begin digging numerous new wells. During this period only a few animals were kept by the farmer, mainly for their own consumption, and these would have to eat a diet of dried fish. From 1934 with the discovery of oil, rapid changes greatly affected agricultural production with any good arable land being urbanised. The plant life of Kuwait and her eco-systems have been described and provided by Kamal's publication on "Food & Agriculture."<sup>1</sup>

In order to develop the Kuwait desert lands and

make them suitable for cultivation, the government has conducted comprehensive soil and underground water survey projects in the hope of becoming less reliant on the importation of fresh vegetables and fruits, eggs, meat, etc. Furthermore, the Government has taken several measures in order to improve the agricultural sector, e.g., providing extension services to farmers, conducting r & d activities on agriculture and water usage, providing lands, machines and funds on concessionary terms.

#### B. The Private Sector And Agricultural Development

In 1969, attracted by the high prices paid for agricultural foodstuffs, the private sector ventured successfully to explore areas suitable for farming. In 1977, (69) farms were cultivated to provide vegetable production to the local market. However, the author believes that the extent of the success of the private sector in developing agriculture depends mainly on the extension services and R & D activities conducted by the agricultural department, and by the financial support provided by the Government. The author urges that the National Assembly, which constitutes of members who are in constant contact with the farmers, should study this issue and propose a bill to the Government suggesting the formation of an Authority which deals with the development of the food security in Kuwait. Food security issue should deal with several aspects such as: agriculture, fishery, animal and poultry breeding and diary products. Furthermore, the authority should establish the guidelines

for any R & D activities in the food security sector based on Kuwait environmental conditions and social priorities and needs. To fulfil such task and to avoid duplication, the author adumbrates that the Government Agricultural Department should be under the supervision of the suggested authority.

### C. The Government Agricultural Department

The department was established, in 1955, as a department of the Ministry of Public Works. The department was given several responsibilities, amongst which are:<sup>2</sup>

- i) To propose the general agricultural policy and make the relevant recommendations.
- ii) To execute agricultural projects in the public sector.
- iii) To provide agricultural services, extension services, improvement of animal resources, analysis of soil water and fertilisers.
- iv) To co-operate with the Ministry of Electricity & Water in suggesting irrigation-water policy.
- v) To conduct R & D in various agricultural issues and to develop manpower in the field.

As for the general agricultural policy, Kuwait has not, for socio-political reasons, did not endorse any 5-year plans or policies per se, thus the author believes that the absence of agricultural policy by the department which has been established almost three decades ago reflects the general

non-policy trends adopted by the decision-makers in Kuwait. This haphazard trend had cost Kuwait to import the majority of her food, e.g., 80% of fresh vegetables.<sup>3</sup>

As for the extension services to the public, the author has conducted two interviews with a Kuwaiti owner of a farm and with a director of agricultural company who confided to the author that the department neither aware of its duties nor competent of carrying out the responsibilities assigned to it and thus increase the impediments facing the agricultural sector in Kuwait.

As for the R & D activities, the department has conducted activities mainly on the following topics:<sup>4</sup>

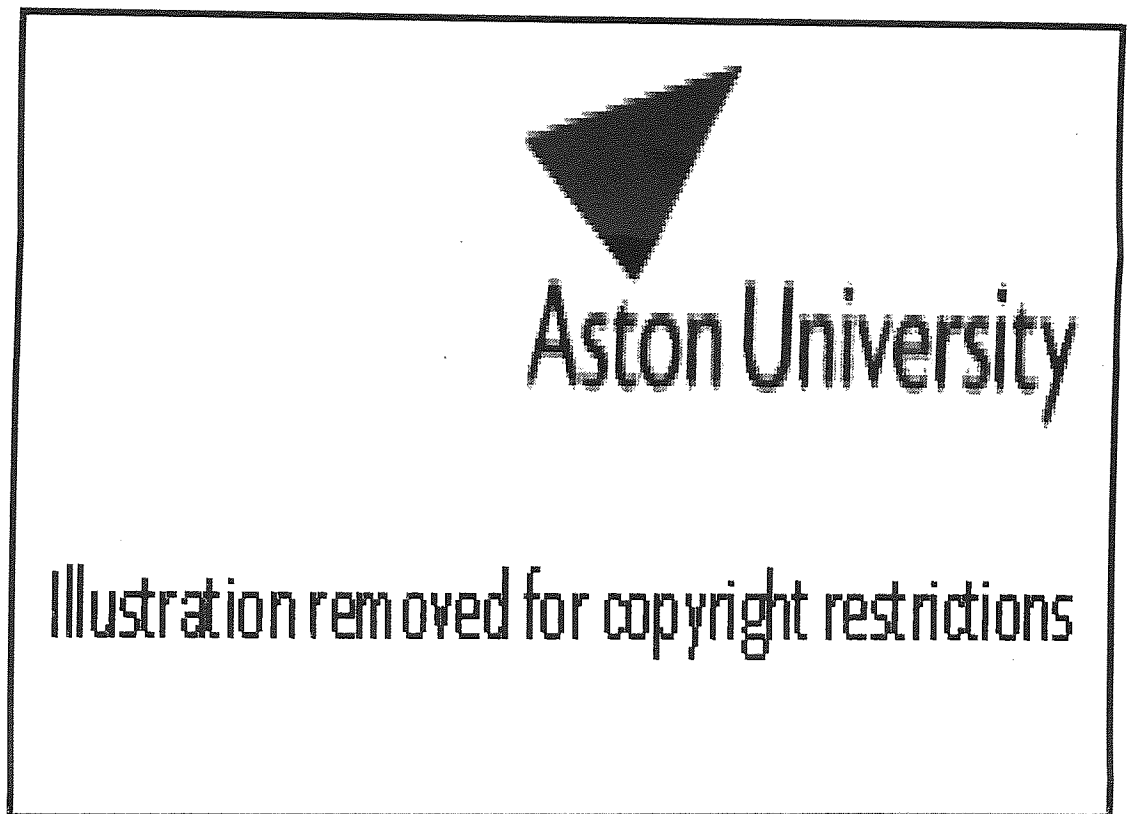
- i) Vegetable Crops.
- ii) Brackish water utilisation.
- iii) Irrigation with treated affluent.
- iv) Rangeland management.
- v) Livestock production.

Due to the diversified topics of these R & D topics and due to the limitation of personnel to conduct these activities in the department as shown in Table 7.1 co-operation between the department and the existant R & D centres in Kuwait is essential to ensure the success of its tasks. The director of the department Engineer SALEM AL-MANNAI has described, to the author, the extent of this co-operation:

"Research co-operation in the field of Agriculture exists between KISR and the Department. The Department supplies technical equipment and financial aids according to the size of the project. Furthermore, the Department supplies consultation to KISR whenever asked for. As for the University, co-operation in terms of research activities, services or consultation does not exist. However, I am certain that the University would respond to such

TABLE 7.1:

Manpower Distribution by Fields & Nationality:  
Agricultural Department as of May 1982



Source: Engineer MARIAM AL-TAOHED, Agricultural Department, June 1982.



co-operation whenever asked, providing that the Department participates in financial matters.

These two institutions are performing their functions as asked for, nevertheless, they could contribute more than they are doing at the present time; a possibility that could be discussed and recommended by top officials..."

At this stage, the Author would like to mention that the Director was a member of the Board of Trustees of the College of Sciences, Kuwait University and was (and still is), a member of the Board of Trustees of KISR. Such recommendations and criteria for Kuwait University and KISR to participate more efficiently should have been nurtured by him as he was one of the policy and programme makers of these establishments.

The Department faces great obstacles in terms of Kuwaiti manpower. As shown in Table 7.1 the Department does not have any Kuwaiti chemical engineers, marine scientists or lab-technicians. Furthermore, Kuwaitis are outnumbered in every field of occupation. The overall percentage of Kuwaiti manpower in the Department is 7.6% which is no different from the Kuwaiti manpower participation in other sectors in Kuwait (as has been shown earlier, and will be seen again in the following chapters). Nevertheless, it indicates that the agricultural development and output in Kuwait will be heavily reliant on expatriates and largely lacks the involvement of indigenous manpower.

The above discussion indicated four major facts:

- i) Kuwait is heavily reliant on the import of the majority of her food. The author is convinced that there are several arid lands, e.g., the desert lands occupied by Israel, where planners have used appropriate science and technology to cultivate them. Therefore, Kuwait could at least, with apt utilisation of science and technology, maximise her self-reliant of food security.
- ii) Kuwait did not promulgate, as been ~~confined~~ to the authority ~~by a Government~~ official, any explicit food security policy.
- iii) The Agricultural Department has not conducted its responsibilities efficiently.
- iv) Kuwait lacks qualified indigenous manpower in the food security sector.

Therefore, the author suggests the formulation of food security authority to fulfil the following tasks:

- i) To formulate and monitor the application of national food security policy in accordance to the socio-economic plans.
- ii) The authority should place strong emphasis on the agricultural development programmes in terms of endeavours to solve problems rather than concentrate mainly on the services activities.
- iii) The authority should formulate publicity programmes,

in collaboration with other establishments in Kuwait to attract more Kuwaiti manpower.

- iv) Effective co-operative liaison must be initiated between the authority and R & D institutions within and outside Kuwait.
- v) The authority should find new and improved agricultural and cultivation techniques such as:
- Nutritionally balanced feeds that would produce large amounts of eggs, dairy products, meat, etc., from each gram consumed.
  - Improved breeding process of animals and poultry to ensure the production of large amounts of edible consumer products.
  - New high-yielding varieties of palm trees, vegetables, animal feeds, forage crops, etc.
  - New mixtures of fertilisers (to cope with the Kuwaiti environment) to increase the crop yield ratio to cultivated land.
  - To improve the standards of veterinary medical care and utilise sophisticated technology to control crop and animal diseases.
  - Improve the quality of consumed insecticides and pesticides and minimise their negative health and pollution impacts.
  - Study and evaluate any new cultivation techniques

based on economic usage of water due to the scarcity of rivers and streams in Kuwait and to the high consumption of sea-distilled water by other ~~sectors~~ such as household and industry.

- The authority should formulate and plan its research policy involving agricultural economists to ensure the utilisation of the most profitable quantity of agricultural tools, e.g., seeds, fertilisers, protective greenhouses, etc., which could produce the maximum output of food and meat.

vi) Promoting extension services. The extension services in the authority should serve as a link between the research section and its output and the farmers. The extension service men should be able to convey and translate the results of research to the farmer in simple terms and language to be understood by the farmers. The extension services could be improved by adopting the following procedures:

- Communication with outlying farmers should be improved so that the benefits to be reaped apply to all.
- An educational body should be established, specifically for teaching farmers about any agricultural technology or new techniques introduced and how to improve their productivity.

The educational body should employ adequate numbers of well-trained staff who are constantly able to up-date their knowledge and capabilities.

- The extension service programmes should be performed in as short a time as possible since climatic changes occur suddenly in Kuwait.
- The extension service office should be a well-recognised branch of the authority, should have access to R & D results and should have the freedom of movement and contact with national R & D centres and farmers without any bureaucratic hindrances.
- The extension service officers should be aware of the people's attitude (farmers in Kuwait are combinations of many nationalities), and the type of community in which the farmers live could not be over-emphasised. The officers should therefore be adept in psychological and sociological aspects as well as in agricultural knowledge.
- The officers should be aware that farmers do not want to feel that they are being forced or manipulated in any way to co-operate with them. The results of an obligatory exercise may be impressive, but they would not make the farmer self-reliant and more productive in the long-run. The

authority should be careful it is not regarded as interfering or imposing. Furthermore, the authority could perform its responsibilities more adequately if its officials based their endeavours and R & D activities on the obstacles in the way of the agricultural development.

- vii) To utilise to the maximum the land allocated for cultivation and animal breeding.
- viii) To improve the needed infrastructures, e.g., roads, transportation, public utilities, etc.
- ix) To encourage and support the co-operative marketing societies.
- x) To encourage private sector to invest in the fishing industry.
- xi) To assess the possibilities of establishing public shareholding companies (or joint ventures with the Government of Kuwait, or foreign parties), in the field of animal breeding and meat production, poultry and dairy foods; and agricultural crops. The activities of such projects should be executed in another country (e.g., Egypt, Sudan, etc.) where suitable natural factors exist in addition to inexpensive labour, provided that the produce (in proportion to the capital investment), is exported to Kuwait. Such a development would enhance the "food security policy", for Kuwait.

Furthermore, the author believes that if Kuwait opts the alternative of developing agriculture as opposed to, or in parallel to industry, she has to consider:

What the country is best suited for? and  
What sort of financial income is expected - or hoped for?

The advantages of one must be pitted against those of the other. In Kuwait, looking at the country's advantages, i.e., the availability of land, raw materials and skills, more often than not, agriculture or primary production seems the best prospect. Indeed, looking at it from the expected financial income point of view, agriculture come out on top. After all, industry requires heavy capital investment, location problems, education and training of staff, provision of housing, transport, shops, etc., all of which could in fact harm what agriculture there is, and detrimentally effect the infrastructure and the welfare of the nation. Yet there are long-term results which should be considered too, e.g., job opportunities, larger real income, industrial outlets for agricultural produce, more demand for agricultural products, diversification of labour, a more balanced and flexible economy. It is true that industry can be hit very hard by fluctuations in the world market, but this is equally true of the agricultural sector which also has to wage war against the weather, crop diseases, etc. A balanced rate of growth is essential for Kuwait, so if a balance can be achieved between agriculture and industry, this is obviously the answer.

In this context, Hershalg<sup>6</sup> stated that moving on to labour-intensive options as opposed to capital-intensive options, this is a problem which both agriculture and industry has to contend with. It is not true that by up-dating agricultural methods, men will be made redundant. Obviously machinery can replace men, but new techniques mean that land can be reclaimed, more crops are planted, irrigation is improved, fertilisers lead to greater harvests, etc., so the effect on employment is not necessarily an adverse one, though evidence would suggest that overall, whilst production is more efficient, less workers are involved.

## 2) The Government Testing Station & Laboratories

The discovery of oil in Kuwait and hence, the fast pace of socio-economic development necessitated the impact of various building and construction materials to meet the needs for executing the physical plans. This, in turn necessitated the establishment of a station to assist in evaluating the quality of such imports and to ensure their adherence to the international standards and specifications.

The Government Testing Station and Laboratories (which was called the Government Research Station until June 1982), was established in 1953. The station is under the supervision of the Ministry of Public Works and was assigned the following responsibilities:<sup>7</sup>

- i) To solve the scientific and technological problems that resulted from the materials and construction sectors.



- ii) To analyse the specifications and composition of imported building materials to ensure their adherences to international standards.
- iii) To perform physical and chemical tests analysis on all proposed construction and industrial materials.
- iv) To perform site tests for construction foundations.
- v) To conduct soil samples analysis.
- vi) To conduct tests on concrete and solid rocks to ensure their durability and suitability for use according to various construction projects in Kuwait.
- vii) To examine the safety of construction of buildings as requested and in ~~cases~~ of emergencies or crises.
- viii) To conduct tests by analysis of the materials supplied by Government or private establishments to ensure their durability and suitability for construction according to international standard specifications.
- ix) To provide technical consultancies regarding construction obstacles throughout Kuwait.
- x) To represent the Ministry in various technical committees.<sup>8</sup>

The above assignment indicates that the station was charged with the sole responsibility of construction and

building materials. The station has not published any documents or articles to enable the assessors evaluate its performance or efficiency, however, the author has conducted a brief meeting with the Director of the station, DR.ABDUL-MAJEED JERAGH, to enable him to appraise the station.

The Director has ~~confirmed~~ to the author that the station composes of the following three sections.

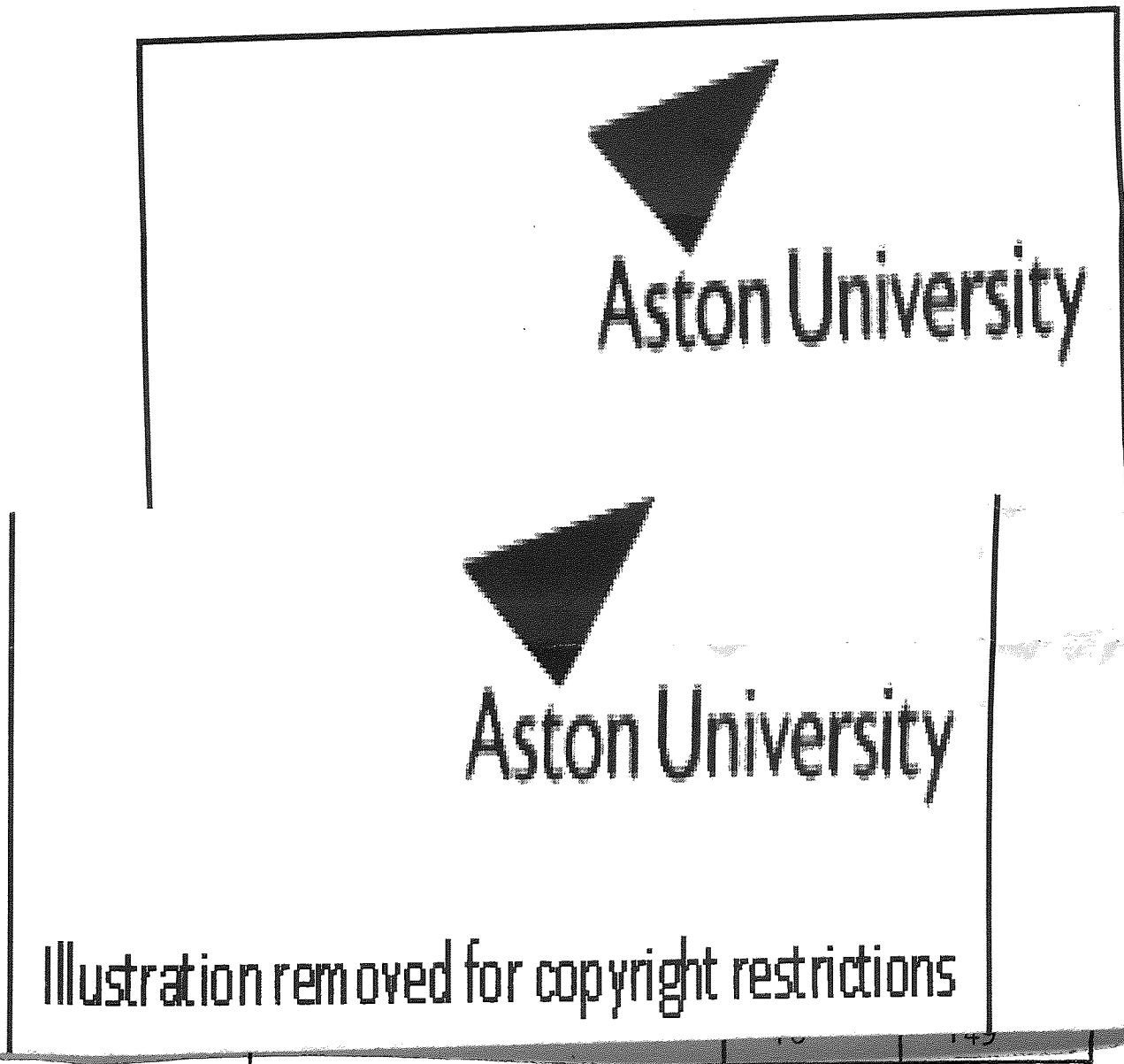
i) Soil testing & foundation levels, ii) Chemistry, iii) Metal, materials and special material testing.

The sections have been furnished with sufficient equipments to conduct their activities, however, as the general trend in Kuwait, the station lacks the participation of Kuwaitis where they amount to 9.7% of the total manpower as shown in Table 7.2. The table indicates that there are important specialisations in the station where Kuwaitis are not available, e.g., engineering. The reason to this phenomena in the author's view is that Kuwaitis are either not aware of the existance of the station or that the station does not offer financial or moral incentives to them. In any case, the author recommends that the planners in the Ministry of Public Works should re-evaluate this phenomena in order to formulate incentive measures to attract more Kuwaitis.

Moreover, the interview with the Director revealed several facts that should be reconsidered by the decision-makers to assist the station to conduct and develop the performance of its activities. The station should be allowed freedom of movement and contacts with the local and foreign

TABLE 7.2:

Manpower Composition in the Government  
Testing Station and Laboratories



Overall Percentage of the Kuwaiti  
Manpower = 9.7%

Source: Data was provided by Dr. ABDULMAJEED JERAGH,  
the Director of the Government Testing Station and  
Laboratories. Jan.27, 1982.

agencies which are needed to improve their activities. This issue necessitates the Ministry to reduce the bureaucratic procedures by allowing flexibility of contacts to the station. However, since the station is charged with the responsibility of monitoring and evaluating construction and building materials which the Ministry should guarantee the supply of funds (as proposed by the Director) to acquire the needed technical know-how and manpower. In addition, the present building of the station is not suitable (in terms of physical structure) to conduct laboratory tests and should either be modified or moved to a newer physical site.

The last topic regarding the station that should be evaluated, is that the officials should ensure the publications of documents regarding its activities. Such publications would familiarise the public with the station and its objectives and would also make the documents available for review, critics and assessment.

### 3) The Standardisation & Specifications Department

An Amiri Decree-Law was promulgated in October 1977 regarding Metrological Unification.<sup>9</sup> The Decree-Law has declared the objectives of the standardisation and specification department, as part of Ministry of Commerce & Industry, to be as follows:

- i) To accomplish the objectives of Metrological Unification, in particular, to simplify, allow, unify, organise, promote, improve quality, and co-ordinate

the national activities in various production and service sectors.

- ii) To conserve energy, resources, time and endeavours in materials and equipment, to reduce production costs, and to ensure the improvement and exchange of industrial costs.
- iii) To achieve the ideal overall economy.

The author is not convinced that the department (or any other individual department or ministry) could by itself achieve ideal overall economy as stated in (iii) above and would suggest that this article should be revised to read: to assist with other bodies in achieving the ideal overall economy.

The author, in conducting studies on this department, has faced the difficulties of finding written documents referring to the department and had to conduct interview with its Director, MR. ADNAN AL-SHALFAN, to collect information.

The department embraces three divisions: standards & metrology (17 employees), gold & balances (104 employees) and quality control (no information on manpower). Composition of qualified manpower are provided in the following table:

DEGREE & FIELD	NATIONALITY	NUMBER
B.Sc. Chemistry	Kuwaiti	2
B.Sc. Chemistry	Arab	1
B.Sc. Geology & Chemistry	Kuwaiti	2
B.Sc. Electrical Engineering	Arab	2
B.Sc. Industrial Operations	Arab	1
B.Sc. Food Industry	Kuwaiti	1
Economist	Arab	1
M.Sc. Food Industry	Arab	1

Overall Percentage of Kuwaitis: 45.0%

The above data illustrates the following facts:

- i) The percentage of Kuwaitis exceeds the overall national employment percentage of Kuwaitis, nevertheless, the department still lacks Kuwaitis' involvement in key specialisations, e.g., engineering, economy.
- ii) The department does not have any non-arab employees.
- iii) The department has failed to identify the numbers of its employees in the quality control section which reflects the haphazard employment and administrative affairs followed in the department.

One of the main responsibilities of the department

is to report to the Ministry the technical assessment on the industrial licenses submitted to the Ministry for approval, particularly, the conformity of the products with the Kuwaiti specifications. The procedure has been described, to the author, by the Department's Director as follows:

"When an application to grant an industrial license is submitted to the Ministry of Commerce & Industry, the Ministry transfers the application to the Industrial Development Committee to study it and submit its preliminary approval or refusal to grant the license. When preliminary approval is given, the Ministry requires the licensor to refer to the Standardisation and Specification Department to ensure that his products are in accordance with the specified standards and metrology. In most cases, the licensor would consider the Ministry's approval the most important issue, and that he either did not need to adhere to standards or specifications for his product or he would go into production first and then after having his products marketed, would consult the department to try to make them accept his products."

The author believes that standardisation and specification provide basic data for technical education, or R & D as a source of technical know-how, and provide testing methods and quality control for industry and public enterprises. Therefore, the following proposals are given, by the author, to further develop and improve the performance and activities of the Standardisations and Specifications Department in Kuwait:

- i) Well-based national standards should be formulated and adopted by incorporating the international standards into the actual needs and capabilities of the local industry. Then, the policy-makers should approach the Gulf states to adopt and

formulate regional standards. The Department should, however, find out which standards are most urgently required and what to adopt from abroad.

- ii) The standards should be reviewed and altered (if needed) at least every five years to keep pace with the growing experience and needs of international technology, innovative processes and national needs.
- iii) The Department should establish within its scope of activities a workshop to assist industrialists and manufacturers in defining procedures for sampling, inspection and after-sales-services.
- iv) A publicity programme is to be formulated and disseminated to make the industrial sector aware of the benefits of standardisation in order to enable them to design their products in accordance with the department's standards.
- v) Close links must be established between the department and R & D institutions inside Kuwait.
- vi) The department should add the following objectives to its activities and should prepare the needed manpower and facilities accordingly:
  - to promote the use of new technology and innovative processes.
  - to ensure the reliability, compatibility and



accuracy of measurements conducted within the economy.

- to provide standard reference materials to enable users to calibrate their own instruments.
- to establish adequate quality control of processes and raw materials.

vii) The Ministry of Commerce and Industry must request that applicants for industrial licenses obtain the approval of the department for the standards of their products as a pre-requisite condition to being granted a license. They should not merely have the department involved at the end of the license-granting process, which causes social and official embarrassment and "uneasy" procedures, and might lead to production of materials that are not in accordance with the department's specifications. Furthermore, the Ministry must ensure the acquisition of qualified manpower to conduct such tasks.

viii) The Department should publish its activities to enable the public and the assessors evaluate its performance.

#### 4) Patent And Trademark Activities In Kuwait

Patent systems and the offices issuing them play a very important role in assisting the industrialisation process. The nature of this relationship can be explained by

the following factors:

- i) Patents act as a 'reward' for inventors, thus encouraging them to seek new inventions.
- ii) The granting of patents makes available information, particularly in the form of documentation, on technology.
- iii) The granting of patents assists in the training of engineers and technicians.

The aspect of patents providing a source of information for industry is an important one. WIPO<sup>10</sup> has listed the traditional functions of industrial property offices relating to trademarks and industrial designs. Further references on such matters are listed in the Bibliography of this thesis.

#### Industrial Property And The Patent System In Kuwait

Law number (4) was issued in 1962 to allow for the establishment and organisation of the patent, industrialisation designs and models in Kuwait (refer to Appendix XV). The law has not been revised ever since to cope with various advances and changes in the socio-economic-industrial system in Kuwait. Therefore, the author has studied the articles of the law and would suggest the following amendments:

##### Article 3:

The applicant should be notified in writing, within a year, whether he has been granted a Patent or not. The invention could either be entirely new or not, since for a new process or product, even if the invention is partially new, it alters the whole, which might not be obvious.

Article 5:

The Article starts with, "The following persons ..." and in sub-sections d and e, states "Companies, societies, establishments and public facilities". These do not of course, possess personal entities. Subsection e does not specify the general public facilities. Therefore these subsections need clarifying.

Articles 7 & 8:

These Articles do not specify the person (or the party) to decide on the "justifiable compensation".

Article 9:

The Article does not provide for the case where an invention is achieved in a person's spare time. The Article should include this possibility.

Article 10:

The Article does not mention the identity of the owner, i.e., licensor, inventor, patentee, third party, etc.

Article 11:

The Article is in contradiction with Article 3 (a), in that the user must first be granted the patent.

Article 13:

The fee is very small, which might encourage too many non-serious applications.

Article 17:

Article 17 contradicts Article 2 (a), (b). Article 17 allows the patentee to use the invention from the date of application. What if the invention "contravenes the general orders or is a chemical invention related to food and medical drugs" as in Article 2 (a), (b)? Furthermore, an applicant might have infringed an existing patent, would he be allowed to use it without any legal protection for the original inventor?

Article 18:

Annexes are included in the original application

and need not be mentioned.

Article 26:

The Article allows any person to examine a copy of the application prior to a patent being granted. Such an action could lead to patent infringement or to reveal secret information. Any person should be allowed to examine the documents after the patent has been granted.

Article 35:

The Article should include "electronically", since a person might design transistor components.

All issues related to industrial property in Kuwait are under the authority of the Director of Registry of Commerce in the Ministry of Commerce & Industry. As has been mentioned in the two preceding sections, the author has faced difficulties in collecting information regarding this office and to arrange for a meeting with the Director of the office to gather the necessary information.

The Directorate is composed of three divisions:

- i) Patent and industrial design & models.
- ii) Trade Marks (Refer to Appendix XVI).
- iii) Registry of Commerce.

As in the patent and industrial design & models division, only one non-university graduate is employed to record the applications. For the period of 1962-1981, the Ministry recorded 2,153 patents.

The Directorate does not have an independent budget. Its financial and administrative activities are within the authority of the Ministry of Commerce & Industry.

The Publications of the Directorate activities appear in the Government Official Gazette "Kuwait Al-Youm", which is issued every Sunday. No annual report is produced internally. No information or documentation

services exist within the Directorate. Such services are provided by the National Scientific and Technical Information Centre of KISR, which has contacts, with U.S.A., U.K., Federal Republic of Germany and WIPO.

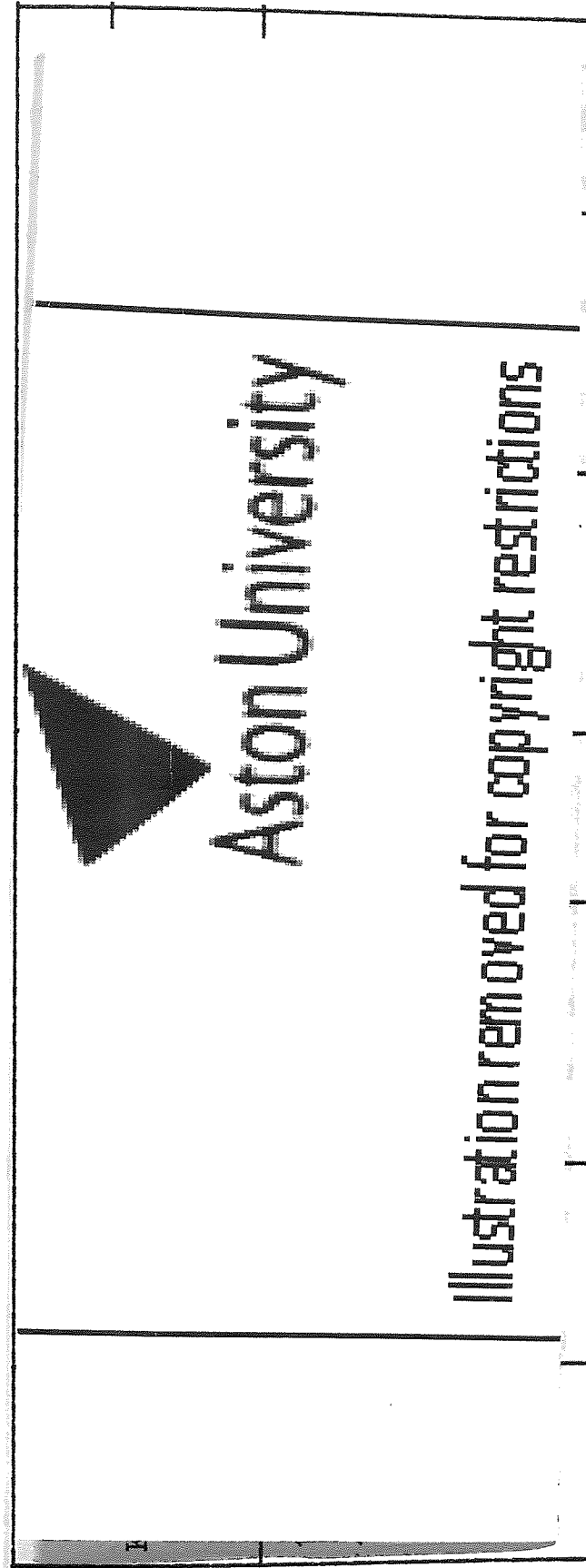
The Directorate co-operates mainly with Kuwait University and KISR.

The Directorate does not employ the International Patent Classification for inventions, but rather uses its own classification comprising 40 classes as appears in Appendix XVII.

The above information topic indicates the existence of a mediocre patent system and patent office in Kuwait. This is evident from the absence of any patent granted to a Kuwaiti and from the fact that the patent office does not produce any internal report concerning its activities, does not provide any information or documentation services, and does not employ any of the international patent classification. Furthermore, WIPO has reported (see Table 7.3) that for the period of 1971-75, no Kuwaiti or residents have been granted any patent although (343) persons have applied for patents. This fact proves that the populace in Kuwait are not familiarize with patentship issues and the roles played by them to develop the industrial base in Kuwait. Several persons and bodies might be responsible for such familiarisation, e.g., the policy-makers in the Government, the R & D Centres, the industrial sector, the Ministry of Commerce & Industry, etc. Amongst which, the author believes that the Registry of Commerce office in Kuwait has not played its role effectively in this issue. The reasons for such trends, as has been deduced by the author, are the absence of any persons in this office who realize or understand the technical and

TABLE 7.3:

Patent Applications Filed and Granted in Kuwait



Source: "Situation of Industrial Property in the Arab States",  
(Vienna: WIPO), 1978.

theoretical aspects behind the patent system and the role played by it to develop the industrial sector in Kuwait. The author believes that this is a crucial issue facing the development of industrial sector in Kuwait and that the policy-makers should assess it if they are willing to promote inventive and innovative potentials in Kuwait. To this matter, the author adumbrates the following proposals:

- i) To revise Law 42/1962 concerning Patents, Industrial Design and Models in Kuwait.
- ii) To reorganise the contemporary directorate of the Registry of Commerce using the model law as prepared by international organisations, e.g., WIPO, UNESCO, etc., modifying them taking into consideration the national needs.
- iii) To train specialised personnel in the field of patents and industrial design & models by organising workshops, seminars, and by sending them abroad to acquire more advanced knowledge.
- iv) Kuwait should begin by adopting the non-examination patent system (as in Belgium) and move slowly towards partial examination (as in Germany) and then adopt as a long-term policy, the thorough examination system (as in the U.K.). Bearing in mind the lack of qualified manpower in the Industrial Property field in Kuwait and aiming for regional and Arab integration and unity, the author recommends

the adoption of such systems on a regional level including all the Gulf States.

- v) A higher committee should be appointed by the policy and decision-makers to investigate the reasons behind the absence of any Patent being granted to Kuwaitis.
- vi) Due to the absence of any national Patent system in Kuwait, the policy-makers should identify the relevant strengths of areas of patenting within the Kuwaiti socio-economic and industrial sectors. The most relevant fields of interest at present would be the oil, petrochemical industries, pharmaceuticals and construction.
- vii) The State of Kuwait, with its advancing rate of involvement in publications, etc., should also formulate and enforce a copyright law. This law would protect the original author of a piece of work from having his work copied, published as someone else's work or re-produced. Before it can be used in any way, an agreement must be reached with the author.

#### 5) The Meteorological Department

The situation in this department was the same as the previous one, i.e., absence of any published documents describing its activities, manpower, facilities, etc. Thus,



information was provided by conducting interviews with its officials.

The department was established in 1953, by that time it was just a branch attached to the Government Research Station at the Ministry of Public Works.<sup>11</sup> In August 1965, the Meteorological section was transferred from the Ministry of Public Works to the Ministry of Interior and Defence, and placed under the Director General of Civil Aviation, and by that time, it was a Superintendency. On June 18th, 1975, the Meteorological Superintendency was changed to a Department with reference to the decision of the Minister of Interior No.1/75. On January 7th, 1979, the Directorate General of Civil Aviation (including the Meteorological Department) was attached to the Ministry of Communication.

The budget and administrative affairs of the Department are incorporated within the authority of the Civil Service Aviation.

The above information indicates that the supervision of the department has been altered three times within (26) years between three different ministries. This instability reflects the uncertainty presented in the decision-makers on deciding the body which should supervise this department. The author believes that the present attachment of the department with the civil aviation is an adequate decision since the civil aviation is mostly concerned with weather conditions and predictions.

The department was assigned the following responsibilities:

- i) Establishing meteorological stations in order to provide regular observations of the atmosphere.
- ii) Providing facilities, reports and weather forecasts in order to secure the safety of aviation and shipping and to warn shipping and aircraft of any dangers such as storms, fog, hail, low visibility, duststorms, etc.
- iii) Collecting the data of the atmosphere for climatological purposes and the application of the climatological statistics to agriculture, industry, transportation, public health and other human activities.
- iv) The training of Kuwaiti Nationals.
- v) Conducting research and studies of local climate.

To assist conducting its duties, the Department has established the following divisions:

- |   |                                 |
|---|---------------------------------|
| i) Climatology.                           | ii) Scrutiny & Climatology.     |
| iii) Weather forecasting.                 | iv) Marine Forecasting.         |
| v) Upper-atmosphere.                      | vi) Telecommunication Division. |
| vii) Foreign Affairs & technical library. | viii) Maintenance.              |

The department is headed by a Kuwaiti Director with the aid of an assistant to the Director, four superintendents and nine heads of divisions. There are 152 employees in the Department. The forecasters are mainly university-science

graduates with diplomas in meteorology and forecasting and the observers have either intermediate or secondary school certificates with a meteorological course certificate.

Every person is influenced and affected by the weather. Diverse activities such as industrial production & operation and food supply are strongly dependent upon the climatic conditions. Some atmosphere conditions are more predictable than others depending on the duration of predictions (one day or more); the technical know-how employed and the capabilities of the employed manpower to utilise and maintain the equipments. Thus technical know-how and scientific advancements could play important role in developing the efficiency and the manpower employed in the department. The following proposals might help developing the ability of the department:

- i) Offering meteorological courses in Kuwait University based on Kuwait's environment.
- ii) Offering better working conditions and more social and financial rewards for the Department's employees.
- iii) The organisation of field-missions for the employees to countries who have advanced meteorological services to enable them to be acquainted with the equipments and other issues related to the field.
- iv) Publications of documentations concerning its

activities to make the public aware of them and to allow for better assessment and appraisal.

To Conclude: there ~~exists~~ in Kuwait diversified science-based service establishments which provide services for the agricultural, industrial, construction & materials, and weather forecasting sectors. Nevertheless, less emphasis ~~has~~ been given to these establishments in terms of manpower, supply of experts and specialists, inadequate facilities and the absence of any documentations and publications regarding their activities. Such lack of support did undoubtedly minimise their activities and made them unknown to the public and concerned persons to assess and appraise their role. The author believes that the absence of SPMB in Kuwait is a major reason for the moderate performance, organisations and outputs of these establishments.

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## CHAPTER VIII

### RESEARCH FINANCING FOUNDATIONS

Research activities are considered one of the main topics in dealing with the development of the scientific, technical and industrial infrastructures of any country, due to their involvement in developing the fundamental understanding of the natural laws and phenomena around us, to their endeavours in solving problems facing human progress and their participation in producing more advanced machinery.

With reference to Kuwait, in addition to the fulfilment of the above objectives, research activities would stimulate the development of national scientists and engineers who would be experienced in research and consultancy, to co-plan for better socio-economic structures, to co-design the most appropriate diversified economic activities in Kuwait based on the available human and physical resources. Nevertheless, research activities are normally time consuming and need the involvement of specialised manpower from which arises the necessity for a funding programme to allow for these activities to progress and accomplish their targets and objectives on schedule.

To further encourage research and development in Kuwait, two private (non-governmental) foundations were

established in Kuwait to support the existing scientific and research institutions.

They are:

- 1) SABAH AL-SALEM AL-SABAH'S ENDOWMENT.
- 2) KUWAIT FOUNDATION FOR THE ADVANCEMENT OF SCIENCES.

This chapter will give an overview of the present status and activities of these foundations to assess their contributions to the progress and support of research and scientific institutions in Kuwait and thus their impact on the overall science and technology plans for the development of Kuwait.

#### 1) SABAH AL-SALEM AL-SABAH'S ENDOWMENT

The late Amir of Kuwait (who died in December 1977) endorsed a philanthropic non-profit making Endowment on 14th January, 1976, aiming to encourage scientists, scientific research, artists and novelists to continue their tasks, to further promote their status, and to help the people in need. The Articles of the Endowment were stated as follows:<sup>1</sup>

##### Article 1

The capital of the Endowment is a non-refundable K.D. million (2.1).

## Article 2

The establishment will be called "SABAH AL-SALEM AL-MOBARAK AL-SABAH ENDOWMENT".

## Article 3

The location of the Endowment shall be the State of Kuwait.

## Article 4

The objective of the Endowment shall be as follows:

- a) To grant scholarships to Kuwaiti and Arab scholars of distinction to conduct advanced research and higher studies.
- b) The scholarships are granted for all fields of science, art and literature.
- c) To encourage scholars in science, art and literature by giving cash awards or prizes.
- d) To provide grants to institutions of scientific research, literature, special and higher training centres.

Moreover, the Endowment could conduct any activities to promote its objectives according to the Board of Trustees' decisions.

## Article 5

The Endowment Funds should be allocated from:



- a) The Endowment capital as indicated in Article 1 above.
- b) The revenues of the invested capital providing that the capital shall not be involved in stock market exchanges.
- c) Any unconditional bequest or gift according to their Endowment regulations and subject to the approval of the Board of Trustees.

The Endowment has not yet constructed offices or headquarters. The activities of the Endowment have been, as of December, 1981, as follows:<sup>2</sup>

- i) Providing Scholarships for 15 Kuwaitis and non-Kuwaitis to study abroad.
- ii) Sending patients for treatment outside Kuwait.
- iii) Construction of mosques in Kuwait and Yemen.

The above information clearly indicates that the Endowment has not, as yet, fulfilled one of its main objectives as stated in Article 4 above which deals with furnishing grants and funds for scientists and R & D establishments. The justification of this was conveyed to the author by His Excellency SHEIKH SALEM AL-SABAH, the Minister of Defence and the Chairman of the Board of Trustees of the Endowment, in January, 1982, as follows:

"The Members of the Board of the Endowment do not seek rapid growth and immediate activities to conduct the objectives of the Endowment as stated by its Articles. Nevertheless, the Members would like to perform the Endowment's objectives calmly and steadily."

The author believes that the Endowment has good potential to promote and support the existing scientific and research institutions and thus promote the research and development activities in Kuwait. The author suggests that the Members of the Board of Trustees of the Endowment should re-consider and re-evaluate their contemporary policy with respect to their involvement with scientific endeavours and to take the necessary steps, with understanding, to support, encourage and finance the scientific and research activities in Kuwait in consonance with Kuwait's socio-economic development plans.

## 2) KUWAIT FOUNDATION FOR THE ADVANCEMENT OF SCIENCES (KFAS)

### A. Background:

The Kuwait Foundation for the Advancement of Sciences<sup>3</sup> was established in 1976 upon the initiative of His Highness SHEIKH JABER AL-AHMED AL-SABAH, the present Amir of Kuwait (then Crown Prince and Prime Minister), with the support and participation of the Kuwait Chamber of Commerce and Industry.

The Foundation is a public-benefit organisation

supported by all Kuwaiti corporations (public and closed) to the tune of 5% of their annual profits and by endowments from individuals, public and private organisations.

The Foundation is governed by a Board of Directors Chaired by His Highness the Amir, composing ~~of six members~~ elected for three-years terms from the Kuwaiti Corporation who contribute funds to KFAS. Thus, KFAS does not fall into the domain of the executive power or the supervision of the legislative power and therefore, it is an autonomous body.

The Foundation is ~~managed~~ by a Director General responsible to the Board of Trustees for the activities of the Foundation.

The Foundation ~~sponsors~~ activities in the following fields:

- i) Basic sciences.
- ii) Applied sciences.
- iii) Technology.
- iv) Science education.
- v) Social and behavioural sciences.
- vi) Authorship and translation.

The Foundation also focuses on supporting and promoting the development of links and co-operative efforts between Kuwaiti and other Arab and International scientific entities<sup>4</sup>.

B. Objectives:

The Kuwait Foundation for the Advancement of Sciences is a grant-awarding organisation whose objectives are:<sup>5</sup>

- i) To support through grants pure and applied research in the Natural, Engineering, Health, Food, Social and Economic Sciences.
- ii) To promote and support through grants and project related investments, research, development and demonstration work of relevance to the Kuwait economy.
- iii) To support through grants, prizes and awards, the intellectual development in Kuwait and other Arab countries.
- iv) To support through fellowships, workshops, seminars and conferences, the training of Kuwaitis in the sciences.
- v) To promote and support the modern development in sciences which could help the mankind as a whole by linking and co-operating efforts between Kuwaiti and other Arab as well as International establishments.

C. Organisational Structure:

The Foundation consists of the following departments:<sup>6</sup>

- i) Research Proposals: This department is responsible for accepting and evaluating research proposals submitted to them. In accordance with the statutes of the Foundation, this department recommends for funding if the proposal is accepted.
- ii) Cultural Relations and Seminars: This department is responsible for organisation and supervision of seminars ~~and~~ for granting scholarships and scientific missions.
- iii) Translation and Authorship: The department is responsible for encouraging publications in Sciences, Engineering, Health and Socio-economic fields.
- iv) Scientific Culture: The department aims to foster scientific appreciation and to encourage scientific trends in the society.
- v) Prizes and Grants: The department is responsible for advertising annual prizes for International, Arabian and Local levels and for granting bonuses for outstanding students in Kuwait.
- vi) Finance and Administration: The department maintains accounts, preparing Budgets and related activities according to the decisions of the Board of Directors.

vii) International Affairs (Understudies and Preparation):

To promote liaison between KFAS and International bodies.

D. The Programme Sponsored By KFAS:

KFAS, aiming to promote the scientific and technical infrastructures in Kuwait, planned to fund topics in the following fields:

- i) Basic Sciences
- ii) Applied Sciences
- iii) Food Resources
- iv) Environmental & Resource Management
- v) Water Research
- vi) Inorganic Materials
- vii) Energy
- viii) Technology
- ix) Organic Materials
- x) Health Sciences
- xi) Systems Education
- xii) Science Education
- xiii) Social & Behavioural Sciences
- xiv) Grants, Prizes, Awards & Fellowships
- xv) Science Information, Authorship & Translation
- xvi) Miscellaneous (Scientific trips and Competitions, etc.)

Furthermore, the Foundation has been publishing as from October, 1982, a Scientific Periodical Journal, entitled "Advancement of Sciences". The journal aims to publish materials in the following fields<sup>7</sup>:

- i) Sociology
- ii) Economic
- iii) Arts & Literature
- iv) Fundamental & Applied Science
- v) Islamic & Arabian Heritage
- vi) Educational Subjects (short stories, competitions, etc.)

Programme objectives and activities sponsored by

KFAS are illustrated in Appendix-XVIII. Lists of prizes, awards and fellowships funded by KFAS are given in Appendix-XIX.

E. The Budget of KFAS:

The budget of KFAS, for financing scientific researches and activities, is as follows<sup>8</sup>:

<u>Year</u>	<u>Budget (K.D.)</u>	<u>% Increase</u>
1978/79	119,530	-
1979/80	541,751	+ 353.2 %
1980/81	520,529	- 3.9 %
1981/82	510,958	- 1.8 %

The above table indicates that the budget for the first year of research activities funded by KFAS was relatively small, following by a sharp increase (three-fold) in the budget to meet the diversified programme sponsored by it.

F. Analysis Of Research Projects Funded By KFAS:

Morvesik<sup>9</sup> had adumbrated two systems to fund R & D activities in any country. The first system is Dribbling Down Egalitarian System, in which a funding agency decides to apportion the money equally among R & D centres. The

second system is Reading Down Merit System where a funding agency would evaluate each research proposed in terms of its scientific merit and then divide the budget accordingly.

Since KFAS, according to its programmes, adopts the second system, the author must emphasise explicitly the appropriateness of the system to allow the officials of KFAS to be more aware of the pros and cons of such system and hence promote its selection priorities.

The main advantages of this system are:

- Flexibility. It fully recognises excellence and merit.
- It promotes change by treating new people and new ideas on an equal footing with older ones.
- It eliminates the bureaucraties in handling the fund and it bolsters the morale of ~~the scientific~~ community by operating on the principle of competition based on scientific merit.

The drawbacks of the system are:

- It cannot function properly unless there exists an elaborate system of evaluating the research proposals, assessing the merits of various projects, gauging the past performance of scientists and research groups and determining the ability



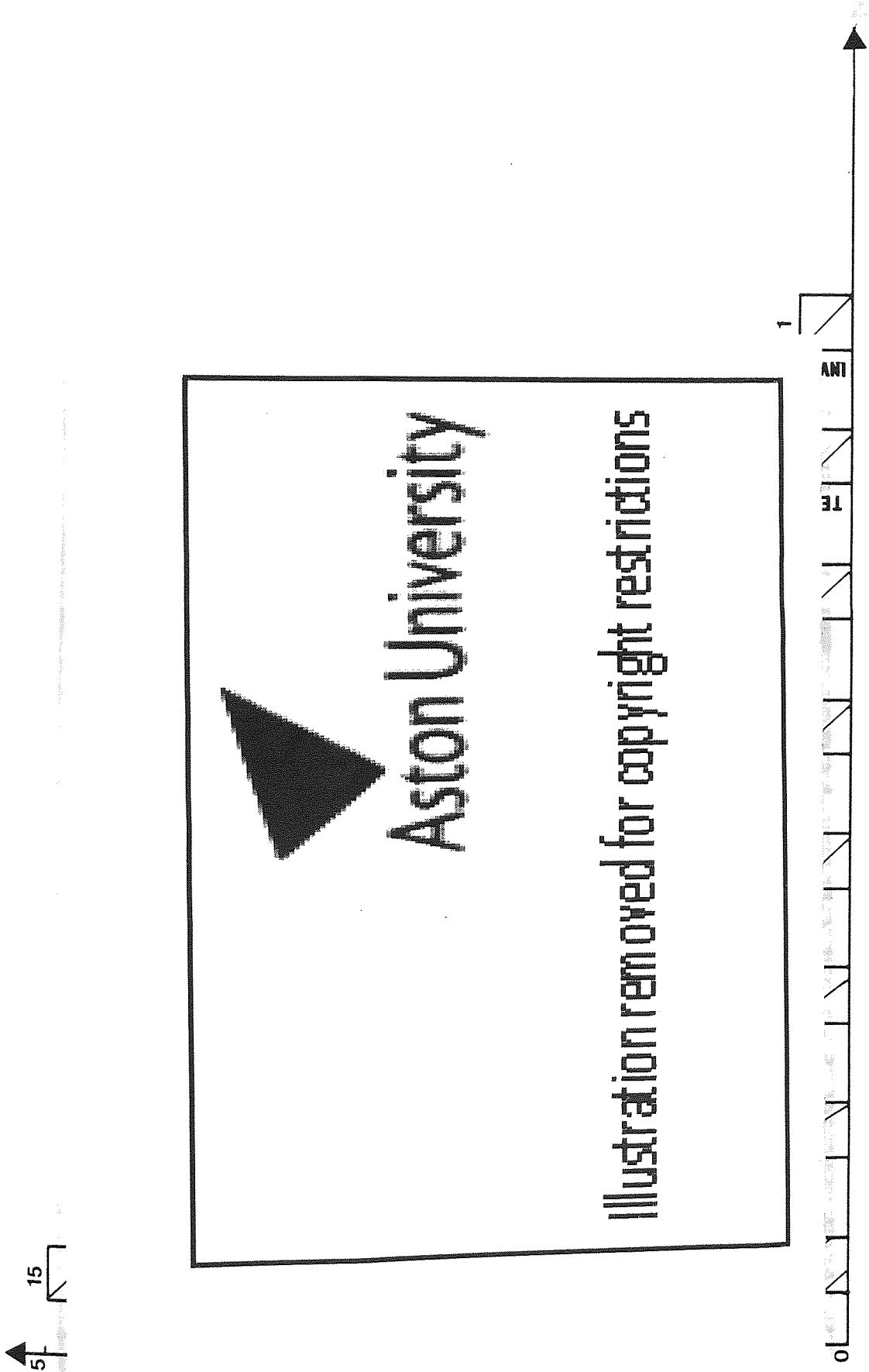
- of the applicants to perform the proposed research.
- It can be hard on new researchers and/or groups, since in order for a group of researchers to be involved in research, it often needs a temporary subsidy.
  - It does not provide institutional support except through specific research projects, and hence new institutions might find it difficult to acquire funds for their infrastructure needed to create the condition under which good research can be performed.

KFAS has fostered a policy to sponsor research topics executed by Scientific Institutes. The Institute first proposes a project to the Foundation giving the objectives, timetable, and the expenses of the proposed project. The fund is then granted upon full evaluation of such projects by the Foundation. A non-Kuwaiti Institute is eligible for such endowment providing that the project is executed by Kuwaiti establishment.

Appendix-XX provides the details of project titles, institutes conducting the projects, duration, values and objectives of projects funded by KFAS for the period of 1978 - 1981.

Figure 8.1 illustrates the number of projects by

Fig. 8.1 : NUMBERS OF PROJECTS BY FIELDS FUNDED BY KFAS : 1978 - 1981

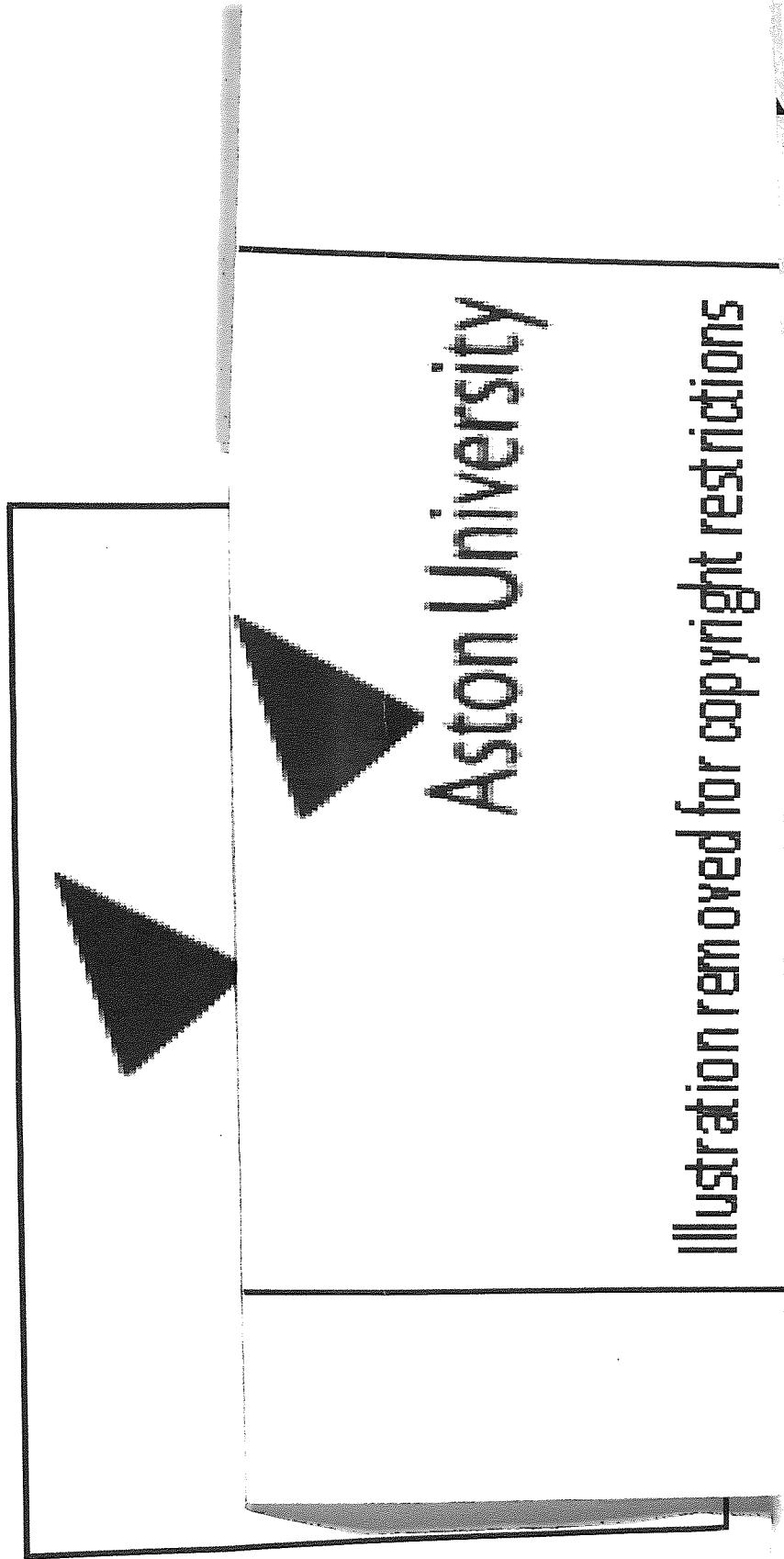


Source: "Synopsis of Kuwait Foundation For The Advancement of Sciences: 1979-1982", Kuwait. In Arabic.

Fig: 8.2: ALLOCATION OF FUNDS BY PROJECTS - FIELDS AS SPONSORED BY KFAS: 1978/81

400  
380

3772 772



Source: "Synopses of Kuwait Foundation For The Advancement of Sciences: 1979-82",  
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fields as sponsored by KFAS. Furthermore, figure 8.2 indicates the allocation of funds for such research fields.

The author proposes the following criteria to be evaluated in terms of the validity, utility and effectiveness of scientific researches and activities to be national socio-economic development plans:

- i) The Macro-Objectives: to compare the allocations and distributions of funds to projects with the main sectors contributing to the GDP.
- ii) The Micro-Objectives: to compare the funded scientific endeavours with the objectives of the Foundation.
- iii) Manpower: to assess the involvement and development of manpower, particularly Kuwaitis, in scientific activities funded by the Foundation.
- iv) Others: i.e., the impacts of funded scientific activities on mental and scientific thought of the society, the encouragements and bolstering of various sectors in the country, the utility of such projects to setting research and science policy in Kuwait.

The next analysis will be to compare KFAS' activities with the above postulated criteria.

#### The Macro-Objectives

The following Table 9.1 summarises the fields of

scientific activities funded by KFAS.

Table 9.1: Fields Of Scientific Activities Sponsored by KFAS  
(1978 - 1981)

Field	Number Of Projects	Allocated Funds (K.D.)	% Of Total Funds
Constructions and Building Materials	4	238,698	13.33%
Medicine, Bio-Chemistry and Zoology	9	235,812	13.20%
Conferences	7	215,080	12.03%
Food & Agriculture	6	150,200	8.40%
Investment (Film Production)	2	135,000	7.55%
Encyclopaedia	4	114,309	6.40%
Technology	2	100,150	5.60%
Social Services	3	76,250	4.27%
Physics, Chemistry and Mathematics	4	68,040	3.81%
Industry	3	54,004	3.02%
Energy	1	50,000	2.80%
Environment	2	43,441	2.43%
Support to Local Sectors	2	34,618	1.94%
Traffic Problems and Public Transportation	3	33,746	1.89%
Oil and Petroleum	1	10,800	0.60%
Others	7	227,620	12.73%
Total	60	1,787,768	100.00%

Analysis of Table 9.1 indicates the following conclusions:

- i) The Oil and Petroleum sectors which are the main economic sectors in Kuwait and which contribute over 60% of the total GDP, have only 0.60% of the total funds allocation. This fact contradicts the national socio-economic plans which necessitate that at least an equal percentage of oil contributions to GDP should be allocated for scientific research involving these fields.
- ii) The Food and Agriculture sectors which contribute about 0.3% to the total GDP<sup>10</sup> have been allocated 8.4% of the total funds. This again contradicts the national socio-economic plans (although it is good trend aiming to develop this sector).
- iii) The manufacturing sector (excluding the petrochemicals) which contribute 2.3% to the total GDP<sup>11</sup> has been allocated 3.02% of the total funds, a criteria which corresponds to the GDP contribution to fund allocations.
- iv) The Foundation allocated funds to basic and fundamental research in sciences and medicine and also provided funds to educational and services programmes, i.e., encyclopaedia, training schools, etc.

To conclude, the funds allocated by KFAS do not

correspond to the overall national plans development and are in reverse orders, viz., the Oil sector which contributes to more than 60% of the GDP, is only allocated 0.6% of the research funds, whilst the Food and Agriculture sectors which contribute to 0.3% of the total GDP have been allotted 8.4% of the total research funds and the construction sector which contributes 2.84% to the total GDP is assigned 13.33% of the research funds. These trends need to be re-assessed and evaluated by the officials of KFAS to ensure the fulfilment of Kuwait's Macro-objectives.

#### The Micro-Objectives

By comparing the objectives of KFAS as stated in section (B) above with its activities, we can conclude that the Foundation has fulfilled its objectives by:

- i) Supporting various research activities, i.e., sciences, engineering, social and economic sciences, environment, etc.
- ii) Promoting and supporting links between Kuwaiti and other Arab and International scientific entities.
- iii) Supporting the intellectual development ~~in~~ Kuwait and other Arab countries.

#### Manpower

No details have been given in terms of the number

of manpower involved in each project, particularly Kuwaitis. Thus, it could be concluded that:

- i) The Foundation has encouraged individuals by granting them fellowships or sending them to further training and to attend conferences.
- ii) Since no records of Kuwaitis' involvement in projects have been given, then the author would recommend that the Foundation should not sponsor any proposed projects unless the projects include at least 50% of Kuwaitis in their manpower composition to ensure the fulfilment of the Foundation's objectives with regard to manpower development.

#### Others

The Foundation has played a great role in promoting and developing several national sectors such as the Science Club, the Disabled Societies, etc. The Foundation has, also, participated in strengthening the ad-hoc research activities in Kuwait and contributes a great deal to improving the scientific standards of the public by sponsoring several scientific games, quizzes and granting prizes to the top graduates of the University and the Technical and Vocational Institutes.

The policy of the Foundation would be further assessed by evaluating the thoughts of the Director General



of the Foundation.

G. The Policies And Strategies of KFAS:

The policies and strategies of the Kuwait Foundation for the Advancement of Sciences have been expressed by Dr. ADNAN AL-AQEEL, the Director General of the Foundation, in reply to the author's questionnaire in September, 1981, as follows:

"The research activities in KFAS consist of:

- i) Applied research.
- ii) Basic research.
- iii) Technological research.
- iv) Industrial research.

Most of the basic research is directed toward academic enquiries and might not have any practical applications. Research activities which might have positive impact and applications for socio-economic development plans usually occur in the applied research.

The present research activities do not contribute to societal demands due to the lack of planning and the scarcity of researchers and technicians."

The author believes that this statement is very critical and does not correspond to the objectives of the Foundation as mentioned in section (B) above, particularly item-b, which emphasises the needs to re-evaluate and assess the numbers and quality of projects funded by the Foundation.

"Socio-economic and political impacts of any projects are usually assessed thoroughly and in particular if the proposed projects are concerned with the natural resources of Kuwait and their consequences on the economy, environment, etc.

The various research programmes are usually designed in accordance with the needs of Kuwait in collaboration with several establishments. There exists no Kuwaiti capable of assessing such projects! Nevertheless, KFAS calls for the assistance of Kuwaiti experts to evaluate the projects according to their fields of interests. The Foundation performs, in-house, long-term projects."

The author would like to emphasise the contradiction in this quotation by first implying that there exists no Kuwaiti experts capable of appraising the research programmes for Kuwait's needs, and then indicating that the Foundation involves the Kuwaitis in assessing its research projects; that is unless the national Project Programmes are different from the research programmes sponsored by the Foundation, which, in turn, would be a deviation from its objectives as stated in section (B) above.

"Foreign participation is essential to assess the research projects due to the lack of Kuwaiti experts in such respect."

The author is surprised that the Foundation did not formulate a programme to develop national peer assessment as it is called for in part (iv) of its objectives, particularly since the main task of the Foundation is to assess Projects Proposals.

"Social assessment is conducted for applied projects which are involved with Kuwaiti Society, i.e., education development, housing, job performances, etc."

Although the author believes that social assessment is an important component of overall project assessment, nevertheless, unless Kuwaitis are involved in this task, social assessment will never be very effective or representative of the Kuwaiti Society.

"The development of Kuwait cadres to formulate scientific programmes and projects evaluation is a national duty, notwithstanding, such efforts require time.

Kuwaitis are usually asked to participate in scientific project evaluations according to their areas of specialisations."

The author agrees with the Director General on this issue, nevertheless, is it not part of the Foundation's objectives to develop, train and promote the Kuwaiti's cadres? If so, an immediate programme must be adopted by KFAS to train Kuwaitis on projects appraisals issues.

"Most of the projects, at present, are assessed by experts outside Kuwait. If such projects do not involve any social impacts, then the foreign assessment might cause positive impacts. The Foundation should choose whether the assessment is to be conducted locally or abroad."

The author does not believe that the sole assessment of projects by foreigners who reside outside Kuwait and might not know anything about the Kuwaiti system are

successful or have positive assessments. Furthermore, any applied, technological or industrial projects must involve a socio-economic impact that necessitates the involvement of national experts. The Foundation, thus, must re-evaluate this policy where foreign experts are needed but not as sole assessors.

"In general, the Government does not interfere in directing the research activities, nevertheless, the Government might suggest some social problems or ask for specific studies from scientific research institutions.

The Foundation provides funds for research proposals which are in keeping with the annual research programme laid by the Foundation (this programme is formulated after a survey of the national needs of scientific research topics). The Foundation has its own procedure for projects funding, i.e., pre-proposals, proposal according to the Foundation's rules, evaluations, rejections or acceptances, etc. 95% of the sponsored projects are designed and/or deal with the Kuwait's needs."

#### H. Conclusions And Recommendations:

Although the Foundation has been established for six years and has conducted scientific activities within the last four years, it has funded several researches and scientific activities which have developed and promoted the scientific industrial and technological infrastructures in Kuwait, as has been discussed earlier. Nevertheless, the author would like to propose the following recommendations, aiming to further improve the performances and strategies of the Foundation.

- i) The science policy of the Foundation is inadequate in that it has allocated minute funds for the major economic sector in Kuwait, namely, the Oil sector and conversely it ~~allocates~~ allocates larger funds for sectors with lower contribution to the GDP, namely, the Food and Agriculture and Construction sectors. The officials of the Foundation have to re-assess such critical and important criteria.
- ii) The Foundation has to establish a permanent Project Peer Assessment group. The group must involve as many Kuwaitis as possible. Furthermore, the group should include, in addition to scientists and engineers, specialisations from major impact fields of analysis such as environmentalists, sociologists, economists, etc.
- iii) The Foundation should not sponsor any project which includes less than 50% of Kuwaitis in its manpower composition.
- iv) Since the Foundation follows the "Reaching Down Merit System" of funding as described above, then the Foundation must assure the existence of an elaborate system of evaluating the research proposals, assessing the merits of various projects, gauging the past performance of scientists and research groups and determining the ability of the applicants to conduct the proposed research.

- v) The Foundation should decrease the reliance on foreign experts to evaluate its projects, since any scientific project includes socio-economic impacts and evaluations, criteria with which foreign experts are not familiar with, irrespective of their scientific capabilities.
- vi) The Foundation should design policies and incentives to encourage Kuwaitis to be involved in the science and technology policy area.
- vii) The Foundation must assess the absence of any Kuwaiti able to compete and to achieve the Foundation's prizes in fundamental and applied sciences.
- viii) The Foundation should sponsor the publication and distribution of all the Kuwaiti and non-Kuwaiti Ph.D. theses relevant to their objectives. Such Ph.D. efforts and contributions are national valuable resources that must not be overlooked and that should be available to the public and to the concerned agencies.
- ix) The Foundation must assure that the funded projects give priority to local CEDO's whenever needed.
- x) We have concluded in chapter V that the project selection and priority in KISR are not adequate or appropriate to the socio-economic development plans of Kuwait. Since KFAS ~~sponsors~~ some of the projects conducted by KISR,

KFAS would be indirectly responsible for such inadequacy and unappropriateness, and consequently part of KFAS' funds would be allocated to R & D activities and not apt to Kuwait goals. Therefore, KFAS should re-assess all the previous projects sponsored to KISR and re-evaluate carefully all of their future proposed projects.

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## CHAPTER IX

### CONSULTING & ENGINEERING DESIGN ORGANISATIONS

#### (CEDO's)

#### 1) Introduction

As the name might suggest, CEDO's provide consultancy and engineering services in various fields. The types and forms of services conducted are varied and may range from direct involvement with the work of national planning agency, in drawing up an integrated industrial or sectoral development plan to specific design and engineering services for a particular development plan.<sup>1</sup> However, Malhotra<sup>2</sup>, has specified the tasks that could be performed by CEDO's as follows:

- i) Better choices in investment decisions.
- ii) More efficient purchase of technology.
- iii) Absorption and diffusion of technology.
- iv) Development of local industry.
- v) Utilisation of indigenous R & D.
- vi) More intensive use of local resources.
- vii) Reduced technical vulnerability.
- viii) Reduction of foreign exchange components of Project cost.
- ix) Export of Goods and Services.
- x) Development of technological self-reliance.
- xi) Consultancy Services.
- xii) Process and technological services.
- xiii) Project implementation services.
- xiv) Procurement and inspection services.
- xv) Operation and maintenance services.

In addition, UNIDO<sup>3</sup>, has functionally classified CEDO's into five major groups, namely:

- i) Design & engineering services
- ii) Economic services
- iii) Technological services
- iv) Management services
- v) Training & manpower development

The author believes, however, that the efficiency and effectiveness of CEDO's are determined by the extent of their impacts on industrial, economic, technological and manpower services. The range and measurements of the performances, operations and success of CEDO's depend mainly on their capability and capacity to conduct a job in terms of manpower, know-how and facilities, and in terms of trust and encouragement given to them by various governmental and non-governmental establishments and sectors.

## 2) The Significance Of Consultancy & Engineering Work For The Developing Countries

The essence of engineering consultancy work is its link between the building of machines (effectively the supplying of goods for investment purposes) and the way in which real capital is amassed by industry. Engineering consultancy has a very important role to play in DC's as have been mentioned earlier. Notwithstanding, the importance and significance of CEDO's for DC's could be evaluated by their involvement in the following contexts:<sup>4</sup>

- i) Advantages & Disadvantages of Turn-key Contracts.
- ii) The external benefits of consultancy and engineering design.
- iii) The bargaining power of technology acquisition.
- iv) Advisory capacity to machine producers and researchers.

The author is convinced that lack of real experience

of industrialisation can be an obstacle to indigenous consultants, who can only gain experience from industrial situations. The areas to which consultancy can be applied may be limited because the technological processes underlying capital formation in some industries are predetermined. Technological knowledge only enters a country with the blessing of a licensing agreement, or if foreign firms have subsidiaries located there. This effectively cuts down the areas in which consultancy services can work. Equipment manufacturers' consultancy services is another area in which CEDO's could function. For various reasons, the demand for domestically produced machines is not sufficient to be profitable or because clients require a more complex machine than the manufacturer can provide.

### 3) The Size of Consulting And Engineering Design Offices

Small CEDO's with less than 25 employees, usually specialise in a particular technological sphere. Often they carry out pre-investment and feasibility studies.

Medium-sized CEDO's usually have 25-100 employees. These are mainly private-sector CEDO's. They are economic management consultants, specialised inspectors, and specialised maintenance engineers. They carry out consultancy and feasibility reports.

Large CEDO's employ over 100 people and are usually set up by the State. They take on large scale projects such as refineries, steel plants, etc. They carry out all sorts of services but are controlled by the government.<sup>5</sup>

The number and efficacy of CEDO's in Kuwait will be analysed in terms of their participation in the socio-economic development programme.

#### 4) Consultancy And Engineering Design Offices in Kuwait

The urgent necessity for national independent consultancy and engineering design offices to assist the socio-economic development plans in Kuwait has given several groups of people the motivation to establish such offices in Kuwait. At present there are sixty-four<sup>6</sup> CEDO's in Kuwait which deal with Engineering, Consultation, Architecture, Design & Consultation, Civil Engineering, General Engineering Studies, Industrial Design and Consultation, Technical Studies, Construction and Building, Petrochemical and Oil Studies, Engineering Drawing, Decoration and Engineering Planning. The offices are either completely owned and operated by Kuwaiti Engineers, co-owned by Kuwaiti and Arab Engineers, or entirely owned by Arab Engineers. See Appendix XXI which provides their names. Most of these offices employ less than 25 employees which could be considered as a small CEDO.

Out of the sixty-four offices, there is only one office which deals with petrochemicals, industrial and engineering consultation, a fact that contradicts the real need for more of such offices in Kuwait to participate in various socio-economic industrial development, planned and need-based technology transfer, development of national manpower, etc. Since this office deals with such economic development and since it is the largest Consulting and Engineering Office in

Kuwait, the author will describe its activities in order to assess its role and participation in the National Development Plan of Kuwait.

5) Industrial Consulting Office And Industrial & Engineering Consulting Office.

The developing countries have common ground in so far as the process technology is concerned, in terms of development of indigenous manpower, planned transfer of technology, economic development plans, etc. For these purposes, the Industrial Consulting Office (InCo) and Industrial & Engineering Consulting Office (InCo.Eng.) have joined forces with a number of selected internationally ~~known~~ Consulting Engineers abroad as "International Associates" catering for the sophisticated and up-to-date processes and technologies. The group's professionals screen the various alternative of process technology and select the most economical, the optimum suited to the technical, commercial and social conditions.

As consultants, the group go through a series of steps and decision making at all stages of the project. Close contacts and frequent consultations with the owners and their engineers form an integral part of the group services which shorten the implementation period by the alleviating eventual bottlenecks through remedial measures.

The group's part as Management Consultants goes beyond the standard and usual forms. Experts and engineers are provided for supervision and management of construction, installation and commissioning of projects and keep continuous

check on both quality and quantity ensuring successful completion of the project. Details of the sphere of activities, scope of activities, reference projects and staff are provided in Appendix XXII<sup>7</sup>.

i) Sphere of Activities

International Associates take an active part in all processes from preliminary investigations and feasibility studies, through concept studies and detailed designs for:

a) civil engineering - including structural and infra-structural aspects, air-conditioning, heating and ventilation;

b) mechanical engineering, and;

c) electrical engineering,

all based on the process technology being incorporated, to include and supervise construction services such as site supervision in ~~converting~~ the projects and the industries list below:

Engineering Industries.	Metallurgical Projects.
Chemical & Electrochemical Plants.	Harbours & Ports.
Environmental Protection.	Repair & Maintenance Plant.
Material Handling Facilities.	Infrastructures.

ii) Scope of Activities

The InCo group of Consultants offer comprehensive engineering and ~~management~~ consultancy services for projects and ~~industries~~ from conception till completion and start-up stages and whenever required, during plant

operation. Although the owner obviously has the ultimate responsibility, the professional responsibility is fully shared by InCo-group of Consultants. The scope of services broadly encompass the following:

Preliminary Investigations.	Market Studies.
Pre-feasibility Studies.	Process Selection.
Licence Agreements.	Detailed Design & Engine- Engineering.
Pre-qualification Documents.	Tenders & Contracts Documents.
Site Supervision.	Operation & Management.

iii) Staff:

The group consists of the following personnel, a majority of which are non-Kuwaitis:

Technical & Economists: 55; Technical Support Staff: 17;  
Site Supervisors: 15; Administrative Staff: 24.

It is considered as a large CEDO.

This group is the only consultancy group in Kuwait to undertake to cover all these activities, showing their diverse capabilities, their excellent organisation and equipment. Yet the government have done nothing to encourage the group to expand by providing assistance, or by sponsoring their efforts by allocating tenders to them. The assessment of their participation in the socio-economic-industrial development is described by the Chairman of the group Board, Engineer, MOAYED AL-RASHIED as follows:

"The industrial activities in Kuwait consist of:

- a) Government Industries - which are mainly in the petrochemical and petroleum sectors. The group

did not participate in these because this sector invites only international consultants to conduct: pre-feasibility studies, project execution and supervision. National CEDO's are not involved in any of these processes and hence would not have the chance to develop their capabilities. The group office could perform either one or all of the following activities in governmental industries:

- i) Pre-feasibility studies; the group could conduct a better role than most since they know more than foreign firms with respect to local costs, utilities, availability of manpower, specifications, etc.
- ii) Could contribute upto 40% of engineering design.
- iii) Supervision.
- iv) Maintenance.

The Government thus follows conventional methods of technology implementation (by referring to foreign firms for consultancy, design, erection, maintenance, supervision, etc.) rather than developing the national firms by allowing gradual and rational participation in their projects. Continuous contacts are made by the group with several Government establishments, particularly the petroleum and petrochemical sectors, requesting they encourage them by allocating parts of their activities to them. The reply was merely a series of empty words of encouragement. Undoubtedly, such attitudes indicate the absence of a proper Science and Technology Policy to involve, develop and promote the capabilities of indigenous CEDO's.

- b) Private and Mixed Sector - this sector usually have less complex projects (mosques, multi-storey car parks, etc.). This sector has more inclination to encourage the indigenous CEDO's than the Government sector."

(refer to reference projects in Appendix XXII).

In many countries, consultant offices carry out a remarkable role because of the high level of services reflected by their various activities. These consultant offices do not grow and expand by chance or by a stroke of luck, but by trial and experience.

Consultant offices need the support of the State,



not as establishments that aim at realising profits, which is their right anyway, but because they are Kuwaiti establishments that should be supported and strengthened, and also encouraged till they attain a good reputation in the Gulf, the Arab World and internationally. The primary beneficiary will be Kuwait, since these offices will reflect the technological development achieved by Kuwait, whereby it becomes a source of advice to the public and private companies in the Gulf, the Arab World and worldwide, particularly where the State extends its assistance to the various activities in furtherance of the public interests.

How does the State regard the Consultant Offices? The building up of confidence and trust between the State and the Consulting Offices is not an easy matter, because the State regards the Consultant Offices in Kuwait as unworthy of comparison with the foreign consultant offices that enjoy international reputation, therefore, they cannot be trusted with major and sophisticated projects, and that even if they are given such projects, they should refer to international foreign offices for assistance, or just assign the whole project to them. Thus, the State finds it more appropriate to deal with the foreign consultants directly, without the mediation of the local consultant offices.

What is the point of view of the local consultant office? On their part, the Kuwaiti Consultant Offices argue that the development of the Kuwaiti Consultant Offices is a matter of vital importance and that, if they are neglected, they will dwindle to obscurity, at a time when it is in

Kuwait's interest that they are encouraged and strengthened, to safeguard the interests of Kuwait. They admit that some international foreign consultant offices are more advanced, but such offices were established a long time ago, and were able, after gaining sufficient experience, to offer their services beyond their local boundaries and advance on the international market. The Kuwaiti Consultant Offices seek the assistance of such foreign offices sometimes in order to transfer the technology possessed by them to Kuwait, because direct contact between consultant offices is considered a means or a channel for the transfer of modern technology from the advanced countries to the developing countries. Kuwait knows this, and while it needs more building, economic and social progress, it cannot ignore the local scientific and technical capabilities.

In the Western States, there is complete co-ordination between all the private and Government sectors, particularly in respect of the establishments that operate outside their borders, because the grouping of local potential is very important to the social and economic building process, and is given priority before seeking foreign assistance.

Here, such co-ordination is not found, particularly between either the funds and banks operating in Kuwait, which give loans for financing foreign projects, or between the Kuwaiti Consultant Offices. The same can be said about the relationship between the Kuwaiti Consultant Offices and the Committee for the selection of consultants in the Ministry of Planning. This led to a weakening of the role of the Kuwaiti

Consultant Offices in Kuwait in particular and in the Gulf and Arab areas in general.

The consultancy offices in Kuwait generally lack an awareness of their potential role and possible functions, contributions and capabilities in the socio-technological development. As a result of the prejudice against them and the hesitation shown in using the local consultancy services, both government and private or mixed ventures have long become accustomed to acquiring their engineering and consultancy services from international firms. Furthermore, indigenous consultancy and engineering design offices in Kuwait face severe competition from international counterparts who are usually provided with some diplomatic and financial support from their government.

In order to improve this situation, the most important recommendation should be the re-organisation and re-classification of the consultant offices with the due consideration of their capabilities and experience. There are some new offices and there are some that have already accumulated a reasonable amount of experience and know-how. The second possibility should be an attempt to limit the number of such offices, so that they become more organised as consultant offices, reflecting the progress achieved by Kuwait. Now is the time to re-organise and re-classify the consultant offices, as was done in respect to the contractors, who are classified in certain categories that take into consideration their capabilities and potentials.

6) The Impediments To The Development Of National CEDO's.

Law No. 37 was promulgated in 1964 with regard to "General Tenders" as organised and monitored by the Central Tenders Committee. The Law stated that the Central Tenders Committee, as attached to the Council of Ministers, is the sole organ in Kuwait whereby each and every Government Ministry and Department has to process their tenders. The Law consists of 66 Articles specifying the scope of authorities and all matters related to the tender processes in Kuwait.

Article (8) of the Law divided the contractors, eligible to conduct projects into four categories according to the value of the projects. Category one consists of projects valued over K.D. One Million, category two consists of projects valued upto K.D. One Million, category three consists of local contractor conducting projects upto K.D.500,000, and category four allows local contractor to perform projects valued upto K.D.250,000. Article (12), however, allow a contractor for promotion to higher category after one year from his registration with the committee and subject to the committee's approval.

The Law does not stipulate that any foreign contractors must involve or allocate parts of the projects to national contractors or CEDO's.

Table 9.1 provides the values of some major projects executed by foreign firms in Kuwait over 1976-1982.

If Al-Kholy's assumption - as an Arab who has been

TABLE 9.1:

Names and Values Of Major Projects Executed  
By Foreign Corporations In Kuwait (1976-82)



Aston University

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Aston University

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Continuation/-

TABLE 9.1:

Name Of Project	Value (K. D.)
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Total	1317539723
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Source: Data was supplied by His Excellency, NAIF AL-MOAWSHERJE, The Secretary General of The Central Tenders Committee Nov. 1982.

working in the field of science & technology policies - is adopted where he stated that the multinational Corporations should allocate 10% of the project's total value to their national CEDO's, then it would assume that Kuwait has paid 10% of the total project's value shown in Table 16.3 which amount to K.D.131,753,972 in five years to develop foreign R & D and CEDO's. This large amount of money would have been given by the Kuwaiti Government to the Kuwaiti CEDO's and contractors, if there existed a national science and technology policy, stipulating that the Ministries and Government Departments should impose the involvement of national CEDO's and contractors in the execution of a portion of the projects. Therefore, the implication of the absence of Science and Technology Policy resulted in the Kuwaiti Government paying large sums of money to developing the foreign R & D activities and CEDO's at the expense of promoting their indigenous capabilities.

#### 7) Policies to Develop National CEDO's in Kuwait

One of the purposes of consultancy work is to save, in the long run, on costs. This may be the theory behind the action, but in reality, this is not always the case. Foreign consultants charge in many cases exorbitant fees - sometimes there is available a local consultant who could do just as satisfactory a job at a far lower price. In other cases, a local firm knows where to buy cheaper materials, hire less costly contractors, etc., thus reducing overall costs significantly. Yet other examples reveal that local consultants who have carried out feasibility studies, have shown how

technology packages could be broken down and their components made economical use of.

The continued trend to give preference to national consultancy and engineering design offices would, undoubtedly, develop and encourage these offices to be involved in the socio-economic national Plan and hence increase the shift towards self-reliance and to a better formulated Science and Technology Policy.

Measures can be taken to improve the indigenous CEDO's in Kuwait, or to make the environment in which they function more receptive. Explicit policy instruments can be used to stimulate the demand for Kuwaiti CEDO's; at the same time the quality of consulting and engineering services to be developed needs to be the object of an apt policy instrument. The institutions and mechanism that implement such policies must have discretionary powers, viz, the Central Tenders Committee. Furthermore, CEDO's may not be built up in a crucial sector of the economy, leading to repetitive involvement and the import of the same technology over a period of time. They should be rotated at random in all the sectors of economy, according to their efficiencies and capabilities. A policy instrument such as "Consultancy and Engineering Design Promotion Law", should be formulated and promulgated in Kuwait aiming to protect CEDO's from foreign control, and to encourage their development in Kuwait. The Law should:

- i) Make it mandatory for foreign CEDO's to associate with



and involve Kuwaiti counterparts to participate in all projects preparation, execution, supervision, maintenance, etc., in accordance with the capabilities of Kuwait CEDO's.

- ii) Differentiate between engineering and construction to allow for possible development of engineering offices independent of construction firms. These firms should be independent from equipment suppliers or manufacturers.
- iii) Assure that local consultants should be apprenticed initially to foreign consultants charged with the design and construction of a plant. The skills they learn at this preliminary state can be then employed to help maintain the plant. Experience gained in this way will serve them in good stead when it is a matter of designing and constructing a plant themselves.
- iv) Make the authorities grant indigenous CEDO's a certain amount of independence and trust, so that without any constraints they can grow at their own pace until their full potential is realised.
- v) Assure that government and industry should pair up CEDO's with suitable projects in accordance with their capabilities and professions.
- vi) Allow policy-makers to forecast what the likely results of using a CEDO will be.
- vii) Identify CEDO's and register them annually, assessing them through this register, and form a Committee of the various parties to study setting the criteria for

registering and assessment of CEDO's.

- viii) Allocate all the government projects to Kuwaiti CEDO's and leave it to them to seek the assistance of foreign international counterparts that possess the qualifications not available in Kuwait, unless the projects are too complex to be handled domestically.
- ix) Formulate a ladder for the fees of national and foreign CEDO's for the services performed by them regarding the Government projects, forming a Committee for this purpose.
- x) Allow national CEDO's to assist in:
- the identification of technological needs for a variety of economic activities, in context with the socio-economic-political and national framework;
  - promotion, absorption, adaptation and diffusion of the acquired technology;
  - negotiation of the best possible terms and conditions for transfer of technology;
  - the evaluation and selection of appropriate technology for various economic and industrial sectors.

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7. "Industrial Consulting Office and Industrial & Engineering Consulting Office Document", Kuwait. Undated.
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## CHAPTER X

### THE SERVICES SECTOR : ELECTRICITY & WATER

The Services Sector, viz, Housing, Social Affairs, Education, Electricity & Water, operate in Kuwait to provide services to Kuwait and its population in accordance with the socio-economic plans. Since the electricity and water sector is widely concerned with domestic services and industry, and since it employs sophisticated science and technology, the author has chosen this sector to analyse its 'impacts on' society and 'influence of' society upon it and to evaluate the extent of the participation of Kuwaitis in its domain and the nature and trends of executing tenders in this sector.

#### 1) Preface

The growth in consumption of water and electricity in Kuwait has been very fast for the past decade to meet the expansion and development of the socio-economic-industrial sectors. The per capita consumption of electricity in Kuwait is amongst the highest in the World. The electrical energy is mostly consumed in air-conditioning in homes, companies, offices, etc. Industrial use in Kuwait only accounts for about 20% of the total consumption of electricity. The prevailing building codes, materials and methods used in Kuwait result in high thermal losses, which can be further reduced

or minimised by proper scientific and technological means, viz, the utilisation of insulating materials adapted to Kuwait and its methods in the construction of roofs, windows, walls, etc.<sup>1</sup> The Ministry of Electricity & Water (MEW) is responsible for the activities of this sector, namely:<sup>2</sup>

- i) Electricity.
- ii) Electrical Networks.
- iii) Fuel.
- iv) Production and Supply of fresh & brackish water.

Details of these activities are listed in Appendix XXIII.

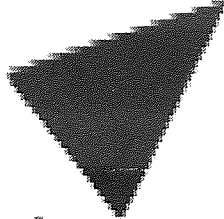
Table 10.1 illustrates the expected future consumption of electricity and water for the period 1980-90. The table indicates that the consumptions of both services is almost doubled every five years which necessitates the need for the Ministry to improve its capacity and ensure that the following policies are adopted:

- i) Develop its scientific and technical capabilities and particular to increase the participation and development of its Kuwaiti workforce.
- ii) To sponsor educational mass-media programme to the public to guide and instruct them in various methods to conserve and save in the usage of electricity & water.
- iii) To sponsor R & D activities for the development and improvement of the electricity and water sectors in Kuwait, e.g., programmes related to wall and ceiling installation, energy-saving water distillation methods, etc.

TABLE 10.1:

Expected Future Growth In Consumption of  
Electricity and Potable Water in Kuwait,  
(1980 - 1990)

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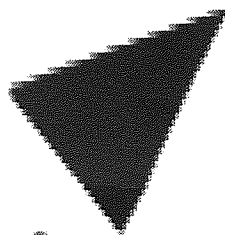
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TABLE 10.2:

Number of Different Specialised Engineers In  
The Ministry of Electricity & Water (Dec. 1980)

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## 2) Manpower Composition

Table 10.2 provides the composition of engineers in the Ministry as for Dec. 1980. The table indicates clearly the low participation of Kuwaitis in the Ministry's workforce (an average of 5.3%), a phenomenon that should be re-evaluated and assessed by the officials in the Ministry to increase the participation of a higher percentage of local engineers and to decrease the extent of dependence on foreigners. It is worth mentioning here that there are areas, e.g., instrument, production and design, survey & maintenance engineering where Kuwaitis are not involved at all.

However, an ex-ministry trainee has ~~confined~~ the following to the author, in summer 1982:

"Two hundred Kuwaiti trainees were given various types of intensive training as operators and technicians, to perform certain jobs for the Ministry. Upon satisfactory completion of their training course, they were told by a top official in the Ministry that the Ministry would hire technicians from one of the Asian countries provided that the Kuwaiti trainees would train them and acquaint them with their new tasks and that they would be working under the supervision of the Kuwaitis. Surprisingly enough, upon the completion of the training programme, the Ministry appointed some of the Asian trainees as supervisors and put them in charge of the well-trained Kuwaitis. The impact was that almost all of the Kuwaitis have left the Ministry for elsewhere."

This brain drain, undoubtedly, demonstrated the absence of a manpower development policy in the Ministry and unveils the reasons for the facts mentioned earlier that the Ministry lack the qualified Kuwaiti manpower. A trend that is being supported by the Ministry's officials rather than there

being a deficiency in the Ministry itself.

### 3) Obstacles In The Electricity & Water Sectors

The author believes that the balancing of electricity & water output is a formidable challenge requiring considerable financing, scientific and technological efforts and the supportive human organisations for the operation and maintenance. Nevertheless, there exist several adverse factors affecting Kuwait and other DC's, particularly those in the hot dry and sandy zones, amongst which are:<sup>3</sup>

- i) The bulk of electrical summer load used by air-conditioning, in addition to the decrease of thermal efficiencies of steam and gas turbines ( 70% of normal output). Such phenomena needs further modifications and innovations of the acquired equipments.
- ii) Sea water has been used and is still being used for cooling and condensing steam and production of distilled water which has corrosive effects with increase in temperature. Therefore, further R & D should be conducted to study the use of special techniques and materials to prevent or decrease corrosion.
- iii) The absence of frequent rain results in the accumulation of dust on insulators and electrical equipment causing "caking" effects. Thus, further studies are needed for the design and manufacturing of these units and for evaluating special types suited for Kuwait's environment.
- iv) Recruitment of new technical personnel is becoming more difficult due to restriction of the exit of such people



from their homelands and to the high cost of living in Kuwait. Socio-political measures need to be evolved to solve such important obstacles.

#### 4) The Role Of Science & Technology In The Development Of Electrical Sector

This section can be best described by an historical account<sup>4</sup> of the progress of activities in fields of electrical power mainly the generation, ~~transmission~~ and distribution of electrical power.

##### A. Generation of Electrical Power

The fast rate of increase in the size of electrical power generation was due mainly to the need to meet the fast growth in demand requiring the addition of more generating capacities. Presently, Kuwait relies exclusively on gas and oil as the basic sources of energy. However, alternative energy sources such as Solar and Nuclear Energy are also being studied. Nevertheless, R & D in solar energy has not been progressing successfully (refer to Chapter V) and solar energy might face social objections.

The initial design planning, timing, size, number of units, etc., of a new power station is done by MEW. However, consultants are usually engaged to carry out detailed site selection and feasibility studies and to propose preliminary design criteria and parameters for approval by MEW staff. This procedure creates a continuous process of interaction and exchange of ideas between the consultants

and MEW staff. This interaction has led to the fact that for new desalination plant projects, no consultants will be engaged which speaks highly for Kuwait's engineering acumen.

Practically all machines and equipment are manufactured abroad and imported with expert manpower. Marine and civil construction works are generally entrusted to the international contracting, but the participation of local contracting firms and indigenous manpower is appreciable.

As a result of this transfer of technology, there are now a number of local firms who are specialised in certain aspects of construction and the erection of equipment, and the numbers and capabilities of such firms are increasing.

Testing, trouble-shooting and putting the power plant to work is a sensitive and important phase when the engineers and technicians of both the contractors and MEW closely co-operate and joint forces to identify, isolate and solve 'teething' troubles and to render the plant fully operational. This knowledge and experience acquired will serve as a guide and reservoir of experience to draw upon for the operation and maintenance of the plant in the future by the local staff.

#### B. Transmission & Distribution Of Electric Power

Suffice it to state the evolution and development

of the transmission and distribution networks followed a path parallel to that of the generation of electric power. Immediately steps were taken to extend the electric service by the construction of a high-voltage (11,000 volts) network. This was adequate until the early 1960's when it was decided to build a new power station to introduce a higher transmission voltage - 132,000 volts - for the network linking two major power stations.

The author is convinced that technological development has occurred in this field in Kuwait by usage of aluminium instead of copper for the conductors of low voltage cables and for the use of cross linked polyethelene insulation instead of oil-impregnated paper for underground cables.

Street lighting has, however, seen wide applications of technological improvement to attain high illumination intensities.

The Ministry is also facing another developmental impediments represented by the tenders which are executed for it mainly by foreign firms.

#### 5) Tenders Executed To The Ministry of Electricity & Water:

##### Patterns & Analysis

The State of Kuwait has established what is probably the most comprehensive welfare system in the world. Public utilities, e.g., water, gas, electricity, have undoubtedly supported the establishment of this system and also assisted in the evolution of the industrial structures. The installation of electrical energy and water services have been carried out

by numerous tenders, mostly by foreign firms. Analysis of the trend of these tenders would assess the self-reliance concept and thus, the Science and Technology Policy adopted by the Ministry.

His Excellency KHALAF AL-KHALAF, The Minister of Electricity and Water, provided the author with a list of (610) tenders that were executed for the Ministry for the period 1976 - March 1982. The document included the following information:

- i) Year of execution.
- ii) Type of executed project.
- iii) Nationality of Executor (and name of Company).
- iv) Value of executed project.

Full details of this information are provided in Appendix XXIV.

Table 10.3 summarises the types of projects executed, the percentage of Kuwaiti Contractors' participation and the total value of projects for each year.

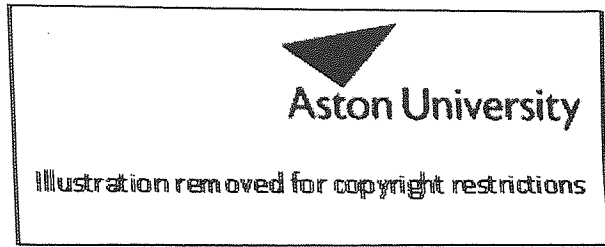
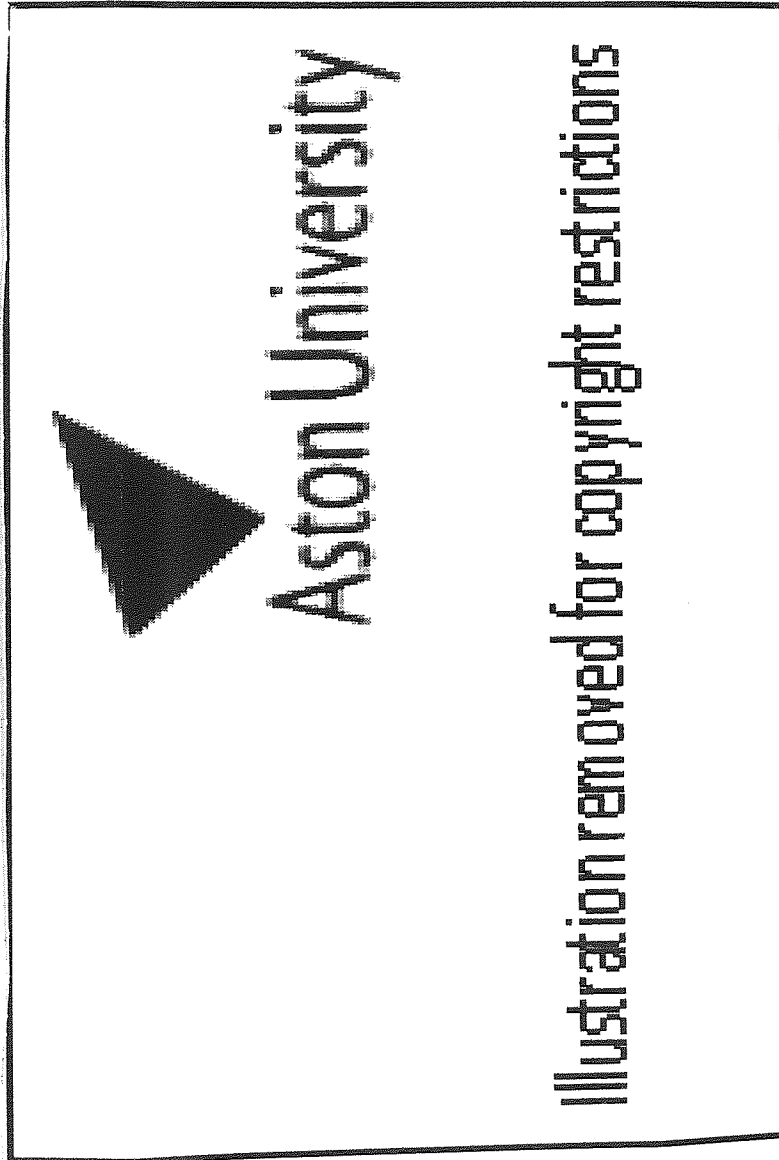
Table 10.4 provides the nationalities of companies that executed the tenders.

Table 10.5 illustrates the percentage of Kuwaiti participation in total projects and the percentage of Kuwaiti financial allocations of the projects.

Analysis of Tables 10.3 - 10.5 give the following facts:

1. Kuwaiti contractors executed most of the civil work projects

TABLE 10.3: Projects Executed For The Ministry of Electricity & Water : 1976-1982

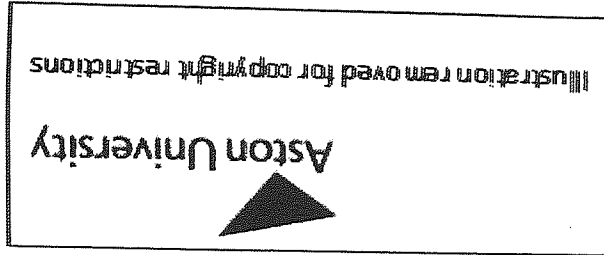
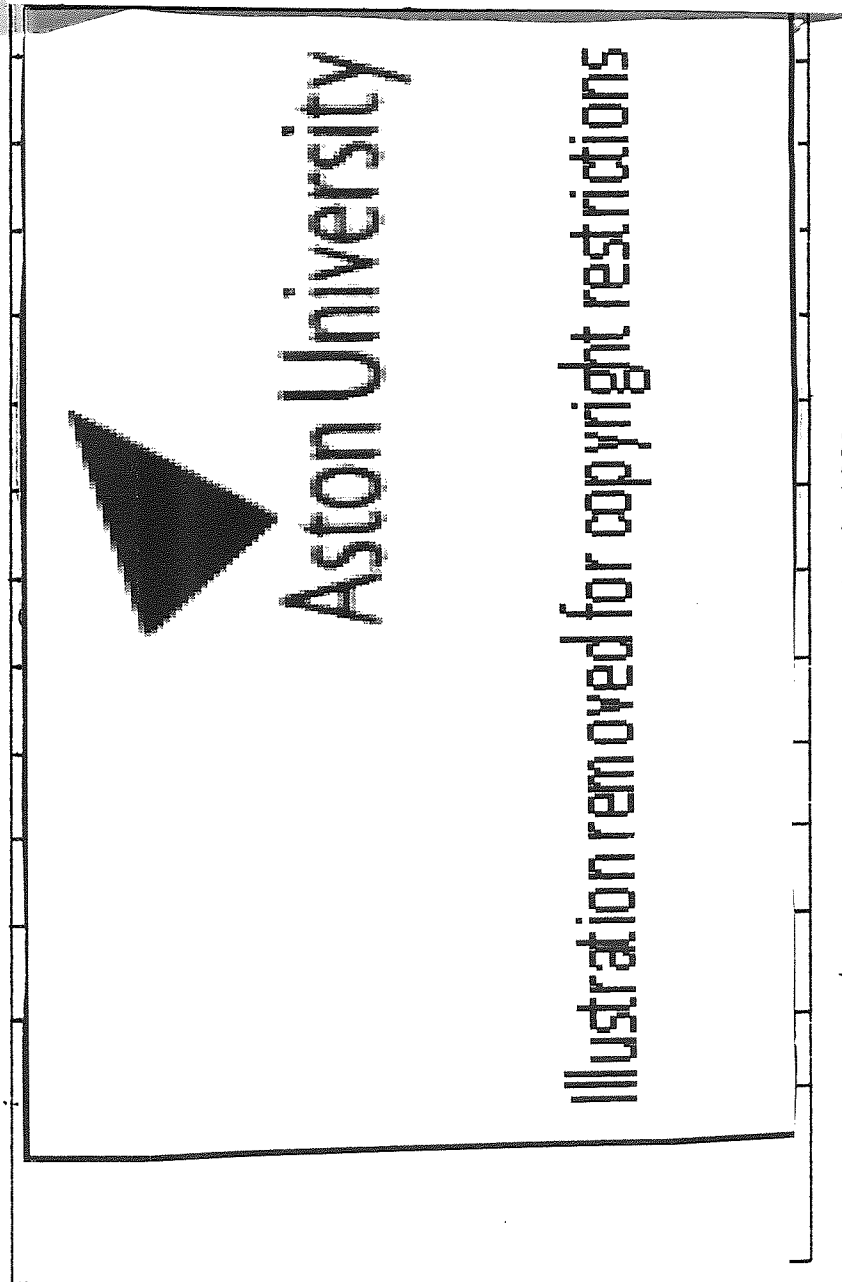


\* 81/82 Projects are up to March 1982.

Source: Document was provided by His Excellency KHALF AL-KHALIF, The Minister of Electricity & Water, Kuwait, April 1982.

TABLE 10.4:

Nationalities of Companies That Executed Tenders To The Ministry of Electricity & Water: 1976-82

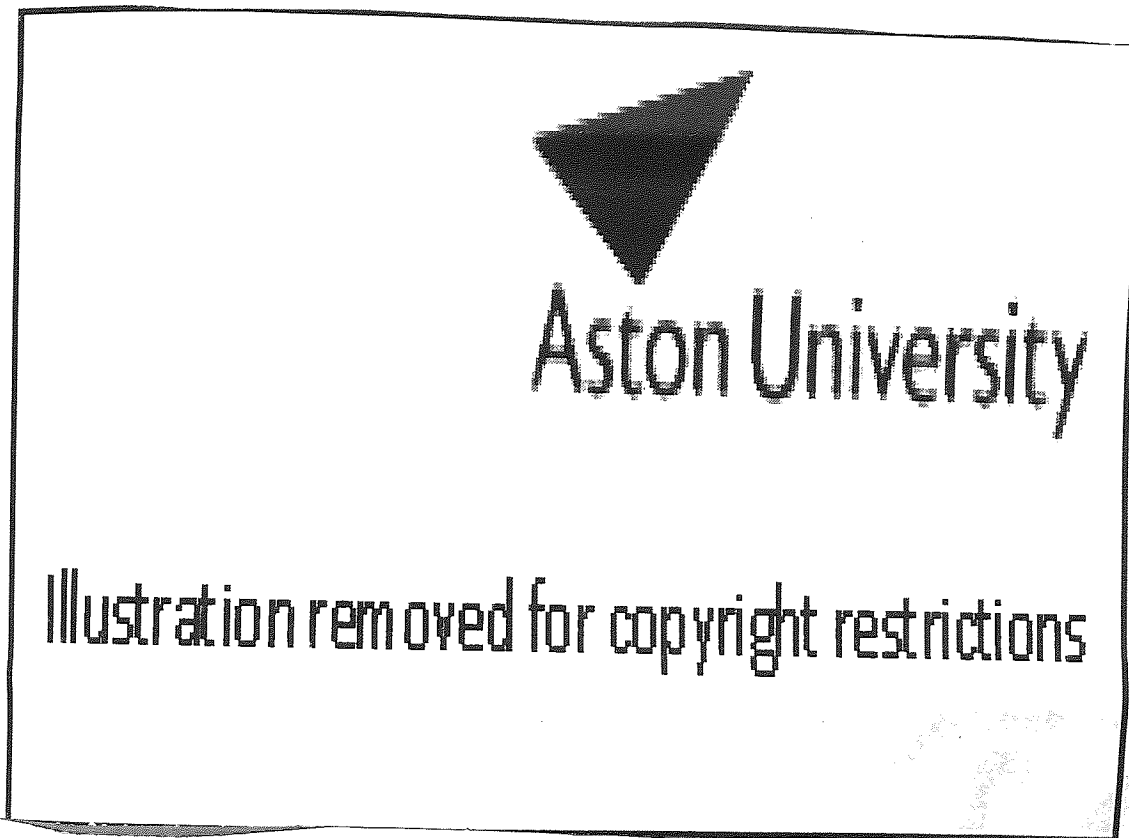


\* 1981/82 Projects are up to March 1982.

Source: Document was Provided by His Excellency, KHALF AL-KHALF, The Ministry of Electricity and Water, Kuwait. April 1982.

TABLE 10.5:

Total Projects and Percentage of Kuwaitis  
Participation In Tenders Executed For The  
Ministry of Electricity and Water: 1976-82



\* 1981/82 Projects are up to March 1982.

Source: Document was provided by His Excellency KHALF  
AL-KHALF, The Minister of Electricity and Water,  
Kuwait. April 1982.

(an average of 92.5% of total tenders for the period 1976-82). The civil work projects were mainly low technology-based ones, viz, erection of stations, installation of water systems, erection of stores and guards' rooms, etc. Although civil work projects were mainly assigned to Kuwaiti contractors (which is an excellent trend), nevertheless, they are non-sophisticated technical jobs, that do not develop or improve the quality of the contractors in terms of scientific and technical standards.

2. Kuwaiti firms' involvement in electrical projects and consultations is minimal (an average of 6.7% of the total tenders for the period 1976-82). If we assume that the Kuwaiti firms conducted such tasks without the reliance on international entrepreneurs, the Ministry has to further encourage the involvement of Kuwaiti firms in this area by either allocating more tenders to them or stipulating their participation in tenders executed by foreign firms by promulgating proper statutory laws.

As for the Ministry, their solutions to challenges and problems stemmed from an almost entire dependence on international entrepreneurs to execute the major electrical energy and water projects which lies in the path of development in the realms of science and technology. Automation, labour-saving techniques, special materials and methods, intensive educational and training programmes, involvement of Kuwaiti firms in project execution, etc., are only a few examples in which science and technology can serve the development of these services. To further minimise



technological dependence, the Ministry should:

- i) Form a permanent internal Committee in the Ministry with members from within and from outside the Ministry (if needed) to plan, design and evaluate the acquired technology and its adaptation to Kuwaiti environmental conditions. The Ministry should encourage Kuwaitis to be members of the Committee.
  - ii) The Ministry should allocate proper funds to develop and further train the members of the Committee in Kuwait and abroad.
  - iii) The Ministry should stipulate the participation of the members of the Committee with foreign firms in all the layout of the acquired technology. The involvement should be in the country of origin of the technology and in conjunction with foreign entrepreneurs upon project execution in Kuwait.
  - iv) The Ministry should allocate an annual budget for research and development to conduct further research to improve the services of the Ministry and particularly, research should be performed for the adaptation and diffusion of new technologies in Kuwait.
3. Kuwait establishments have executed almost the entire supply and installation of equipments tenders (97.2%) of the total projects were executed by Kuwaitis over the period of 1976-82). This category of tenders consists of two stages:
- i) The supply of equipments for the Ministry. A task that

does not involve any technological development or involvement. It merely consists of quotations and orders of equipment from international markets.

ii) The installation of equipment and materials which involve a minimum phase of technological development such as the Kuwaiti contractors require to install or deliver air-conditioning units, street lights, bookshelves, various types of pumps, etc. Such undertakings hardly develop the technological capabilities of the Kuwait establishments.

4. Although Kuwaiti contractors have carried out most of the total tenders of the Ministry (average of 64.6% for the period of 1976-82), nevertheless, their share of financial rewards was very low, (14.6% for the same period). These figures clearly indicate that Kuwaiti contractors are not involved in the major and large projects of the Ministry and are only given ordinary and small tenders.
5. The participation of Kuwaiti firms in executing tenders has been declining from 1976/77 till 1981/82 in terms of percentage of total tenders, (85.60% of total tenders in 1976/77 to 48.57% of total tenders in 1980/81).
6. The financial share of Kuwaiti contractors of tenders has been fluctuating and decreasing sharply. (46.20% in 1976/77, 6.7% in 1977/78, 1.28% in 1978/79, 2.85% in 1980/81). These figures indicate clearly, the absence of any technology policy in the Ministry to encourage more technical self-reliance.

7. The execution of the Ministry's tenders by international firms (in 1976-82) were allocated to the following nationalities, from highest to lowest:

i) Japan	: 54 tenders
ii) West Germany	: 36 tenders
iii) U.K.	: 30 tenders
iv) France	: 20 tenders
v) Switzerland	: 16 tenders
vi) Holland	: 11 tenders
vii) South Korea & Hungary	: 9 tenders
viii) Italy	: 8 tenders

Japan is the country which has executed the majority of tenders done by foreign firms, while European countries and South Korea have also executed a large number.

As for potable and brackish water services, due to the large actual and projected water consumption, and due to the limited natural water resources and sole reliance on sea water desalination, the Ministry should adopt the following measures to ensure adequate supply and reserves of water to meet individual and industrial demands:

- i) To further increase public awareness (by a mass media campaign) of the vital need for water for socio-economic industrial development for a country such as Kuwait that lacks natural resources. The educational Programme should aim for water conservation. A gradual increase in water rates will assist in the success of such a Programme.

- ii) To conduct extensive surveys and assessments of all water resources in terms of utilisation and life span.
- iii) To establish advanced leakage detection and prevention measures and control of evaporation, covering of reservoirs, tanks, etc. to decrease wastage of water.
- iv) To carry out R & D which aims to appraise water-recycling processes to be used for industrial and agricultural purposes.
- v) To perform R & D to investigate more efficient ways of producing potable water in addition to sea water desalination. The technique or technology used must be adopted to the Kuwaiti environment.

#### 6) Conclusion

The Ministry of Electricity & Water have been assigned the responsibilities for providing electricity and water services for Kuwait. Over a period the Ministry has successfully acquired and utilised scientific and technical output to help the provision of these services. The potential market exists within the Ministry to constantly acquire technologies, nevertheless, the Ministry should aim to involve Kuwaiti establishments in executing its projects by allocating tenders to them or pass a Law to stipulate their involvement with foreign firms in executing its tenders. More encouragement should be given towards the participation of local CEDO's.

However, the author believes that the Ministry should further employ science and technology to develop the following sectors:

## Conservation of Energy

Air-conditioning makes up for about 70% of the electrical summer load. Employing thermal insulations in buildings such as, insulated double walls, hollow bricks, insulated roofs with sun reflectors and double glazing windows and doors to name a few could contribute significantly towards savings for owners, society, substantial savings in State subsidies and conservation of fuel and gas.

To attain the above objectives would require the concerted efforts of the: Ministries of Electricity & Water/ Public Works/Housing/Commerce & Industry as also University of Kuwait's College of Engineering/Kuwait Institute for Scientific Research/Kuwait Society of Engineers/Architectural & Civil Engineering Design Offices in Kuwait and abroad/ Regional and International Institutions concerned with Buildings Materials and Conservation of resources.

Optimal results could be achieved by incorporating:

- i) Co-operation with related regional and international R & D institutions.
- ii) Introduction of a new building code designed to encourage the insulation of buildings to reduce thermal loads and granting of financial and other incentives to encourage the practice.
- iii) Developing economic, low-thermal load designs of buildings which satisfy local cultural, social and environmental requirements.

## Development of Human Resources

Continued increasing capacity of the electrical network will necessitate more highly skilled manpower. Efforts should be emphasised to train and develop educational Programmes for Kuwaitis and other Arabs via improved training, appropriate change in attitudes, motivation and increasing employment opportunities. Local symposia could be arranged to deal with local or regional problems and international experts could be invited to lecture on the latest progress in science and technology in the pertinent fields. Furthermore, developing handling of information and data system would be an access to personnel and sections of the Ministry for more quick and efficient execution of work, planning and design, operation and analysis of results, administrative purposes, consumer services, invoicing, etc. The distinct process of utilising the latest innovations in "storage and retrieval systems" should be given paramount importance not only at the MEW but also encompass all other national bodies.

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## CHAPTER XI

### THE SERVICES SECTOR: HEALTH SERVICES & CARE IN KUWAIT

#### 1) Introduction

Modern medicine involves the import of technology and medical products that are not available in Kuwait and which might impose several problems related to the health services. The author has chosen the health services sector as an integrated chapter of this thesis because:

- a) it is a highly developed and mature system;
- b) it is concerned with R & D and qualified manpower;
- c) it employs scientific and technological tools, apparatus, instruments, etc.
- d) it is involved with different categories of skilled workforce, i.e., Physicians, Pharmacists, X-Ray Technicians, Nurses, Dentists, etc.;
- e) it is concerned with all the population irrespective of their age, sex, nationality, and;
- f) it links protective medicine to preventive medicine, each of which requires scientific planning and technical activities.

In order to understand such services, it is necessary to analyse the history, progress, organisation, R & D activities, etc., that are involved in administering and performing



the health care in Kuwait.

## 2) History And The Role Of Health Services In Kuwait

The history of health services in Kuwait<sup>1</sup> began before 1910 when Islamic medicine using herbs and plants was used in accordance with the known practice at the time. In 1912, the first missionary clinic was set up in Kuwait by an American mission. Health services then advanced in 1936, when the first dispensary was set up to provide free medical care. In 1949, the first hospital was established. The Ministry of Public Health was established in 1961 (refer to Appendix III for the responsibilities of the Ministry). The major roles of the Ministry are:

- i) offering preventative services,
- ii) offering medical care,
- iii) supervising the work of its departments and hospitals,
- iv) regulating public record (birth, death),
- v) supervising local and imported medicine.

Health services in Kuwait are provided free of charge for all the population. If a patient needs more sophisticated medical care that cannot be found in Kuwait, he/she will be treated abroad on the Government's expenses. The local medical care is provided by 17 hospitals, 23 ancillary medical services (oncology, blood bank, dermatology, etc.) and 13 polyclinics. Details of the activities, names, staff composition, etc., of these systems are provided in Appendix XXV and XXVI.

As for preventative medicine, the Ministry has established the "Preventative Medicine Division" to solve societal health problems rather than individual ones concerning epidemic

or chronic diseases and to provide the preventative means by studying, analysing and monitoring the origin of the epidemic. To accomplish its task, the division has organised several workshops and seminars for participants from Kuwait and the Gulf States and conducted various research activities with respect to epidemic, environment and food-handling problems. Appendix XXVII encompasses some of the research activities. Analysis of research topics indicates that the division has concentrated mainly on the following four categories of diseases:

- i) Epidemic Diseases: Salmonella outbreak, Measles control, Gastrointestinal outbreak, Typhoid fever, etc.
- ii) Chronic Diseases: Lung cancer, Heart diseases, Respiratory illness, Diabetes Mellitus, etc.
- iii) Infants & School Students: Fractured teeth, Gastroenteritis, etc.
- iv) Public Health: Food poisoning, Vaccination coverage, etc.

The analysis of the above research activities indicate that the preventative medicine division - with its moderate capabilities in terms of qualified manpower and equipment - has conducted a well diversified investigation of preventative health issues in Kuwait in accordance with its duties as specified by the Ministry. Nonetheless, eating habits have altered tremendously in the past decade, consumption of food has increased and spread within the community to become a luxury rather than providing nutritional needs. This has introduced diseases that were not prevalent in Kuwait before,

e.g., diabetes, tooth-decay, etc. Therefore, in order for the preventative medicine division to fully perform its activities, Kuwait societal diseases and the following suggestions should be taken into consideration:

1. The Ministry of Public Health must allocate appropriate funds to the division, to allow them freedom of movement, personnel hiring and equipment acquisition without bureaucratic formalities.
2. The division must have full contacts with national scientific institutions, (Kuwait University, KISR, etc.), as well as regional and international organisations with similar activities to further support its endeavours.
3. A publicity campaign must be adopted, via the media, to make the populace aware of the scope and functions of preventative medicine.
4. The division personnel should participate more actively in relevant seminars and workshops held inside or outside Kuwait.
5. Due to the eating habits in Kuwait, the division must concentrate heavily on:
  - cardiovascular and heart diseases;
  - stone phenomena (kidney, bladder, etc.);
  - nutritional values in meals consumed;
  - infants milk feeding and child health;
  - diabetes.
6. The Ministry should encourage the enrolment of Kuwaiti

manpower in these activities by providing viable incentives and encouragements.

Furthermore, a national health plan has been drawn for the period 1981 - 2000. The plan aims to assess the present health status in Kuwait, to modify the existing patterns of health care services, to demonstrate policies and to propose strategies for the improvement of the health services. The plan also aims to reduce infant mortality to a level of 10/1,000 (presently 31/1,000), child mortality (1 to 4 years) to less than 0.5/1,000 (presently 2/1,000) and raising life expectancy to 75 years and to eradicate several diseases, e.g., tetanus, tuberculosis, etc.<sup>2</sup>

In this chapter, the author aims to illustrate the various tools for medical services, e.g., budget, facilities, manpower, R & D activities, etc., that have been allocated to the health sector in Kuwait and thus to evaluate the impact of such facilities on the development of health status and medical care in Kuwait.

### 3) Tools For Medical Services

#### A. Health Expenditure

Statistics<sup>3</sup> has shown that:

- i) The budget allocated to the Ministry of Public Health is 6% of the State's total budget.
- ii) Hospital services and operation consume 50% of the Ministry's budget.
- iii) Only 1.5% of the Ministry's expenditure is offset by

its own revenue.

iv) Annual health per capita expenditure is US\$.205.00.

v) The cost per bed/day = US\$.105.00.

The Ministry budgets for 1976 - 1982 were as follows:<sup>4</sup>

<u>YEAR</u>	<u>BUDGET - (K.D. MILLIONS)</u>	<u>% INCREASE</u>
1976/77	59.738	-
1977/78	67.472	13.0%
1978/79	69.500	3.0%
1979/80	97.500	40.3%
1980/81	127.670	31.0%
1981/82	160.100	25.4%

The rapid increase of Ministry of Public Health's budgets are due to:<sup>5</sup>

- i) The increase of population, particularly of foreigners.
- ii) The adaptation of scientific achievements and funding of research and development needed to cure fatal and chronic diseases.
- iii) The continuity to provide and improve the quality of medical services by inauguration of hospitals and poly-clinics, (there are at present 17 hospitals, 13 poly-clinics and 41 clinics).

#### B. Health Research Administration:

The administration aims at developing scientific

research and encouraging the Ministry staff to perform scientific research by providing them with scientific and financial aid as well as providing the scientific atmosphere which is necessary for research workers. Moreover, the administration co-operates with the local and international scientific committees.

The priority of the health research to be performed is as follows:<sup>6</sup>

- a) Health environment and social health problems in Kuwait.
- b) Scientific studies which aim at developing and improving health services.
- c) Basic research in medical science branches.

The supervision of research activities has been assigned to a Committee of "Higher Research Board", headed by the Minister and including the Undersecretary (both are medical doctors). The Committee aims to review proposed research projects in order to accept or refuse the projects. An annual budget is prepared for health researchers by the Committee, according to the suitability of the proposed projects. The 1978/79 budget was K.D.578,264 distributed among various medical and clinical activities. Undoubtedly, this is a low figure compared with the Ministry's total budgets and health activities within Kuwait.

Several medical research activities are performed under the umbrella of the Ministry. The main activities are:<sup>7</sup>

- Lipid Research Unit: This deals with the exogenous and indigenous factors affecting lipid depositions.
- Allergy and Skin Unit.                      - Genetics.
- Preventative Medicine: As discussed earlier.
- Islamic Medicine and Medical Plants.

Unfortunately, although Kuwait is a wealthy nation with advanced medical and administrative services, the medical research activities face numerous obstacles and impediments such as:

1. The existence of duplicated and unco-ordinated research activities within the Ministry, i.e., heart disease risk and complications research has been conducted independently in the lipid research unit and the preventative medicine unit. Such a lack of co-operation produces wastage in funds and human output.
2. The view of some of the medical research workers were that the research committee is assigned to the Minister and undersecretary, both of whom are inclined towards medical aspects rather than research and both of whom are extremely busy with various governmental and organisational tasks. This might not produce an effective appreciation of the research projects evaluation, since the appraisal of research required undivided effort. In addition, the committee does not include members who have experience in research evaluation.
3. The absence of a general research co-ordination body to

ensure the co-operation assessment and originality of medical research within the Ministry.

4. Due to a lack of appraisal and appreciation of medical research topics, the majority of the Ministry funds is allocated for health services, hospital building, etc.
5. The absence of effective and planned links between the College of Medicine of Kuwait University and research units in the Ministry. Proper links and liaison would produce more valuable research outputs and develop human capabilities.
6. The bureaucratic and lengthy processes necessary in issuing financial allocations.
7. Human and academic contacts between researchers do not exist. This has a discouraging and declining effect upon research activities. This Ministry must promote interchange of information and ideas, and make serious efforts to solve this problem.
8. The discouragement and ivory tower status of the higher management of Kuwait Institute for Scientific Research. The impression of the employees of the lipid research unit of the Ministry was that the management of KISR has completely ignored their needs and proposals to co-operate in jointly studying Kuwait Societal Medical Problems (cardio-vascular, diabetes, etc.). The employees realised that the facilities in KISR in terms of qualified manpower and equipment could provide such services as part of its research activities in accordance with the Amiri Decree.

The Ministry of Public Health must, therefore, make



careful assessment of and encourage, problem-oriented research in Kuwait. In particular, it should consider that the Kuwaiti community suffers from over-feeding and should not merely concentrate on health services, since preventative medicine and problem-oriented medical research would solve and minimise illness risks in Kuwait and hence decrease the enormous budget allocated for health services. Therefore, a proper re-design and planning of medical research activities must be seriously considered by the Ministry's policy makers. In addition, the Committee does not make publicly available its decisions on the allocation of funds to research activities, which makes it difficult to assess the trends of R & D in the Ministry.

#### C. Medicine & Medical Equipment Acquisition:

This section will discuss the procedure and principles<sup>8</sup> followed for acquiring medicine and equipment in order to clarify the methodology of purchasing and transferring such products.

##### i) Medicine

- a) Budgeting - The budget is prepared yearly, six months before the beginning of the financial year by the head of the Medical Store, and it contains the items, quantities and the price of every item, the quantity estimated according to the last year's consumption, with about 15% extra, unless some other factors arise, such as establishing new units or shifting from an item to another. The estimated price must take into consideration the usual increment, and the expected currency

fluctuation. The budget would then be submitted to the official of the Ministry for approval and revision.

b) Purchase - There are three types of purchases conducted by the Ministry as follows:

i) direct order from one company for those items produced solely by a company;

ii) order after limited tender, for those specific items that should be bought from specialised companies; successful offer is selected according to the lowest price if it complies with the specification.

iii) public tender for non-specific items (aspirin, vitamins, etc.), all medicines imported through any of the above types must be analysed by the drug control centre before distribution to the units.

ii) Equipment

The budget is prepared by estimating the requirements of every section in every hospital, and must be submitted by the chief pharmacist of every hospital to the central medical stores administration. They take the necessary procedures to allocate the budget and execute the purchases according to one of the three methods shown above, but in addition to that, every tender should include free warranty for at least one year, installation, and training of the Ministry staff where applicable.

Manufacturing of equipment is out of the question for the time being, but maintenance is available by the companies' engineering staff during the warranty period according to contract; or by the Ministry engineers for other equipment that is not included either by contract or by free warranty.

The above information indicates that the Ministry does not possess or intend to develop, the capability to manufacture the necessary equipment and apparatus, but depends solely on foreign imports, and thus, is creating a complete and definitive technological dependence, rather than a self-reliant scheme. Health services in Kuwait are advanced and plentiful for all the populace. A complete self-dependent technology policy might hinder the performances of the services, but entire reliance on foreign sources is vulnerable to change in various economical, technical and political issues of international affairs. The health policy, therefore, faces a dilemma in any move towards self-sufficiency.

In order to, gradually, overcome this difficulty, the officials of the Ministry should establish an engineering and design department within its control to participate in the unpacking, operation, maintenance and spare-parts manufacturing of the acquired technological equipment, as a short term policy. Simultaneously, the Ministry could propose to the Gulf Co-operation Council States that they initiate collaborative attempts to negotiate with some foreign companies to build assembly lines, as a first stage, as a medium term policy, to allow the local manpower to assemble the equipment and apparatus and maintain them, under the supervision and training

of foreign delegates; and the long-term policy would ensure then a stage where the Gulf States National cadres and their respective engineering and design organisations would be under licence to manufacture their own equipment and tools. Thus, gradually moving Kuwait and her neighbours from complete technological dependence to almost technological independence.

The above arguments which apply to equipment and tools, equally apply to medicine acquisition. Evidence of this is seen in the conditional contract that has been signed between Imperial Chemical Industries (ICI) of England, and the Ministry of Public Health, with respect to the Pharmaceutical factory (See Appendix XXVIII). The agreement specified a clause that:

"ICI will provide the factory with the know-how on one condition, that the factory must purchase from ICI one of the raw materials included in the formulae of the product".

This clause is "self-explanatory".

As a consequence, the danger and impact of technological dependence or of playing the game according to another's rules, is dear. Similarly, pharmaceuticals supply to Kuwait and her Gulf neighbours could be best served by erecting a regional pharmaceutical plant.

#### D. Kuwait Pharmaceutical Industries Company (KPICO)

On 16th June, 1980, the Government of the State of Kuwait (represented by the Ministry of Finance), established jointly with the "Arabian Company for Pharmaceutical and Medical Equipment", a shares holding company to be sited in

Kuwait named, 'Kuwait Pharmaceutical Industries Company'.<sup>9</sup> The main Articles of the "Agreement of Establishment" are stated in Appendix XXIX.

The construction<sup>10</sup> of the company is expected to start in Nov. 1983, whereas, the start up of commercial production is anticipated at the end of 1985. The company will start to manufacture (74) drugs in its first stage (refer to Appendix XXX), furthermore, the company has planned for any future increase in the production according to the Ministry's demands.

The numbers and types of manufactured drugs were chosen, after several consultations, by an in-house committee which was formed from all types of medical specialists in Kuwait. The Committee was assigned the responsibility for evaluating local and regional market needs and consumption and for recommending the strategical medicines which are most urgently needed during wars or catastrophies, and for ensuring that their raw materials are available in Kuwait (i.e., intravenous solutions). Moreover, the drugs are manufactured in accordance with World Health Organisation lists and not by being recommended by multinational companies. This is a positive development trend to define conscious control of medicine according to domestic and regional needs, rather than multinational companies' influence. Nonetheless, an obstacle still remains with respect to integrated pharmaceutical industries in that almost all the raw materials are imported from foreign sources. This aspect has given the policy makers the option of either not producing, and encouraging local industries to rely solely on the mercy of great nations, or, to

initiate national industries with minimum, but vital, dependence on foreign influence and supplies. The author believes that the health policy makers in Kuwait have decided to choose the appropriate option which would create local industries, develop manpower, stimulate self-reliance, utilise local and regional raw materials and markets and hence, make the first step towards industrialisation.

However, the developed industrialised nations have established large well-experienced R & D institutions and facilities, a weapon with which they might aim to eliminate the competition of KPICO in international or even Arab markets, by introducing similar products with lower prices. The rivalry will force KPICO to accept either of the following alternatives:

1. To lower their prices beyond the threshold market prices of foreign products, with growing risks of financial difficulties, conducive to bankruptcy, or
2. To rely on the very parochial market capacity of Kuwait, a status which would erode the finance of the industries and consequently lead to insolvency and closure of the industries.

The economic structure of Arab Gulf States is based on a free enterprise system, being controlled by influential financial elites, and thus does not allow for laissez-faire. Hence, if the governments of these countries do not sincerely wish to improve and support the operations and status of this industry by imposing and initiating strong protective measures against foreign rival products, (i.e., by stipulating high

import taxes), KPICO could never be competitive in the markets and will be steered towards closure.

#### E. Manpower

The following table illustrates<sup>11</sup> the development of medical and paramedical staff in the Ministry for the years 1957 and 1980:

Manpower	1957*		1980**	
	No.	Rate/10,000	No.	Rate/10,000
Physicians	145	7.0	1,867	14.0
Dentists	17	0.8	177	1.3
Pharmacists	27	1.3	258	1.9
Paramedics	152	7.4	2,889	21.3
Nursing Staff	720	34.9	6,538	48.2

\* Total Population : 206,400.  
 \*\* Total Population : 1.355 million.

The table indicates that the manpower in 1980 has been multiplied over ten times that it was in 1957 and consequently the number of manpower/10,000 has almost been doubled.

#### F. Health Efficacy & Safety

Efficacy is defined in terms of benefit; safety in terms of risk. They are quite similar in that neither are absolute, both are probable and discussed in terms of importance of benefit or harm and tied by common factors, i.e., medical problem, population affected and conditions of use. It should however, be noted, that each can only be fully evaluated only in terms of the other. For example, benefits may

arise from technology or medicine used, but the value of the benefits depend on what dangers are involved in using it.

One instance is the use of a mammography device to detect breast cancer. The benefit of delay of death due to the machine's use to detect cancer has to be weighed against the risk of developing cancer from radiation given off by the machine when in use. Benefit and risk have to be judged separately, but technological values depend on comparison.

Efficacy and safety assessment bears four differing factors:<sup>12</sup>

- i) Range of Effects.
- ii) Number of people affected.
- iii) Known or expected benefits Vs. unknown or unsuspected risk.
- iv) Time period of effect.

Technological efficacy is dependent on benefits to the user. What outcomes represent benefits are usually measured in terms of mortality or morbidity beside any other psychosocial factors produced. Since drugs are chemical or biological substances that are consumed by the public, it is worthwhile to assess the safety procedures as applied by the "Drug Control Centre" of the Ministry. The centre has published the following procedures to be used when applying for permission to import or produce drugs for local consumption:<sup>13</sup>

- i) Application of the same trade name given for a preparation of the same composition.
- ii) Application of the same specifications and methods of analysis.



- iii) Type of inspection on manufacturing process and quality control for the finished product from the company as certified by Kuwait Embassy.
- iv) Certificate of registration of the company to manufacture and sell its products freely in the country of origin as issued by the Ministry of Health in that country and should be certified by Kuwait Embassy.
- v) Certificate, showing that the manufacturer fulfils the requirements laid down by World Health Organisation.
- vi) A free sale certificate for each pharmaceutical product showing that it is registered and released for sale in the country of origin.
- vii) A certificate of composition, active and non-active ingredients with their quantities, analysis and full detailed specifications.
- viii) Original sample showing the description, expiry date, etc.
- ix) Reference sample of the active ingredients with their specifications in full detail to be used as standard in the assay and identification.
- x) A certificate of analysis in full detail for the finished product.

The above conditions indicate that although Kuwait imports mainly all of her pharmaceuticals and drugs, nevertheless, a well-planned scheme has been designed to ensure

the maximum safety for utilising medical drugs and pharmaceuticals in Kuwait.

The following section would, however, appraise the impacts of the health services sector on the populace.

### 3) Statistics And Analysis

Kuwait has witnessed an enormous improvement, both in quality and quantity, in its health services during the last two decades. The national income of the country has also gone up tremendously, largely due to enhanced revenue from oil. All these factors have contributed towards a higher standard of living of the people, improvement in nutrition, better housing and sharp reduction in the level of mortality. The country is experiencing a rapid change in its health status from that of a developing country to one of a developed country. The life expectancy at birth in Kuwait is at present reckoned at 70 years, which is indicative of a high level of health of the people. However, the leading causes of mortality and morbidity are still a mixture of diseases associated with developing and developed countries.

Table 11.1 provides the rate of health personnel per 10,000 persons in Kuwait compared with developed and developing countries. It is shown from the table that Kuwait is comparable with the developed countries and in most cases Kuwait is better than most of the DC's.

Therefore, in order to justify the expanding expenditures of the health system (about 6.0% of the total budget),

TABLE 11.1: Rate of Health Personnel in Some Countries. Compared with Kuwait



Aston University

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Aston University

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and to assess the positive (and negative) effects of health care in Kuwait, an analysis of statistics which compare Kuwait's health status with developed and developing nations of the world must be appraised. The following statistics compare such health standards and efficacy.

Analysis of Table No.11.2 reveals two modes of health system analysis in Kuwait: absolute and comparative. In absolute terms we can conclude that the death rates among the population in Kuwait occur in decreasing order by the following causes:

- i) Complications of pregnancy, childbirth and the puerperium.
- ii) Heart and cardiovascular diseases.
- iii) Infective and parasitic diseases (mainly enteritis and other diarrhoeal diseases and tuberculosis of respiratory system).
- iv) Accidents, poisonings, violence and suicides.
- v) Respiratory system diseases.
- vi) Neoplasms diseases.

The ~~death~~ rates by digestive system diseases and endocrinal, nutritional and metabolic diseases are very low, compared to those diseases in other countries.

The high death rates by complications of pregnancy, childbirth and the puerperium, could be attributed to two major reasons:

- a) neglect of pregnant women in the early stages of



pregnancy and ignorance of the procedures, diets and rest to be taken during this period (e.g., particularly Bedouin women who work hard and are less aware of the complications). This attitude would be minimised by more extensive education services, by the media, by visits, or publications, etc., a task that could be done collaboratively between the Ministry of Public Health and other governmental and private organisations.

- b) inadequate maternity and health services provided by the hospitals, clinics and even, at certain stages, the ambulance and emergency calls services.

This is a challenge that has to be re-evaluated and assessed by the Ministry.

The high rates of death due to Infective and Parasitic Diseases correlates with the age group distribution in Kuwait, where almost 50% of the population are below 15 years of age.

Similarly, the high death rates due to heart and cardio-vascular diseases and respiratory systems diseases, resulted from lack of exercises, over-eating and the lack of awareness of the public of the implications of excess eating of sweets, lipids, etc.; a problem that the Ministry of Public Health has to campaign to overcome, with other agencies, in addition to the need to improve its medical system.

The death rates caused by accidents, poisonings, violence and suicides, are not an indicator of the quality of

the health service, apart from the efficiency of their emergency and ambulance services. To minimise these figures, an overall National Programme must be adopted to increase the awareness of the people with respect to driving ethics and the religious and moral implications of suicides.

If the decision-makers in Kuwait are planning to provide better medical care for the majority of the population, which is under 15 years of age, in order to shift the trends of age-group distribution, then the health policy makers should be consulted so they could re-design their policy to expect higher death rates in diseases which are associated with old age (cancer, metabolic disorders, heart, etc.). This trend will necessitate the preparation of medical staff who are specialised in these areas. It is a consequence of reducing death rates in diseases associated with younger ages, that a higher death rate associated with old age will occur.

For purpose of comparison, the author selected data of three countries to compare their death rates by causes within Kuwait:

- a) The U.S.A. (a wealthy and advanced country with sophisticated medical care),
- b) England (an advanced country with a well-established National Health Service), and;
- c) Jordan (an Arab developing country that shares the same religious and inherited cultures as Kuwait, but with less GNP and economic growth).

The comparison shows that in all deaths caused by

disease (except metabolic and digestive system diseases), Jordan has a lower death rate. On the other hand, Kuwait has a lower death rate by causes in most other ones, i.e., cancer, endocrine and metabolic, heart and cardio-vascular, digestive and accidents, comparing favourably with the industrialised countries with advanced health systems. Nonetheless, although Kuwait does not compete in providing a better health service than a poorer country (Jordan), Kuwait is comparable and competitive with the advanced health systems in U.S.A. and U.K. Such a comparison does not indicate that Kuwait possesses a better health service system than U.S.A. or U.K., since the U.S.A. and U.K. population face more socio-psychological challenges and tensions with higher rates of crime, accidents, violence and pollution than Kuwait. The argument should be thus oriented toward the comparison of death rates by between Kuwait and Jordan (which resembles Kuwait in its social structures). Such lower rates of death by diseases in Jordan must stimulate the decision and policy makers in Kuwait to question and evaluate the effectiveness of the budget that has been allocated to the health sector (with its large services units) in respect to its achievements for society and to aim to increase health service efficiency and security. Another reason for such uncompetitive medical output are that the Ministry was given the sole responsibilities of formulating, executing and monitoring the health policy and apart from the National Assembly there is no other body assessing the Ministry's performance. Furthermore, the Ministry has not yet fully realised the importance of medical R & D and its application to organise and solve medical problems and diseases of Kuwait.



When the author discussed the above issues with two officials from the Ministry of Public Health, during a meeting in London in November, 1982, the officials were not satisfied that Kuwait provided lower standards of health services than Jordan because they have visited Jordan several times and assessed her medical services. Their one justification was that the United Nations Demographic Statistics might not be very accurate and reliable. However, the author at this stage, is not in a position to re-evaluate or appraise United Nations' Statistics.

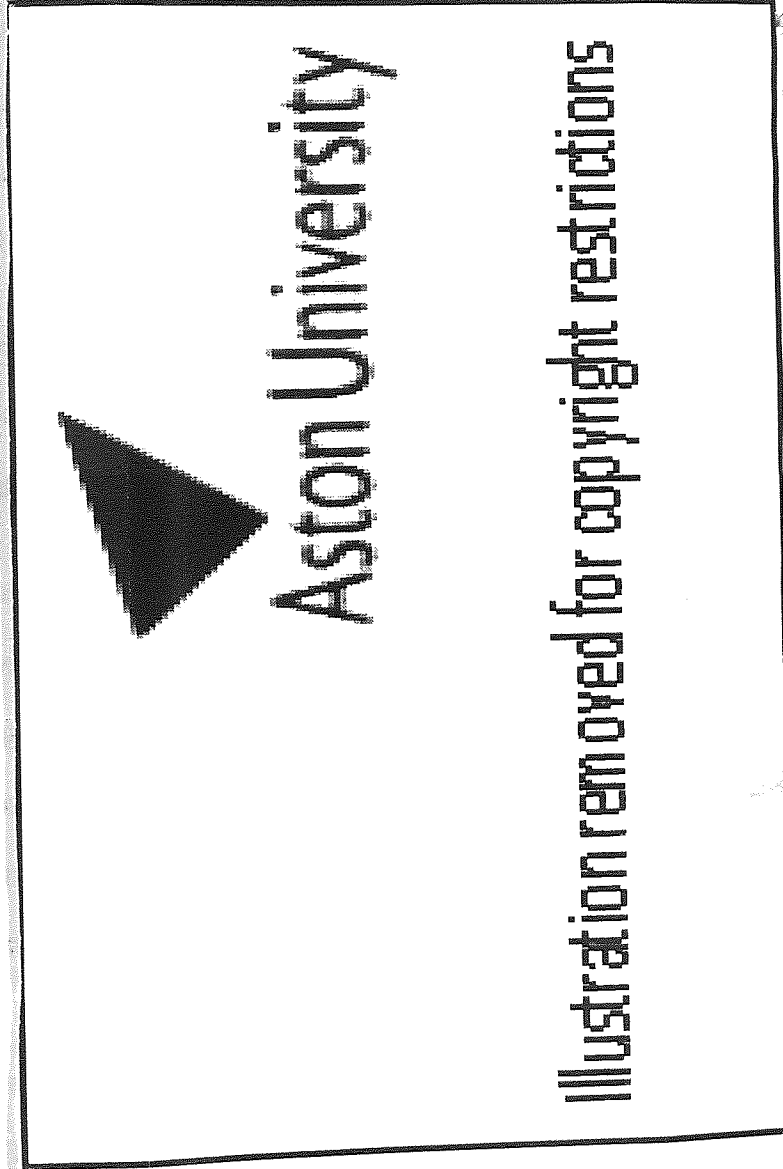
Fig. 11.1 compares the death rate per 1,000 inhabitants for Kuwait and other countries. Again, the graph shows that Kuwait has a lower rate than European Countries, but a higher rate than the U.S.A. and Syria (a developing country with a lower GNP than Kuwait).

Therefore, although the Ministry of Public Health has been granted a good portion of the general budget to perform its activities, nevertheless, a health policy is more complicated than just a mere allocation of budgets or establishing health services and employing professionals. A more comprehensive approach to health efficacy and security would undoubtedly improve the formulation of better health policy and consequently adequate medical services and care.

The following section proposes several suggestions and recommendations aiming to further develop the health services in Kuwait.

Fig. 11.1: Disease - Death Rate per 1000 Inhabitants for Several Countries: 1976

139.3



Source: "Cost Analysis & Performance Evaluation For The Health Services : 1978/79",  
Vol.1, Ministry of Public Health, Kuwait.

tries

Persons

## 5) SUGGESTIONS AND RECOMMENDATIONS

The Kuwait Health Services system has been successfully supported by the Government of Kuwait by the granting of generous funds (6.0% of the total Government expenditure), and by erecting various hospitals and ancillary service units. Nevertheless, the health system in Kuwait has not reached a status to be compared with that in a country, such as Jordan, with ~~most~~ lower GNP, economic growth and medical funds allowance. To further promote the efficacy and performance of the health services in Kuwait, to justify the allocation of generous funds, the following recommendations are suggested:

1. Preventative Medical division and health guidance planning must be given more priority, appreciation and freedom of movement and contacts. (Prevention is better than cure).
2. A comprehensive Health Education Programme must be designed between the Ministry of Public Health and other public and private organisations to increase and develop the awareness of the public with respect to various medical topics (limitations of lipid and sweets, encouragement of polio vaccination, re-evaluating eating habits, etc.). If an individual or family is unaware or insecure in health matters then society might be affected adversely and the health system will be strained. If the family and therefore, society, are more healthy, they can support each other, thus making a more healthy community.
3. R & D activities in various health sectors must be encouraged, planned for, managed and co-ordinated to investigate

home-based illness and obstacles. These activities must be established and improved in collaboration with the relevant national regional and international organisations. The sponsoring of seminars and workshops in Kuwait would certainly develop and promote medical manpower.

4. Medical Technology Assessment must be performed when introducing a new technology (for efficacy and safety) for the following reasons:

a) to ensure that technology which is proven to be beneficial is widely publicised, and thus, promptly utilised. Government regulating and financing bodies should make immediate decisions by collecting sufficient information with respect to its performance in the Kuwait environment.

b) to ban any technology which possesses a high probability of risks or causes complications, (e.g., particularly radiation-emitting apparatus). Such technology might introduce diseases, and affect medical management due to implications of diagnostic or therapeutic practices. The same argument applies for mismanagement of drug reaction (e.g., inaccurate description). Medical technology must also be appraised in terms of available manpower to operate, maintain and interpret its results. Well founded criteria for selection must be established and used as an instrumental policy by the Ministry.

5. There should be collaboration with the Ministries of: Social Affairs & Labour, Commerce & Industry, Education,

Information and all other agencies which deal with pollution, to design a publicity programme concerning pollution and its impact, to promote awareness.

6. The erection and endowment of hospitals, and polyclinics should be gradually achieved, due to the limited indigenous medical manpower and the existence of high competition among Gulf States to absorb qualified foreign manpower.
7. There should be strict surveillance of private hospitals and Pharmacies, to ensure the conduct of proper and prompt medical services with competitive financial fees and to ensure that pharmacies are performing their tasks in accordance with the regulations and procedures of the Ministry.
8. Workshop and training abroad should be encouraged, (particularly in the countries with advanced health systems) for the medical staff to develop their capabilities and performance.
9. A programme of continuous invitations to experienced medical staff and professionals to deliver seminars, provide training courses, and workshops should be planned with the aim of promoting the abilities of medical manpower.
10. Full and intensive co-operation between the Ministry and the College of Medicine of Kuwait University should exist, to establish a joint-medical channel which aims to further support the quality of the services system. The Ministry should plan health with the College of Medicine, to offer a Medical Management degree within its faculty.

11. The clinics and polyclinics which provide mother and child welfare and public health services are not adequate and do not deal properly with emergency cases (as statistics have shown), therefore, such services need to be examined and re-evaluated.
12. Careful planning of all health care must be carried out to meet the future density, distribution and increase of population in Kuwait.
13. Educational and training institutions must be established to offer courses and training programmes in areas of:
  - a) medical awareness and community education programmes;
  - b) ancillary medical technologies; and
  - c) technical support, engineering and maintenance.
14. A sophisticated occupational health laboratory should be developed to establish new testing methods for assessing the environmental hazards created by chemical compounds produced by industry and agriculture. The laboratory should determine the threshold limits of exposure to dangerous substances, the efficacy of chelating agents in the therapy and diagnosis of some heavy metal poisoning, the influence of working processes, and the environment on the health of workers (to decrease accidents and respiratory infections), in order to achieve maximum of efficacy, safety and comfort, to assess technological equipment as well as human, physical and environmental conditions, and to determine the types of dust which produce lung injury.
15. To fully develop administrative and technical manpower.

Kuwaitis in particular must be attracted to join the health services system and to enrol in various medical institutions and colleges.

The World Health Organisation<sup>14</sup> has provided excellent guidelines for health manpower planning. The document recommended seven steps to be followed for this:

- i) There should be a report on the Health Manpower studies giving existing manpower and services.
- ii) Future supply of Manpower should be estimated.
- iii) Manpower requirements - quantity, quality and distribution - should be assessed.
- iv) Discrepancies between supply and demand noted.
- v) Differences should be resolved.
- vi) Organisational and Management problems should be examined.
- vii) Manpower strategy and outline plans should be formulated.

Looking at the number of health workers in Kuwait, in relation to the number of people, does not help us in our quest to discover how useful these people are, nor how they are distributed over the country. The components of an efficient health personnel include ability to do the job, education and motivation. No matter how good their personal qualities are, they cannot function properly in a badly organised health service.

Most doctors are taught how to care for the individual,

few are educated in, or experienced in, catering for the community as a whole, though both are of equal importance. It does not necessarily follow that a person trained to care for a small number of people can apply his knowledge to a greater number, although obviously, there is a certain amount of common territory.

Generally, it is the government who has sole responsibility for health care. If Kuwait University was to co-operate with the government on this matter, the health package made available would be even more powerful. Collaboration with the government would ensure that enquiring minds did not shoot off at a tangent. Secondly, the health plan would stand a better chance of being accepted nationally. The University's role would not be an easy one, as it would have to try and remain close enough to the community to be aware of the problems, yet far enough away to be able to seek solutions to them in an objective fashion.

The medical profession relies heavily on its support staff and the relation between the support staff and the doctors is also one of dependence. The University has a duty to educate these people as well as the higher echelons of the profession. The two should not be separated as the way in which they work together is an important one. It is hoped that Kuwait University will open its doors to people of lesser academic status.

The first step in implementing a health care plan is to identify the patterns of ill-health, and then to set about



putting them to rights, giving each patient the amount of care he requires for his particular condition. Whether this action will work or not depends on the amount of people being catered for, the area being covered and the distances involved, and also the level of seriousness of the illness. Research reveals some worrying facts about health care in that there is a limit to the staffing fund in Kuwait.

16. The Ministry of Public Health should involve local and professional organisations, (i.e., the Medical Society, ~~Pharmaceutical~~ Society, Dentists Society, etc.), encouraging them to participate in designing the national health policy to ensure optimum results.
17. The Ministry ought to establish within its activities a Complaints Committee to analyse and investigate thoroughly, the remarks and criticisms of the people with respect to the health service.
18. Since the reliance on the international markets for the importation of hardware, technology, tools, machines, raw materials, pharmaceuticals, etc., is a socio-political dimension, and since it might cost less financially to rather than to manufacture them in Kuwait, there must come a time when the necessity to manufacture (in Kuwait or on a regional or Islamic basis) would be safer in the long term, particularly when political issues or catastrophies arise. Therefore, Kuwait should improve the operation and marketing of Kuwait Pharmaceutical Industries Co. and further initiate technological and medical joint-venture

projects at regional, Arab or Islamic levels, to ensure the supply of medical technology, spare parts and drugs at any time. The role of technology transfer via patients, trade-marks, licences, etc., must be carefully analysed to secure that both pharmaceutical production and process rights are granted. Nevertheless, any agreement must not include any clause to force Kuwait to acquire technological components, spare parts, raw materials, etc., from a particular supplier or country. As for trade-marks, the negotiators must be aware of immediate or gradual replacements of foreign trade-marks by local or generic names.

19. The Ministry should, individually or jointly, with other Gulf States, establish engineering and maintenance workshops in Kuwait (or elsewhere in the Gulf), to train the nationals on designing, repairing, maintaining and manufacturing of spare parts for medical technologies used in the health services sector.

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## CHAPTER XII

### THE INDUSTRIAL SECTOR IN KUWAIT

During the last two decades the industrial sector in Kuwait has developed in response to changes in national factor benefit and the development demand pattern. It consists of several important economic activities, the most important are: oil and petrochemical (to be discussed in the next chapter), mixed and private industries. This chapter will discuss and analyse the prospects and strategies of industry and technology transfer in Kuwait. Due to the extreme importance of oil and petrochemical sectors to the Kuwaiti economy and due to the fact that Article No.3 of Act.(6)/1965 dealing with industry in Kuwait has excluded the oil and petrochemical sectors from the industrial sector, the author would discuss such sectors in a separate chapter. Furthermore, the author will discuss the status and the industrial-economic impacts of three case studies, to appraise their role in the development of the industrial sector in Kuwait, namely:

- i) The Industrial Bank of Kuwait,
- ii) The National Industries Company, and;
- iii) Kuwait Melamine Industries Company.

#### 1) Introduction

Following the energy crisis and rise of oil prices

in 1973, a fundamental change occurred in what is called the "terms of trade" between raw materials and finished products. Prior to 1973, for more than two centuries, these terms favoured the industrialised nations. From the beginning of this century, economists predicted that supply and demand would change terms of trade but this did not happen.

The main objects of industrialisation are confined to benefiting from the added value that follows the industrial process. As for Kuwait and oil producing countries, instead of exporting crude oil, it would be far better to process it and then export the processed derivative. This also applies to natural gas, that can be processed into petrochemicals that yield a great added value, instead of exporting all the gas as raw material, or just ~~burning~~ it at the oil sources.

The transfer of technology and development of the labour force cannot be done in a vacuum, but requires an appropriate means to accommodate it. Industry is considered one of the most successful means for the transfer of technology and development of national manpower. The skills gained by the young generations in the Arabian Peninsula through industrialisation are considered the most important riches that may be secured by this area.

One of the important results expected from industrialisation will be the diversification of the sources of income, instead of relying on one source only. It is believed that the relative stagnation in the oil markets at present gives us proof of the dangers of relying on just one source of income.

The sound implementation of industrial policy in any country requires co-ordinating the operations of governmental and non-governmental ministries and agencies connected with industry.

The primary role of Government is industrial development and lies in the general direction of defining those policies and objectives that will help guide and crystallise the efforts required to meet this vital end. Doubtless, government must play an active role in translating its objectives and policies into specific organisational guidelines capable of being used and implemented by its ministries and specialised agencies. Government must also take the initiative in supporting the country's infrastructure and ensuring its viability vis-a-vis the implementation of industrial development programmes of increasingly greater scope.

The industrial structure of any state is made up of a host of agencies and organisations varying in nature, size and scope. Each agency or organisation is governed by its external relations, internal variables and general considerations laid down by the government concerned. Therefore, any decision taken in relation to any agency will necessarily encounter problems during implementation of virtue of the interplay of factors affecting other units or agencies.

Initially, Kuwait followed the same path as other developing countries toward industrialisation. In addition to its reliance on international expertise and international organisations specialising in the study and preparation of feasibility studies undertaken for the purpose of directing

the industrial sector and meeting its service needs, it has also established many administrative bodies over and above its ministries and public agencies that have been authorised to oversee or participate in the organisation and development of the industrial sector.

The economic issues, options, strategy, objectives and impediments involved in industrialisation in Kuwait are to be discussed in the following sections.

## 2) Industrialisation And Industrial Infrastructures In Kuwait

Kuwait has always been acutely aware of the danger of relying on oil as her sole means of income and from the outset she adopted a policy of economic development, directing revenue from the oil into training Kuwaitis and building up other industries upon which a prosperous economy could be based.

Kuwait was faced with the choice of either turning to industry as a means of developing the country or to concentrate on commerce and finance. Kuwait has realised however, that in the former case, she would merely be transferring the emphasis from oil to industry, thereby sacrificing other sources of income. On the other hand, if Kuwait were to channel most of her resources into finance and stock market, this too would be a gamble as external factors cause major fluctuations in the world market. The proof to such ~~an assumption is the~~ dilemma that struck the Kuwaiti economy and hence produced severe negative socio-economic impacts due to the exaggerated post-cheques transactions which took place within the unofficial stock market (AL-MANAKH). Such negative impacts have

forced the Government to withdraw capital from the national reserves and the future generation reserves to inject for liquidity in the market. The answer, therefore was to steer a middle path, building up a base on which alternatives to oil revenue could be found. Industry was the obvious alternative to oil and provided the appropriate opening for oil revenue surpluses to be directed.

Nevertheless, there are certain obstacles standing in the way of a speedy and successful industrialisation process, such as the lack of raw and semi-finished materials, a small home market, a shortage of domestic labour, the high degree of risk involved in a new venture and the delay in financial returns. The author also believes that the European markets, due to socio-political-economic reasons, would impose implications and difficulties in the marketing of any Kuwait products such as Melamine.

As of 1960's, much importance has been given by the Government to the building industry by establishing the Kuwait National Industries to provide construction materials, likewise the Kuwait Foundry Company and Kuwait Metal Pipe Company were formed in 1961 and 1963 respectively.

In May 1964, the Shuaiba Industrial Development Board (later Shuaiba Area Authority) was formed, transforming waste land into thriving industrial estate with facilities such as: a commercial harbour, water and power plants, etc. The main aim of such area was to encourage industrial growth to make Kuwait more self-reliant in providing access to an extensive



range of technical knowledge and giving her a wider scope of opportunities by erecting several industries (refer to Appendix XXXI).

In 1967, the first 5-year Plan in Kuwait set out to create a viable and diversified economic base by means of industrialisation, as it was recognised that oil could not be relied upon indefinitely, being a depleting resource.

Kuwait finds herself in a somewhat different position to other developing countries. For a start, traditional sectors, such as agriculture, were not easy to expand due to climatic and manpower impediments. Kuwait did not turn to industry as the obvious answer because, as is the case elsewhere, there were plenty of raw materials and a surplus of labour. Kuwait turned to industry because she had no choice.

Factors in her favour were that energy was abundant and cheap, and capital presented no problem. The trouble is that current industrial technology produces far greater quantities than Kuwait's domestic market can absorb. That means that Kuwait must join the export race.

The petrochemical industry is not just the drilling up of oil, but until recently, Kuwait confined herself to this activity. Obviously, there was room for expansion here. The result would be:

- i) a diversification of the economy,
- ii) an increase in those industries based on oil which would therefore extend the life of oil reserves, and;
- iii) expand income-producing undertakings, particularly in down-stream processes.

So industrial diversification is being attempted in the oil sector. Many petroleum processes would produce both work and industrial activity, even if they were still destined, ultimately for the export market. Value-added income from processing would help the Kuwaiti economy. Some people were against building on a resource whose life-time is restricted, but the argument is that if Kuwait's petroleum is used less as a fuel and more as industrial feedstock, its life-time will be prolonged.

The Kuwait Government, whilst favouring a free market economy, has been forced to intervene in some sectors, due to demands of mounting financial reserves, the need to produce for an international market, and a shortage of skilled management. However, in other industrial sectors, the government has played a less direct role - in 1965 the National Industrial Law provided a small degree of protection from foreign competition and offered other pecuniary incentives. The Law stated that:<sup>1</sup>

- i) There would be an exemption for legally registered/licensed establishments from taxes for 10 years and a relief from customs duties on imported parts/materials, etc., which were to be used by industry.
- ii) That there would be a tariff of 10-15% on imported goods which were similar to those produced locally, for a period of 10 years.
- iii) That goods which were produced locally would be free of export fees and duties.
- iv) That free land would be granted for industrial plant construction.

- v) That results of studies, researches, designs, etc., would be collected by government agencies and made available to local business men.
- vi) That banks should give priority to industrial projects.
- vii) That the Government would buy products produced locally in preference to imported goods, even if they were up to 10% more expensive.

In addition, the Government has established or participated in the following organisations to assist in further developing the industrial sector:

- i) Kuwait Institute for Scientific Research, Faculty of Engineering in Kuwait University and Institute of Applied Technology for R & D, academic and vocational graduates.
- ii) Shuaiba Area Authority to provide utilities.
- iii) Department for Industrial Specifications and Standards within the domain of the Ministry of Commerce and Industry.
- iv) An Industrial Consultancy and Development Office, in collaboration with UNIDO.
- v) Patent Office, within the authority of the Ministry of Commerce and Industry.
- vi) The Industrial Bank of Kuwait.

Between 1974 and 1977, the manufacturing industries expanded by 17.1% per year, especially in the fields of paper, printing, furniture, and wooden and non-metal products. The

productivity level in the manufacturing industries is far superior to that in other non-oil sectors, for example, the construction sector. Between 1976 and 1979, non-oil exports tripled, showing that Kuwaiti industrialists are making a determined effort to locate external markets for their products.<sup>2</sup> The manufacturing industry is growing steadily now. In 1980, it contributed 11.0% to the non-oil GDP<sup>3</sup>, which is similar to the position it would occupy in a non-oil exporting country. It is, however, important to remember that Kuwait has no sectors such as agriculture to fall back on in an emergency. Approximately 65% of the manufacturing sector's value is derived from the chemical and petrochemical sub-sector based on certain projects of the public sector related to secondary oil activities. Expansion has also been seen in other joint public and private projects, such as the production of building materials and food processing industries. Small firms and companies seem to flourish in the present economic climate, which should serve to encourage other enterprises of a similar size.

Appendix XXXI provides a summary of major industries in Kuwait. The data shows that the oil and petrochemical industries have been well established, furthermore, construction and materials industries (to meet Kuwait needs for urbanization and development) has also been well established. This, however, reflects the fact that the Government is relying for economic-political reasons on these two industries as the major and most profitable industries in Kuwait.

As for the private sector it has contributed greatly

to the growth of the national industrial sector but there is still room for improvement. Private industry has tended to concentrate on other sectors except where the Government considered that development of a particular project was to the country's benefit and it took the first steps to start it going. Thereafter, it has usually become a joint venture. An example of this is the Kuwait National Industries Company which produces building materials. The Government has a 51% share in this company.

The author has conducted an interview with some officials in the Ministry of Commerce & Industry to collect information regarding the private industrial sector in Kuwait. The information indicated that the capital of the private companies ranges from K.D.0.2-8.0 Million that the manpower ranges from 20-1000 depending on the nature and size of the firm. Such firms deal mainly with decoration, paper products, transport and trade of livestock, pesticides, oxygen gas and water storage tanks, etc. The firms rely mainly on foreign manpower. The majority of the firms have been constructed with low level technology to substitute for the imported commodities which have high demands in the local market. Thus, the Kuwaiti market is the main market for such firms, however, some firms export some of their products to the neighbour Arab States.

So it can be seen that industry is growing up without many protective measures from the Government. True land and site facilities are at a nominal cost, energy is subsidised, and capital is supplied at low interest rates, but on the

other hand, there is the burden of the high cost of imported goods and installation charges for plants, etc. The Industrial Bank of Kuwait is helping by indicating which projects are cost-effective and should therefore be invested in. Between 1974 and 1980, the Bank financed 181 projects involving K.D.303 Million.<sup>4</sup>

Appendix XXXII illustrates the various industrial licences issues by the Ministry of Commerce & Industry during 1980-1981. The distribution of licences in terms of projects was as follows:

<u>Project</u>	<u>No. of Licences</u>
Food Industry	4
Fabrics, Cloth & Leather Industry	2
Wood & Wood Products Industry	1
Paper & Printing Industry	1
Petrochemical & Plastics Industry	3
Drugs & Cosmetics	6
Non-Metallic Industries	7
Others	<u>8</u>
TOTAL:	32

The above table indicates a trend towards diversified industrial activities conducted in Kuwait. To evaluate the success and development of these projects in accordance with socio-economic needs, to assess their productivity, necessitates further case studies and appraisal of these projects (upon their completion).

The contribution of manufacturing industrial sectors to GDP is illustrated in Table 12.1. The table illustrates

TABLE 12.1:

Contribution of Industrial Sectors to GDP



Source: "Central Statistics Office", Ministry of Planning,  
Kuwait.

that chemical, non-metals, food and beverages and furniture & wood products are the main contributors to GDP.

Furthermore, the following key establishments are involved - each within the scope of its authority - in providing services, guidance, supervision and consultation to develop the industrial sector:

- i) Ministry of Commerce & Industry
- ii) Ministry of Oil
- iii) Kuwait Petroleum Corporation
- iv) Ministry of Planning
- v) Kuwait Chamber of Commerce & Industry
- vi) KISR
- vii) Shuaiba Area Authority
- viii) Kuwait Municipality
- ix) Higher Authority For Applied Training & Education
- x) Industrial Bank of Kuwait.

However, the diversification of authorities responsible for industrial growth in Kuwait indicates that either the industrial sector is so complicated that it necessitates an intricacy of multi-authorities, or that the Government is so keen on developing this sector that it has authorised numerous establishments to provide aids and guidance. The author is inclined to support the second assumption with the recommendation that more authority and responsibility be given to the Ministry of Commerce & Industry by constant development, appraisal and review of its industrial measures, instrumental policy and the policy-makers involved. The industrial policy makers should evaluate the social costs incurred by immigrant labour (health services, education, multi-cultures, etc.) prior to granting licences. They should be aware that profit margins (and not socio-economic-political or pollution measures) are the prime concerns of private sector investment, and must



gradually alter this attitude.

Al-Noory<sup>5</sup> has emphasised that if Kuwait wishes to go on along the way of industrial development, we shall immediately discover the absence of a clear and explicit strategy for socio-economic development which means the absence of a strategy for industrial development; still worse, there are implicit different trends in industrial development which alone create perplexity and anxiety. Organisations, investors and businessmen always look forward to parameters which will draw for them the picture of the future. This is why discussion of any developmental system cannot be made apart from administrative bodies which are explicitly responsible for laying down strategies and drawing up policies as well as following up their implementation and affecting necessary amendments in these policies if they prove incapable of achieving the set objectives.

Having already given a list of establishments responsible for industrial development in Kuwait, we shall present some issues confronting these establishments which they should be overcome to enable better development for the industrial sector:

- i) Issues relating to the definition of the strategy for the Country's overall development

If it is taken for granted that the sectors of crude oil, natural gas and petrochemicals are the basis of the strategy for overall development, it follows that their development is the basis on which the achievement of all

the other objectives of development depends. The oil sector is by nature included in the industrial sector, owing to the fact that it is one of the strategic industries and that its development will increase the revenues which are used as investments in all sectors. Actually, the oil sector is separated from the industrial sector instead of being connected with it. Such a connection would certainly make the oil sector a means for enhancing the other areas of the industrial sector by increasing the participation of local industrial production units and the initiation of exporting industries. Yet the Industry Act No.6 of the year 1965 has in Article (3) excluded organisations dealing in oil. We assume that this is due to the special concessions and agreements existing at that time. However, this is not the case anymore. It follows that the Industry Act should be reformulated in a way that suits the country's strategy.

However, in the absence of a general unified policy agreed upon by all parties, the decisions of these organisations will tend to duplication, overlapping and contribute negatively especially with reference to big industrial projects.

To cite but one example:

The Planning Board (now the Ministry of Planning), stated in its report to the Council of Ministers in 1970:

"The operations so far affected is not satisfactory in the two biggest units upon which Kuwait depends for industrialisation and the diversification of the national product, viz, the petrochemicals unit and the oil refinery. This necessitates the re-consideration of the soundness of the policy of depending

on industry in the area of economic development and on the diversification of the components of the national product in order to reduce the domination of oil in the future of Kuwait economy".

The report goes on in its decisions on a remedy as follows:

".... If we take into account the characteristics of the components of the Kuwaiti economy there are strong considerations which necessitate the study of a new strategy for development depending on the sectors of banking services and financial operations as an alternative to the policy of industrialisation".

Clearly, this demonstrates the conflict of concepts, interests and lack of competence amongst State bodies in drawing up a viable strategy and an agreeable coherent policy. The recommendations are worth studying as a means for applications; not as an alternative strategy for industrialisation, but as a complimentary policy for economic development.

## ii) Duplication of Responsibilities

Among the causes of the ineffectiveness of bodies responsible for industrial development is the duplication of responsibilities. For example, the following articles were stated among the responsibilities of three different institutions, although their concept and objectives are the same:

### The Industrial Development Committee

"To study the system and discuss suggestions pertaining to the development of industries".

### The Planning Board (now the Ministry of Planning)

"To study and evaluate developmental projects and programmes".

## The Oil Supreme Council

"Here the Oil Supreme Council undertakes the drawing of the general policy for oil resources and the development of related and derived industries".

The above examples need no comment as they embody the extent of duplication of the responsibilities of the most important institutions responsible for development.

### iii) Relationship And Competence Among Different Bodies & Institutions

Kuwait compared to industrially developed Western nations is in its infancy. Consequently, it would be beneficial to draw upon the experiences by way of detrimants and bottlenecks encountered by developed nations. Identified below, though skeletal, are some constraints peculiar to Kuwait:

The Minister of Commerce & Industry meets directly with the Minister of Planning on technical issues—despite the fact that effective relationship means direct contact between technical departments concerned through their respective Executive Boards. Briefly, lack of co-ordination (and its consequent pitfalls) due to centralisation.

Lack of organisational capability due to non incorporation of the latest administrative techniques, systems, methodologies and losing sight of objectives. Suffice to cite one example concerning Industrial Development Committee.<sup>12</sup>

Article (5) of the Industrial Law of 1965 defines the authority of the Industrial Development Committee as follows:

".... to study the system and discuss suggestions pertaining to the development of national industries by protecting, organizing and encouraging them and offering recommendations in this respect".

The Committee has a big role to play, unfortunately, it has explored only a very slight part of it. For example, the term "organisation of industry" should include the following:

study priorities, stipulate industrial policy, provide adequate reasoning for implementation of such plans, suggest appropriate means for follow up and development and last but not the least survey and document the country's natural resources.

iv) The Need Of Administrative Units For Performance Measuring Systems And The Absence Of Evaluation Criteria

The industrial infrastructure in Kuwait has and will be facing some impediments to fulfill its objectives. The following are some of the reasons for such a challenge, and hence should be thoroughly investigated by the officials to ensure the development of the industrial sector:

- The prime concern of the Chamber of Commerce & Industry for commercial activities at the expense of industrial activities.
- The lack of coverage of qualified teams within the domain of the Industrial Affairs Department in the Ministry of Commerce & Industry to conduct integrated industrial surveys for the existing industries, to evaluate their outputs with respect to investments, energy and other changeable parameters.
- The absence of continuous industrial monitoring and of industrial projects follow up.

- The absence of an explicitly defined industrial development strategy.
- The centralisation of administrative contacts and correspondence among concerned establishments and particularly those facing Shuaiba Industrial Authority.
- The absence of a well-defined industrial policy and the ignorance or the inability of the Ministry of Commerce & Industry to formulate such a policy.
- The failure of the vocational educational system to supply the industry with sufficient graduates and the unwillingness of the industry to train such personnel.
- Multiplicity of authorities responsible for industrial development. Establishment of one specialised governmental agency operating with a defined national industrial plan would minimise governmental bureaucracy.
- The great emphasis on the financial and service sectors, with less concern shown for the industrial sector.
- Raw Material Drawbacks: Some raw materials, other than oil and gas are available but require further investigation, e.g., manufacture of petrochemicals from natural gas and petroleum products; chemicals from sea-water effluents and building a tannery to treat animal skins. Only geological surveys will detect the presence of any hidden natural resources; energy found in oil and gas could be used by energy dependent industries such as steel and aluminium.

- Labour Drawbacks: The dependence on immigrant labour is obvious but helps the transfer of technology. The major manpower drawback is the lack of national interest in industrial work due to the high standard of living and government sector work which offers more benefits and higher salaries.

Education through schools and via the media is needed to encourage Kuwaitis to undertake industrial work and make it appear more attractive. One suggestion is to allow social integration between non-Kuwaitis and Kuwaitis, giving the technically skilled expatriates permanent residence.

- Industrial Information Sources: To obtain technical knowledge is one thing, but great importance lies in the utilisation of it and only by actually working alongside skilled men does technology transfer.

The manufacturing sector although rapidly expanding requires the establishment of a central information bank. Its purpose would be to provide information on different industrial technologies available to various branches of industry; their source, advantages, or disadvantages, etc. It would also give details concerning where equipment and raw materials may be found economically and assess the world demand for the potential project and include training centres for further development.

- The Limited Local Market: According to international criteria, the Kuwait market is characterised by its limited size, as the population does not exceed 1,350,000 according

to the estimates of 1980. This number is still lower than the minimum required for a good large-scale industries market. It is risky to rely solely on the Kuwait market for medium or large-scale industries.

- Industrial Management and Environment: Kuwait lacks an industrial environment in its broadest meaning. In this respect, specialised industrial producers organisations and research centres to follow up specialised industrial topics and publish periodicals or letters are not available. This is due to the shortage of industry in Kuwait. Industrial Management therefore is still in its inception stage and has not yet developed industrial traditions and concepts.

Current statistics<sup>6</sup> show that a new industrial project in Kuwait, being a developing country, costs 40% more than the same project would cost in developed countries. This is due to transportation costs of machinery, instruments, and building materials, most of which are usually available in developed countries. This is also a result of raised prices by the suppliers who usually do this when selling to developing countries and oil producing countries in particular. Installation costs are also higher in a developing country as wages of foreign technicians and accommodation costs are high.

Moreover, the low standard of efficiency of technicians when compared with those in developed countries would result in a longer period of installation and more expenditure on construction. As for production, the efficiency of



those operating the factory is lower than those in industrial countries.

- The modest economic effect of national industry on the national economy when compared with the oil sector.
- The continuing increase of industrial spare parts needed and imported raw materials.
- The need for stabilising and unifying measurements and specifications of products on the level of Kuwait.
- The lack of an executive body responsible for determining the process of industrial development and the supervision of its implementation.
- Opposition of certain private concerns in Kuwait - holders of commercial agencies - to industrialisation, to the expected availability of local commodities in competition with the imported commodities.
- Negative effects of the existing social structure, including:
  - a) The widening of the gap in civilisation caused by the inability of society and its value to cope with an economic development that has occurred too rapidly.
  - b) The social structure of the country between Kuwaiti and immigrants, and the resulting imbalance of the work community, in which the Kuwaitis represent less than 22% of the labour force, while they represent more than 50% of the higher administrative echelons.

- The double standard among government establishments with respect to the encouragement of domestic products and output as outlined by one of the Articles of the 1965 National Industrial Law which states that:

"The Government would buy products produced locally in preference to imported goods, even if they are upto 10% more expensive".

The following contradiction of the Law was confided to the author during a meeting in London in May 1982, with a Kuwaiti business man who has been a member of the Boards of both a food-producing company and of manufacturing industries in Kuwait:

"The Government is reluctant to promulgate any Law to protect national industries from competition from foreign companies by stipulating import taxes. The Government declares that it adopts a laissez-faire principle which further supports the commercial structures rather than the industrial sector. The Government does not, however, agree to force its Ministries and Agencies to buy the national products, but leaves such issues to the desire and willingness of the Ministries: such negative attitudes expose national industries to severe competition with foreign products which leads to more debts".

The above argument, though not exhaustive, necessitate the adoption of proper and well-planned industrial strategies to develop a more efficient and productive industrial sector in Kuwait.

The author has selected three industrial organisations in Kuwait, each of which in its own way demonstrates important facets of problems and opportunities for industry in Kuwait. The case studies will deal with the following organisations:

- i) The Industrial Bank of Kuwait which is one of the key organisations which deal with financing industrial projects and which has published valuable documents regarding the industrialisation of Kuwait.
- ii) The National Industries Company which is the largest and the oldest non-oil industry in Kuwait.
- iii) Kuwait Melamine Industries Company; an industry that was established in 1976 and is based on oil as a raw material.

### 3) Case Studies

#### A. The Industrial Bank of Kuwait (IBK)

On December 12th, 1973, the Industrial Bank of Kuwait was established as a Kuwaiti shareholding company, where the Government of Kuwait, represented by the Ministry of Finance, participated holding 35% of its share capital of ten million Kuwaiti Dinars and the 65% shares were distributed among various banks, insurance companies and firms in Kuwait.<sup>7</sup>

Details of the Bank's formation, capital of the bank, management of the Bank, outline of information required to finance industrial projects, financed projects for 1975-1981 and percentage of shareholder ownership are provided in Appendix XXXIII.

#### i) The Objectives of IBK

The objectives of the Bank are as follows:<sup>8</sup>

1. To participate in developing a long-term strategy for

industrial growth in Kuwait, identifying those sectors and activities which would best fit local conditions and constraints.

2. To initiate industrial projects and investment in a promising sector.
3. To provide equity, medium and long-term credits for new projects as well as for the expansion of existing ones.
4. To finance projects outside Kuwait with emphasis on the Gulf region, especially where Kuwait participation is involved.
5. To bring needed technology to Kuwait and identify foreign partners with the necessary expertise.
6. To support the development of domestic money and capital markets in co-operation with other major financial institutions. The development of these markets will facilitate the channelling of private savings into industry.

It is clear from the above objectives that the Bank has been assigned critical and challenging aims to promote the industrial sector in Kuwait. If the Bank seeks to fulfill all these objectives (by avoiding administrative and centralised procedures), then it would become an essential and key-reference organisation, to participate in formulating a national industrial policy. However, the Bank did not specify the measures, criteria, methodology or basis necessary to bring the needed technology to Kuwait (Article 3 above). A well defined strategy must be clarified for this.

It is worth mentioning that in evaluating the proposed projects to be financed by the Bank, the Bank has asked for all information regarding the economic impacts, marketing, financing, manpower, etc., but has not included an environmental impact assessment, an issue which is most essential to evaluate when executing industrial projects in Kuwait.

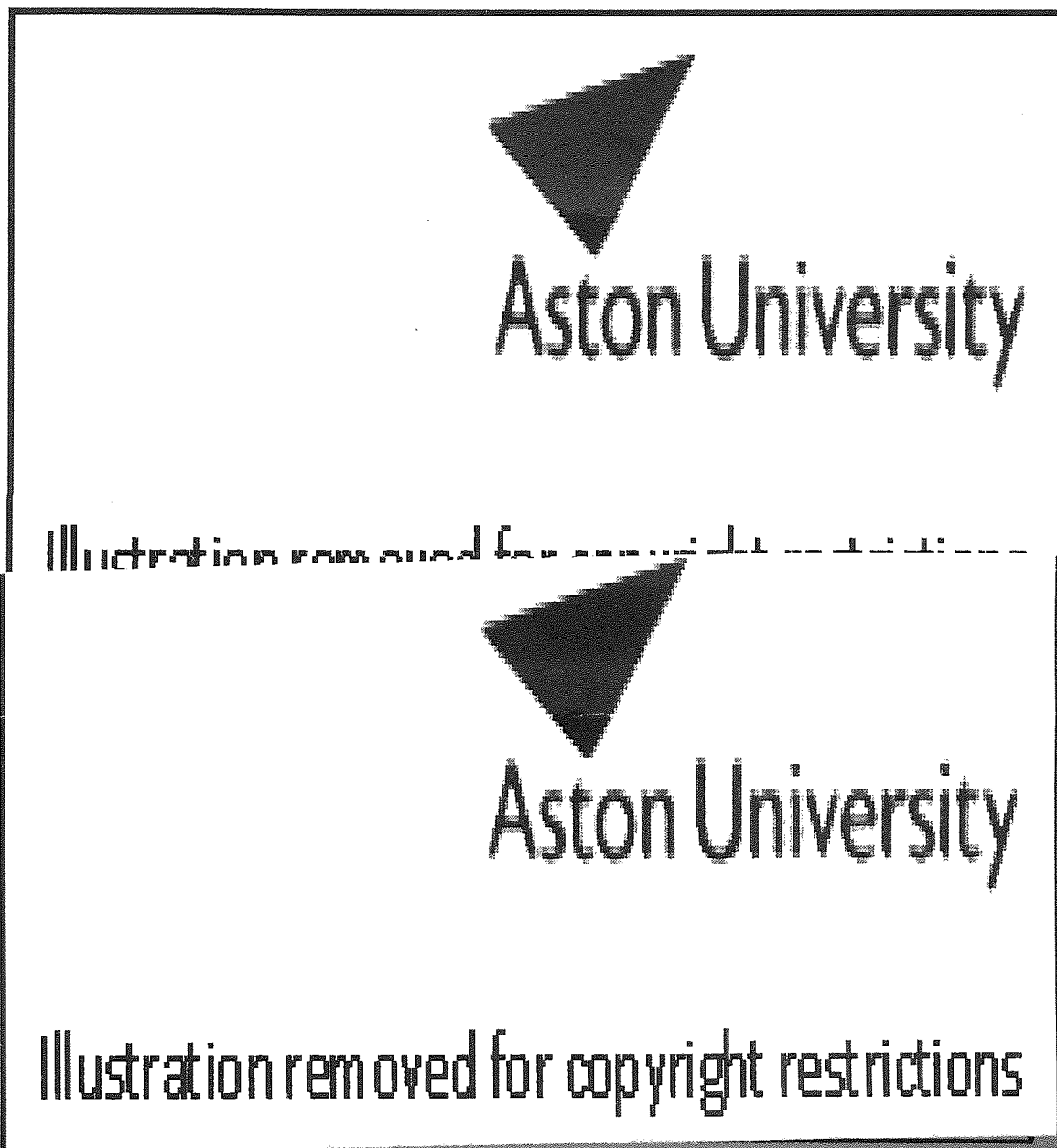
ii) The Industrial Projects financed by IBK

Table 12.2 illustrates the various projects that have been financed by the Bank. The statistics indicate that the Bank has diversified its financial cumulative loan to cover several industrial sub-sectors, particularly construction materials, metal products, food and beverages, chemical products, etc. As indicated earlier, the Bank has played a great role in supporting the industrial development in Kuwait. Prospects for the Bank's loans are promising. The number of applications for loans is increasing rapidly. If the new 5-year plan's estimates of investments are realistic, total financing required for industrial projects in the non-oil sector will be around 270 million Kuwaiti Dinars.

In addition to its role as a source of finance, the Bank is expected to be more involved in the promotion of new projects and in the field of technical help to its clients. The Bank's expertise and knowledge of world markets will be important in service contracts or partnerships with foreign firms. The Bank emphasises the cost of labour which has risen more rapidly recently than any other input.

TABLE 12.2:

Loan and Equity Commitments Classified By  
Industrial Sub-Sectors (1974-1980)



Source: "1980 Annual Report", The Industrial Bank of Kuwait, P.26.

Attention is needed in modernising the traditional sub-sectors of food, clothing, and furniture as they contribute much to production in the industrial sector. There are a great many workers employed in these sectors - modernisation would mean less manpower, the surplus workers could provide the workforce for other industries short of manpower. Imports show, with furniture particularly, that there is a market for modern furniture and there are export potentials in neighbouring countries. Furthermore, IBK should involve and invite local CEDO's in its activities whenever needed.

## B. The National Industries Company (NIC)

### i) Activities of the Company

The National Industries Company was established in 1961 as a joint venture between the government of Kuwait and private shareholders. At present the company has the following activities:

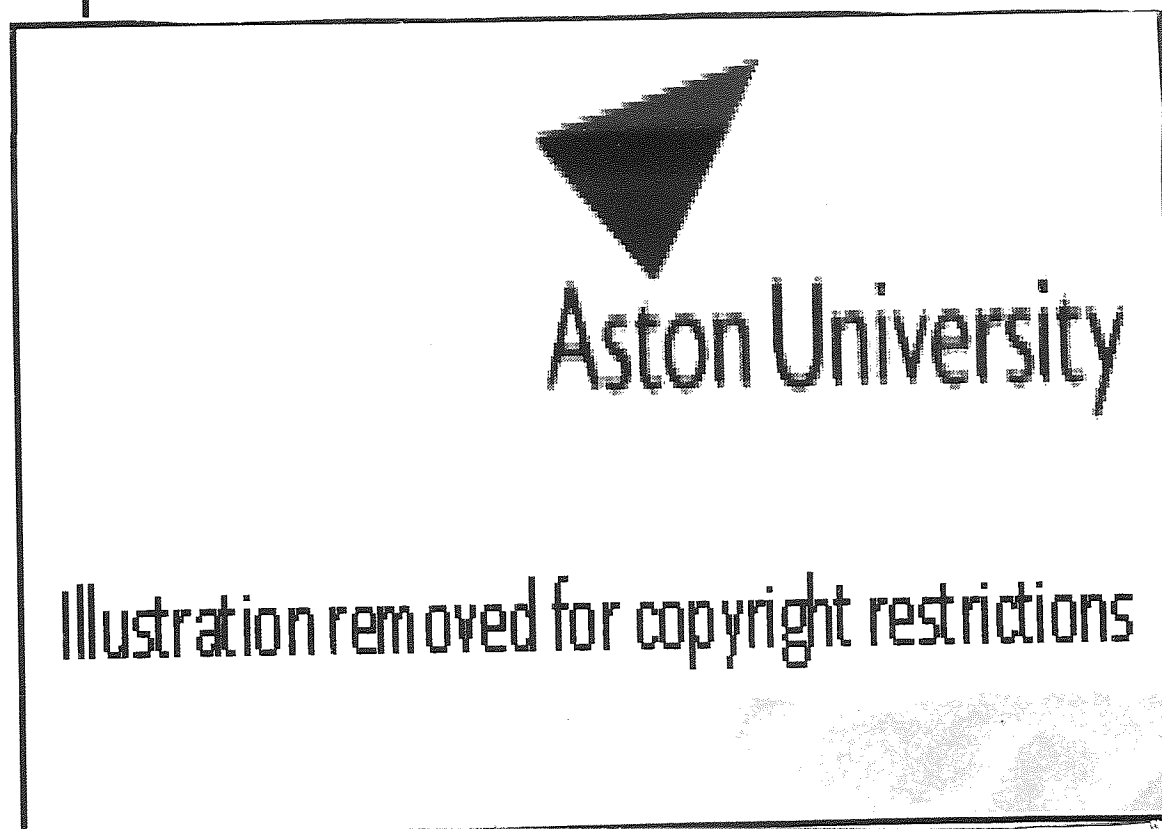
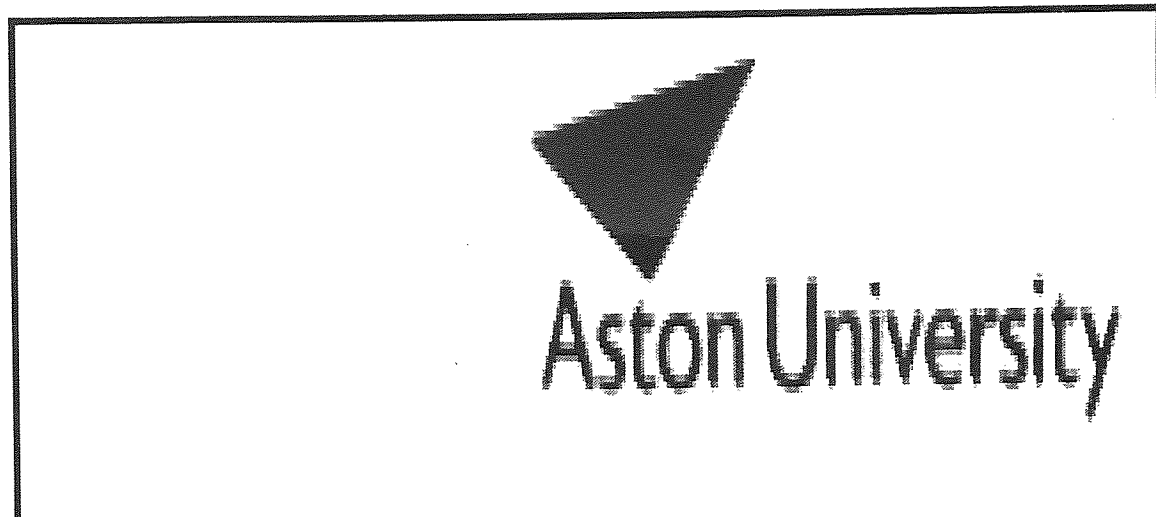
- a) Cements Products Unit
- b) Limestone Products Unit
- c) Asbestos Industries Unit
- d) Consumers Production Unit (engine & car batteries and cleaning detergents).

Details of the products of each Unit are included in Appendix XXXIV.

### ii) Criteria and Policies of NIC

The criteria and policies adopted by NIC were stated

by MR. MUFARREJ AL-MUFARREJ, the Chairman & Managing  
Director of the Company as follows:



The above quotation illustrates the awareness of the policy-makers and planners of NIC of the socio-economic and environment impacts of any acquired technology. Notwithstanding, the author believes that the example of the erection and removal of the electric accumulator plant,



which is a part of the company, reflects the evidence of mismatching the policies and plans with actuality. In 1967, NIC has commissioned the Industry Institute of Lebanon to conduct economic feasibility study to evaluate the erection of liquid batteries plant in Kuwait. In 1970, the NWAK Swedish company started the erection of a plant which lasted for two years. In 1980, NIC formed a Committee with KISR & KFAS to sponsor research programme to diagnose the difficulties and competition facing the sale of products. In 1982, the Municipality Council decided, for pollution and negative environment impacts, to re-allocate the site for the plant. The author believes that the difficulties which faced the plant were due to:

- Relying on non-indigenous firms to conduct a feasibility study for an industrial Plant gave rise to an inaccurate report and to a certain extent might cause damage to the firm. This assumption is supported by the fact that the study estimated an annual 33% profit which is in contrast to the actual present investment trend of the Plant which is facing difficulties in the market and hence subjecting it to capital losses.
- The report did not include any assessment impact other than the economic impact. Technology assessment is a tool to provide a realistic evaluation, not intuition or superficial, economic cost-benefit evaluations for any acquired imported or local technology and hence enhance the accountability of the decision-makers and planners. Furthermore, one of the most viable roles of technology

assessment is to demonstrate the abundant resources available to policy-planners. This role is undoubtedly of great value to Kuwait if she has the ambitions to correctly and adequately built up an industrial base.

The report did not evaluate and assess any future technology assessment impact relevant to Kuwait's society and environment. This report should have investigated the following effects to result from the electric accumulators Plant in Kuwait:

Social Impacts:

Estimation of the timing of impact on society and of time-lags between the application of new technology and the various societal impacts, cross-impact matrix of the expected social impacts, identification of social groups interested in, and affected by, the new technology, etc.

Environmental Impact:

Inventory of the possible impact on the various components of the environment; the estimation of the timespan of occurrence of any environmental impact; determination of the level of analysis of the environmental impacts in relation to the selected technical variants; determination of the main areas likely to be affected; time series of polluting agents, estimation of level of pollution, determination of critical threshold and minimum standards, etc.

Industrial Impacts:

Time-lag between the introduction of the new technology

and the expected impact on the individual; the matrix impact on the individual in descriptive terms, ordinal ranking terms, and in weighted scales of welfare; identification of communication channels through which states of individual satisfaction are made known, etc.

The erection and removal of the Plant within a decade showed the short-sighted approach of the National Industries Company Officials and the Municipality Council in not evaluating and appraising the impacts mentioned above.

Another handicap facing the company is the shortage of national cadres and limited R & D activities as declared by the Company's Chairman:

"Kuwaitis are not involved in the operation or maintenance of the acquired technology and are rather involved in the administration side. This is due to the low percentage of technical Kuwaitis amongst the workforce. The company recruits 2500 employees. The number of Kuwaitis are 70 employees (2.8%), distributed as follows:

0.5% in the technical fields,  
2.3% in the administration."

The author believes that although NIC might be a successful industrial firm, nevertheless, it has faced and is facing several problems as discussed above and thus should aim to:

1. Increase the participation of the Kuwaiti manpower, particularly the technical personnel, by proposing a scheme of collaboration with the Ministry of Education and ~~its~~ various vocational institutes by providing financial and moral

incentives and a continuous training workshop. Another alternative is to increase automation of its industry (capital intensive). It is not feasible to have national industries with 0.5% participation of national manpower.

2. Initiate contacts and co-operation with national Consultancy and Engineering Design Offices to help solve its problems and bring mutual benefits.
3. To support its R & D capabilities to initiate liaison with national organisations, identify problems facing the company and suggest their solutions and encourage development of the capacity and outputs of the company.
4. To establish a strong contact with Kuwait University, and particularly colleges of: Engineering, Sciences, Commerce, Economics and Political Science to participate in solving its problems and develop its efficiency. The company should also gradually increase its R & D budget in accordance with its development (the present budget is K.D.100,000).
5. To put great emphasis on the environmental impact of its activities. The erection and removal of the battery plants within seven years of operation due to pollution, is an illustrative example of such a key-impact.
6. To develop local building materials industries (with modification of such materials to cope with the Kuwaiti environment).

C. Kuwait Melamine Industries Company (KMI)

Today, a sizeable share of Kuwait's natural resources

is being increasingly transferred to downstream products. Large-scale refineries, gas liquifying units, water desalination and power plants have emerged on site. Growing experience in refinery products encouraged the national to initiate and develop the domestic production of downstream bulk petrochemicals like ammonia and urea.

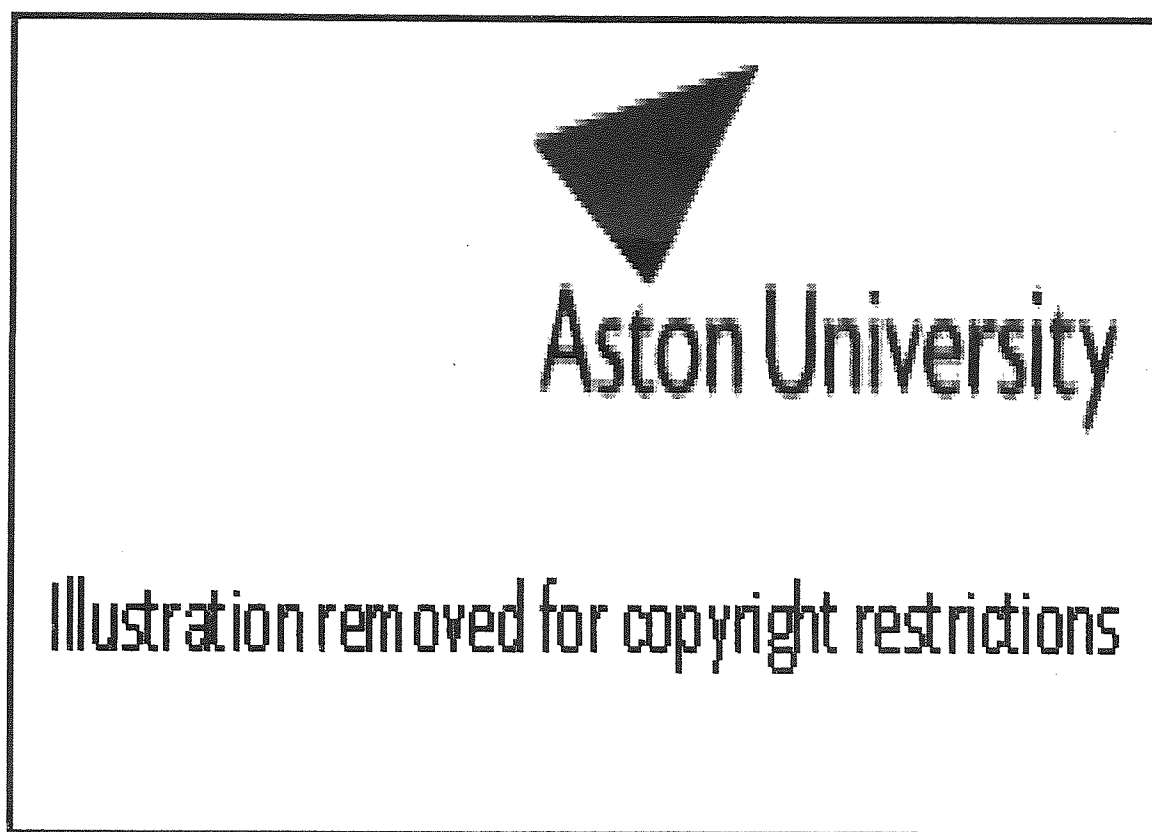
To participate in the development of the country and the domestic industry, a group of Kuwaiti businessmen initiated a feasibility study in 1974 on the manufacture of Melamine Crystals using locally available liquid urea. In close co-operation with the government and with the assistance of foreign licensors (Allied Chemical of U.S.A.) and contractors (Eurotecnica - Italy), the Melamine Plant has been erected in the Shuaiba Industrial Area. The shareholdings are distributed as 40% for the Government represented by the Petrochemical Industries Co. and 60% for the Public.

With a capacity of 15,000 metric tons/year the plant went into operation in the second half of 1980. Melamine is being exported to several countries in four continents, (Table 12.3). Warehousing facilities were established in major markets like Europe, to safeguard short-term availability of supplies. Agents were assigned to provide the best service to customers and to strengthen the Company's market position.

The Company is continuously studying the possibility of launching further projects geared to the downstream application of Melamine in Kuwait and in the Middle East, and is considering raising the present capacity.<sup>10</sup>

TABLE 12.3:

Melamine Marketing Activities



Source: "5th Annual Report - 1981", Kuwait Melamine Industries Co. In Arabic.

The company was incorporated for the following purposes:<sup>11</sup>

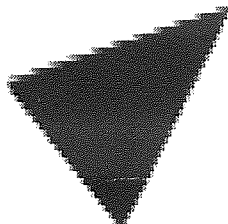
1. Producing & Marketing Melamine crystals.
2. Establishing industries to manufacture relevant products supplementary to the Melamine produced.
3. Trading in all the above materials and products locally and internationally.
4. Forming companies with similar targets and participating in all entities of similar activities in Kuwait and abroad.

Furthermore, the company plans to conduct feasibility studies to produce the following products:<sup>12</sup>

- Melamine products for cement-additives.
- Formaldehyde products as an insulator material for bricks.
- Formica plates for decoration purposes.
- Painting compounds.

i) The Criteria & Policies of The Company

The criteria and policies of the Company were expressed by MR. MOUSA MARAFI, the Director and General Manager of the Company and MR. NADER HAYAT, the Sales Manager of the Company, as follows:



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It is obvious from the above quotation that the Company, one of the major oil-based industries in Kuwait, has set up a well defined and explicit instrumental policy which reflects the awareness on the part of the policy-makers of the Company of the various complicated issues tied in with technology transfer, and technical self-reliance and foreign dependence. However, it could be concluded that irrespective of the awareness of the personnel in KMI of the technological intricacy, KMI would still be at the mercy of and under the control of multi-

international corporations as has been shown by (1. c) above where the plant was executed on a turn-key basis and by (6) above where the Licensor executed the design, purchase, erection and operation of the plant. These facts reflect the realm of dependence concept which is the dominant phenomena of technology in Kuwait.

However, the company, in its fifth annual report,<sup>13</sup> declared a loss of K.D.748,818 in 1981 in comparison to a profit of K.D.43,644 in 1980.

The Director and General Manager, MR. MOUSA MARAFI, justified the production loss in 1981 as follows:

- a) Raw material (Urea) supply cut off from PIC due to PIC plant problems, which gave about 36% of total shutdown time in the year 1981.
- b) Various technical problems faced in the plant, as is usually the case after start-up, which caused about 60% of the total shutdown time in 1981.
- c) Electric power failure from central power grid in Shuaiba, which resulted in about 6% of the total shutdown time in 1981.

ii) The Supply of Fuel & Raw Materials And Industrial Strategy

The percentage of fuel and raw material (Urea) costs of the total production cost (including depreciation) are as follows:<sup>14</sup>

Raw Material	:	44.5%
Fuel (gas oil)	:	7.5%

It is obvious that the raw material and fuel constitute the most important factor governing the cost of production. Surprisingly enough, Urea is produced in Kuwait by Petrochemical Industries Company and sold to national companies at the international market price. This fact was confirmed, in a private communication in August 1981, to the author by His Excellency ALI AL-KHALIFA AL-SABAH, the Minister of Oil and Chairman of Kuwait Petroleum Corporation.

The author is convinced that this is an inappropriate industrial strategy which impose losses of investment and hence discouragement to the private sector to develop or finance any oil-based industry in Kuwait. The study case of KMI illustrates the fact that although the planners of the company are well aware of the technology policy issues, nevertheless, they are faced with an extreme and severe impediment imposed by the Government which deals with raw materials and fuel that are produced locally.

#### 4) Overall View Of The Industrial Sector In Kuwait

The State of Kuwait does not apply a comprehensive National Planning Principle, nevertheless, Kuwait has adopted a 5-year National Plan which includes an industrial sector plan. This suggests that the policy and decision-makers in Kuwait should undertake techno-economic studies and establish principles and body to govern the methods of establishing industrial projects in Kuwait.

The most pressing requirement of Kuwait at the present stage, is to reduce the country's dependence upon oil and to diversify the industrial sector by researching into areas which hitherto not been given sufficient care, e.g., agriculture and fishery, construction materials, private oil-based petrochemical industries, transport, etc. The country must be able to compete in foreign markets, indeed, Kuwait must strive to do better than her competitors, not just compete. Government subsidies such as tax exemption, ample capital, land endowments, low or interest-free loans, tariff concessions, and subsidised energy are all advantages that new companies should make use of until they are firmly established.

The industrial policy makers must evaluate previous and proposed projects and consider their future projected contribution to Kuwait. So it is important to sit back and calculate just what benefits Kuwait has achieved along the path to industrialisation, taking into account losses from value added due to fluctuations in resource use and the high social cost of social services, housing, etc., of imported labour. Then Kuwait's strategy should be adapted according to the result of these deliberations so that Kuwait uses her resources sensibly and encourages Kuwaiti nationals to become more involved in the development of the industrial sector in Kuwait.

Choosing the 'appropriate' industry for Kuwait might not be a critical challenge, nevertheless, a lot depends upon choosing the right technology, viz, one which is capital intensive, labour saving and suitable to Kuwait society, and environment.

The author believes strongly that any industrial policy and science and technology policy should be formulated and developed collaboratively and parallelly and not in isolation since each one could be regarded as the skeleton for the other. However, Kuwait has not formulated or developed either policy and hence the author suggests that the decision makers should - if they do so - formulate the two policies congruently and not in isolation.

Technological localisation, which is a fundamental element in industry, cannot be realised except on a comprehensive Arab basis which is, in the author's belief, a decisive element. Industry is not, ultimately, structures, equipment, the required input, or the provided labour. It is rather the accumulated technical and administrative skills embedded in people. None of the Arab countries could claim to be industrialised, whatever effect the industry has on the national product, on new opportunities of employment for the people, on the provision of various requirements of supplies, or even on the increase of exports, if we do not have the ability to make an engine, car, ship, calculating machine or a plane; and if we do not have the creative ability to produce one generation after another of all the above; or if we do not have the technical know-how among our companies, institutes, universities and other research centres to support our industries.

Kuwait is very dependent on imports. Exploitation of oil has given an accumulation of several billion KD worth foreign investment providing a diverse income. Dependence on

other countries is also evident in the manpower sector with a vast amount of foreign labour, a situation shared by other surrounding countries. Therefore, plans for industrialisation cannot be based entirely on economic factors, but must include the supply and demand situation of labour in Kuwait and its neighbours, requiring an explicit population policy on a long-term basis.

Obviously there is a need for a clear policy for distribution of industrial activities amongst public, private and joint sectors. This should assist in dissipating the private sector's hesitation in entering certain industrial ventures. The industrial development of Kuwait requires all the resources it can get. Therefore there should be more co-operation between private and public sectors.

The existing organisational structure, however, suffers from several drawbacks, namely:

- i) The lack of clarify of the State's policy towards the development of the industrial sector, and in general towards determining a clear role of the public and private sectors, and type of economic sectors that should be concentrated upon.

The importance of this obstacle becomes clear when we take into consideration the modest role played by the private sector in the industrial growth so far; its role has often adversely affected growth; and the inability to transfer the oil and natural gas sector from a financing sector to a pioneer sector and leader of industrial development,

despite the availability of resources and primary materials.

- ii) Multiplicity of the competent authorities responsible for development of the industrial sector, and non-definition of the role to be carried out by each party and the extent of the liaison and connection with the efforts of the other parties.
- iii) Lack of a definite executive party, concerned with preparation of studies for the various projects, and follow up of the implementation of these projects, including contracting, constructions and industrial installations.

In the light of all the aforesaid, we can presume that the general object of development should be to establish a policy that observes the parameters summarised as follows:

- i) Effective participation in expanding the production foundation in the country, and thereafter in finding diversified and versatile production alternatives, that will replace oil in the future. In this respect, it is important to emphasise that industrial development as a fixed policy in the State of Kuwait should be regarded from the angle of its contribution to the maximisation of the real national product, i.e., assessed by fixed prices.
- ii) Development of human resources, and technical and pioneer leaderships, particularly in the fields of industrial organisation and industrial labour at the various levels.
- iii) Kuwait needs to pay particular attention to developing her production sectors, placing particular emphasis on those

sectors where more manpower and investment would pay dividends. Those sectors which will thrive most happily without more manpower, however, are petrochemicals and high financial dealings. Underlying all her moves should be the desire and ambition to one day be in a position to export technology to the rest of the world instead of being on the receiving end all the time. Kuwait would then attract the top brains in the field of technology from all over the world. Such an integration of international ideas would prevent the technology being produced in Kuwait being suitable only for the domestic market.

- iv) More engineering research is recommended to help Kuwait to benefit from their particular resources. They should start by identifying their products, and the processes which will be used to make them, and then research into them.

There is more research needed into those industries which do use labour-intensive technology. Information on such methods should be spread more widely and be more accessible. Industry and trade associations have a keen role to play in encouraging small labour-intensive industries and enterprises to compete.

- v) Improvements are needed when licensing negotiations are being drawn up between buyer and seller - often they do not have an equal knowledge of the situation, leading to wrong choices of technology and incorrect charging.
- vi) Manufacture the largest possible part of the intermediary



goods, as that would realise a greater degree of inter-connection among the various industrial activities.

- vii) Kuwait should endeavour to merge the oil sector in the national economy, to increase its processing and diversify its products, in a manner aimed at serving the other activities.
- viii) Production of the national strategic commodities should be aimed at starting with the commodities required for national security and ending with the commodities required to meet the population's requirements of foodstuffs and the other basic items such as building and construction materials.
- ix) The necessity for setting up a clear-cut strategy for industrialisation in the country with well defined objectives and priorities is evident. The government in this respect, should have a "pioneer" role with regard to determining the required industries and their specifications.
- x) The government should resort to the previous approach begun in the sixties with the idea of "Joint Sector", where the government initiates suitable industries and leaves the door open for the private sector to participate in financing and partnership, taking into consideration the possibility of the private sector totally financing the projects in the future.
- xi) The industrial sector should be motivated to attract more Kuwaiti manpower through stipulating that certain jobs should be occupied by nationals within a limited period of time. Such stipulations should be made by parties

responsible for preparing and training Kuwaiti manpower, together with those responsible for industrialisation activities.

- xii) A steady increase of industrial exports should be encouraged to make it possible to import the food products required for the increasing population and, thereby, securing food security. One aspect to promote such idea is for the Government - represented by Kuwait Fund for Arab Economic Development - to stipulate that for any country receiving financial aid from Kuwait should give priorities to import Kuwaiti products as needed to execute the venture.
- xiii) Transfer of technology with adaptation and modification as needed, and technical know-how from the industrially advanced countries to Kuwait should continue.
- xiv) An attempt should be made to amalgamate enterprises of similar products with a view to raising the standard of production efficiency, improving economical savings, and providing more flexibility in meeting changing demands.
- xv) Emphasis should be placed on protection of the natural environment as a decisive factor in approving the establishment of any industrial projects. Industrial pollution should be kept to a minimum from the preliminary stages of studying and planning any project.
- xvi) The Government should revise its policy with respect to oil-based raw materials by selling them to the industrial sector at a reasonable and competitive price rather than

at the international market price.

- xvii) Discussion with officials in the Ministry of Commerce & Industry indicated that the most of the feasibility studies of proposals submitted to the Ministry lack good quality and hence the author suggests that the decision-makers should establish an organisation to assist the entrepreneurs - in return to specified fees according the size of the ventures - in formulating their proposals.
- xviii) A policy of development and strengthening of Gulf co-operation in particular and Arab co-operation in general in the field of industry should be encouraged on the basis of maximum benefit from the relative advantages enjoyed by each country, relying on the resources and capabilities available therein. This would make it possible to create a strong Arab industrial sector, capable of facing international competition and achieving self-sufficiency for the area, benefiting from the diversification of resources and a large market. This sector should be relied upon as a basic foundation for realising the stages of economic integration, and then Arab economic unity.

The above argument reflects the necessity not only to establish SPMB to plan and promulgate an industrial policy but the need to set up a centre<sup>15</sup> with such body to deal with technology transfer issues and principles.

##### 5) The National Framework Of Technology Transfer In Kuwait

The transfer of technology to Kuwait from more developed nations has indeed brought vast changes to Kuwait's

economy in the form of industrial development and a higher standard of living. Nevertheless, Kuwait cannot sit back in the assumption that her future is perpetually rosy, or even secure, because she has not yet succeeded in diversifying her industry, nor is she mistress of her economy's destiny.

As far as technology is concerned, Kuwait is in an unenviable position. She desperately needs to import technology from more advanced countries, and they, knowing how keen she is to acquire their products, are in a very strong position to dictate terms. Nevertheless, often these difficulties are out-weighted by the increase in production that technology will bring about, and clearly, as more technology is acquired, it is no longer such a rare commodity, and therefore becomes available on more acceptable terms.

As yet, there is no way of calculating the benefits Kuwait has received by importing technology. Such a means needs to be found, as it will also help Kuwait decide which technology is a good purchase and will help Kuwait's economy most.

The transfer of technology is a complicated process that must travel through a number of stages before it is completed and the piece of technology is securely in the hands of its new owner. The first of these stages, the mediation phase, is when the need for a particular technological items is identified and all possibilities, particularly long-term ones, are investigated. Once these investigations are completed, negotiations are set in motion. This is followed by the information phase, when vital information and material is provided,

involving all levels of the workforce in both countries. Then comes the implementation phase when the project is designed, the plans are completed and the plant or whatever is actually transferred to its new location. The installation phase is obviously next, and is self-explanatory. Finally, there is the manufacturing stage, or rather the training required to enable that technology to increase productivity.

If we analyse the transfer of a piece of equipment or technology to Kuwait in terms of the above-mentioned stages, then we have a means to measure the benefits that are being reaped by that particular transfer. To date, the following areas have been on the receiving end of technological transfer: petrochemicals, energy, food, agriculture & fisheries, shipping, manufacturing, public services, housing & construction, communications and civil aviation.

Preparation of feasibility studies, relevant technological documents, consultation and management of technology, etc., in Kuwait, have been assigned to foreign firms and experts (with minimal or no involvement of national cadres). This trend makes the Government of Kuwait and other companies pay expatriates high rewards to learn and gain more experience at the expense of local firms and indigenous manpower, and leaves the developed countries in a powerful and predominant status to control and manage the extent and direction of technology transfer to Kuwait.

In order that the State might build up a stronger technology negotiating capability and might lessen the trade

structures which is based on imports of technology and increase national technology generation, the following recommendations and measures should be analysed and adopted by the policy and decision-makers:

1. They should encourage the participation of scientists, engineers, technical personnel and other key-specialists, in issues related to technology transfer.
2. They should encourage the direct links between R & D centres, the University and the Vocational Institutes and the technological sector.
3. They should encourage the potential of Arabisation of science and technology subjects particularly of documents germane to technology transfer.
4. Laws should be promulgated accompanying technological transfers which state that technology transfer agreements should include provision that national manpower will be trained (by the transferer) so they can handle the new technology themselves. In addition, the transferer should build a prototype in Kuwait to ensure its performance in the Kuwaiti environment and to allow national manpower to be trained in operation, trouble shooting, etc.
5. Laws should be promulgated to involve national Consultancy and Engineering Design Offices in the technology transfer processes (design, construction, maintenance, etc.).
6. A technology transfer specialised body should be established to execute the following tasks:

- a) documentation of available technology,
- b) training supervision,
- c) development of production processes,
- d) transfer and modification of foreign R & D results,
- e) licensing agreements and consultancy,
- f) to manage the horizontal transfer of technology and to exchange know-how within the local industrial sector,
- g) evaluation of acquired technology and appropriate modification of it,
- h) establish well-equipped industrial and technical information sources, and;
- i) to establish criteria for selecting the appropriate technology for development.

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## CHAPTER XIII

### THE OIL AND PETROCHEMICAL SECTORS IN KUWAIT

For the past thirty years, it has been the oil production in Kuwait which has financed her socio-economic development, providing the world with the constant supply of oil and with reserves third to the Kingdom of Saudi Arabia and the Soviet Union. Two real main problems facing Kuwait with respect to oil are firstly, the unstability of international markets of oil and hence the threat to dissolve OPEC and OAPEC, and secondly, the fact that one day the oil reserves will be exhausted. In a private communication, in summer 1982, with His Excellency, SHEIKH ALI AL KHALIFA AL-SABAH, the Minister of Oil, the author was told that the oil reservoir span of Kuwait is about 100 years.

Due to the vital role played by the oil and petrochemical sectors in the life of Kuwaitis and in the trend of Kuwait's socio-economic development programmes and for its unknown and unpredictable future, this chapter will investigate the employment of science and technology to further develop the oil and petrochemical sectors in Kuwait. The chapter will study and analyse the following topics:

- 1) The historical background of oil production in Kuwait.
- 2) The Petrochemical Industries in Kuwait.
- 3) The contemporary status and future prospects of the main

government oil-based companies in Kuwait, namely;

- Kuwait Oil Company;
- Petrochemical Industries Company; and,
- Kuwait National Petroleum Company.

4) The emergence of the Kuwait Petroleum Corporation and its activities.

The author has corresponded and had conducted several meetings and interviews with key-personnel of the oil and petrochemical fields in Kuwait, to enable him to collect the latest data and to discuss issues related to these sectors that might not have been obtained in literature or elsewhere.

#### 1) The History Of Oil In Kuwait

Kuwait's oil history began in 1913 when the late ruler of Kuwait, SHEIKH MUBARAK AL SABAH, endowed concession of oil exploration to the British Government.<sup>1</sup> In 1946, SHEIKH AHMAD AL JABER AL SABAH presided at a ceremony to export the first crude oil on the tanker "British Grenadier". In 1975, the Government of Kuwait bought the shares of foreign companies to be the sole responsible for oil affairs in Kuwait.

Since the discovery of oil, Kuwait felt the necessity to refine oil locally, rather than importing its products from Iraq and Iran. For this purpose, the following refineries were erected:

- i) Ahmadi's Refinery (1949)
- ii) Abdullah Port's Refinery (1958)
- iii) Shuaiba's Refinery (1965).

For many years, gas - as a valuable by-product of oil - was flared off in the atmosphere in Kuwait. However, as of mid 70's Kuwait began to utilise about 60% of her gas output locally and for export.

Figure 13.1 illustrates the major oil fields in Kuwait.

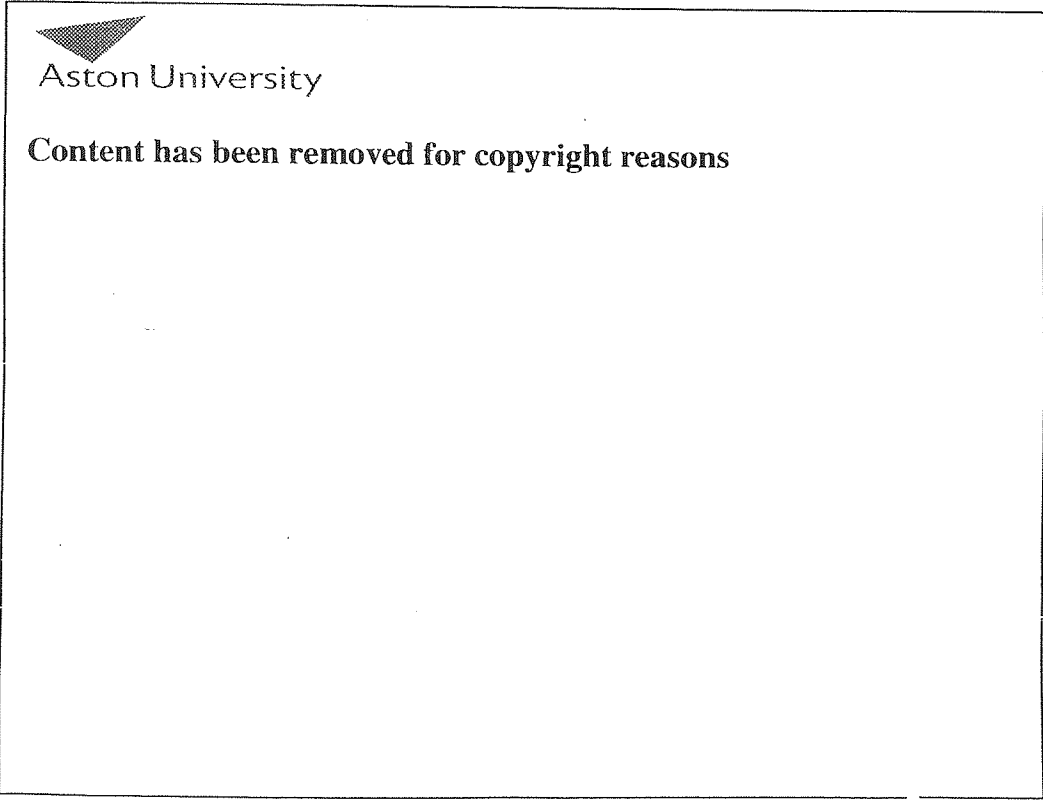
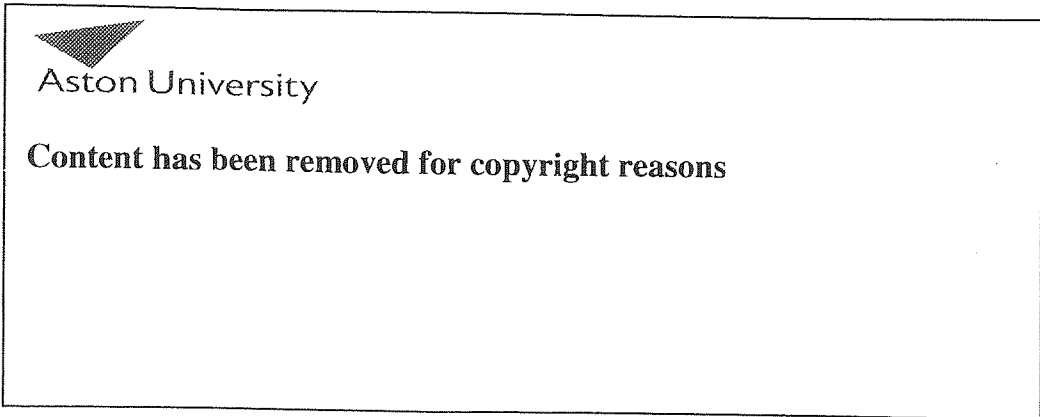
For details of oil history, production and refinery, refer to Sapstad<sup>2</sup>, AL-YAHYA<sup>3</sup>, Ministry of Planning<sup>4</sup>, Khouja & Sadler<sup>5</sup> and Chisholm<sup>6</sup>.

The author believes that the example of not utilising the gas by foreign oil companies illustrates the fact that the major oil companies mentioned earlier, did not have the consciousness or care, to develop the gas production and gas industries in Kuwait. Rather, they aimed as companies of colonial countries to extract as much oil as possible to meet their domestic and commercial needs, irrespective of the damage they did to oil reserves, nor did they initiate any oil-based industry in the oil producing countries. This shows merely selfish and destructive attitudes on the part of the oil companies and their national governments towards the helpless and less advanced countries.

The production and export of oil in Kuwait have stimulated the policy and decision makers to build up the petrochemical industries in Kuwait to provide the domestic markets with various products, to support the industrial infrastructures and to diversify economic activities in Kuwait.

Fig. 13.1: Oil Fields In Kuwait

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## 2) The Petrochemical Industries In Kuwait

When deciding whether or not it is a good policy to encourage Kuwait to invest in the petrochemicals industry, it is not sufficient to say that Kuwait can provide the capital such an industry requires and that raw materials are readily available. Other factors have to be considered like how the organisation of such a business will be run, what problems will have to be faced on the open market, etc. The choice of project to invest in is a very important one and requires a high degree of expertise.

Kuwait is on the point of establishing a petrochemicals industry. It would pay her to do some preparatory work first: building up a technological base which can cope with this industry, studying petrochemical trends elsewhere and petrochemical industries in other countries. Under the auspices of the Ministries of Oil and Planning and Kuwait Petroleum Corporation, these investigations could be carried out. They could look into the advisability of continuing to expand the industry and make valued forecasts and judgements. Those making the recommendations should be unbiased, educationalists and politicians in addition to the industrialists.

Kuwait has again entered wholly into diversified industries such as refining, petrochemicals and maritime transport, taking over from the importing nations usually concerned with these "downstream" industries, giving Kuwaitis more employment and technical advances, using the opportunity to become more than just oil suppliers.

After initial difficulties in producing and marketing, Kuwait is now finding success in the area of fertiliser production. By investing in fertiliser projects abroad, as well as at home, Kuwait is now at the centre of a large marketing organisation. The time is ripe for creating a technological base so that production can experience even more growth.

Kuwait has not yet tackled basic petrochemical products, unlike some of its neighbouring countries, though projects for the production of olefins and aromatics are currently being considered. The Petrochemical Industries Co. and the Industrial Bank of Kuwait has sponsored the Kuwaiti Petrochemical Products Company, with the co-operation of certain national firms in the private sector. The company will set up intermediate and semi-finished petrochemical industries, using some raw materials produced in Kuwait, urea and melamine for example, and olefins and aromatics in the future.

It is difficult to calculate profit margins for the petrochemical industries. The supply of oil to local refineries is not at export prices and the accounts of refining operations are not always fully segregated. However, fertilisers and other chemicals<sup>7</sup> showed a return of 13% in 1978, partly due to the cheap availability of gas to them.

The petrochemical industry is build mainly around oil refining and the fertiliser industry. In 1979, Kuwait used 151 million of the 911 million barrels of crude oil it produced for processing locally<sup>8</sup>, and this was not working at full capacity, though it is currently being improved.

A strong fertiliser industry has now been set up.

The initial difficulties experienced have now been overcome. In 1978, 523,000 tons of liquid ammonia were produced and that was by working the plant at only 76% of its capacity. In the urea plant, 664,000 tons were produced, and the plant was only working at 84% of its capacity<sup>9</sup>. The production of Ammonia Sulphate is not as successful yet. An ammonia plant is well under way and is due for completion in 1983. It should produce 1000 metric tons per day. The Petrochemical Industries Company (PIC) is keen to enter the field of producing complex fertilisers and a study is currently in progress to see if it is a good idea to produce Diammonium Phosphate (DAP), using ammonia produced in Kuwait and phosphoric acid produced in Tunisia.<sup>10</sup>

Notwithstanding, for Kuwait, as an unexperienced industrial and technological State, she is faced with several impediments to develop the petrochemical industries among which are:<sup>11,12</sup>

- i) Intrastructure and prevailing policies & systems: The government developed the public services for the industries to ease operation at economic prices.
- ii) The market: Due to the limitation of local market, the industry has to ensure access to foreign markets to consider the competition by other competitors. Co-operation among Gulf States is essential in this respect.
- iii) Technological expertise: Local capabilities have to be encouraged to participate in this industry and to be developed to minimise the reliance on foreign cadres.
- iv) Quality control of product and applied research: This

is the application of standard techniques and tests of products to be exported. Furthermore, constant R & D efforts should be conducted to improve safety and control of process, discovery of new catalyst, scale-up of new processes for commercial application, etc.

In assessing the necessity to develop local know-how and the petrochemical industries, two aspects of the advantages gained should also be considered:

- i) Independence from importation, avoiding embargo or conditional purchase, and;
- ii) Saving License fees.

The effectiveness of the petrochemical industries and crude oil production in Kuwait be adequately assessed by studying the present prospects and activities of the various governmental companies dealing with such products and by evaluating the response and thoughts of several officials in these sectors. The next section would be an overview of such topics.

### 3) Kuwait Oil Company (KOC)

The Kuwait Oil Company was established in 1934 by the Anglo Persian Oil Co. (now British Petroleum Co.) and the Gulf Oil Corporation to be in charge of the oil industry in Kuwait. In March 1975, Kuwait Government took over the Company and assumed full control of all operations. The main activities of the Company are:<sup>13</sup>

- i) Exploration & Drilling.
- ii) Production.



- iii) Refining.
- iv) Processing of Gas liquids.
- v) Terminal for loading and export.

For further details of the events and significant dates in KOC's history, refer to Appendix XXXV.

Kuwait Oil Company has been assigned responsibility for a very important phase of the oil industry in Kuwait which is concerned with the exploration and production of crude oil and gas. Undoubtedly this phase is connected with science and technology throughout its entire development in terms of equipment, computer models, manpower, tender executions, etc. The extent of the involvement of technology and national cadres in KOC's activities will be analysed in the following section.

#### Science and Technology For Development Of Kuwait Oil Company

Kuwait's economy depends mainly on oil. The oil industry depends on science and technology to develop its activities and output and thus, Kuwait's national goals are determined by science and technology. These aims could be achieved by various methods, e.g., importing machinery, investment in merchandise, tender executions, developing data systems, using Consultant houses, improving the capabilities of manpower, etc. Some of these factors would be analysed next in the contextual framework of KOC.

##### i) Tenders Executions

Appendix XXXVI lists the types of tenders executed for KOC for the period 1976-82. The data shows that the company has promoted tenders for following fields:

- Construction.      - Design Study.      - Survey Study.
- Training.      - Engineering Services.      - Maintenance.
- Storage Facilities.      - Logging & Perforating Services.
- Consultancy Study.      - Design & Supervisory Services.
- Supply & Installation      - Surface Testing Services.
- Site Investigation Work.

In order to conduct such a large number of tenders, KOC has diversified its source of technical know-how by involving companies from Japan, U.S.A., U.K., France, India, Netherland, Belgium and South Korea. Unfortunately, out of the 76 tenders carried out for KOC, only one tender had the participation of a Kuwaiti firm. This indicates that either the Company is not confident in involving Kuwait Construction Companies and Kuwaiti CEDO's due to the complexities and the sophistication of the projects involved, or that the Company has formulated a policy choosing not to involve Kuwaiti firms or that the Company does not realise the existence of such firms in Kuwait. Irrespective of what criteria are sought by the Company, the author believes that in terms of tenders, the Company has developed and adopted a "Zero National Science and Technology Policy" and that the policy-makers of the company should re-assess their policy by trusting in the gradual participation of Kuwaiti national constructions, consultancy and engineering firms in the executions of their tenders in order to take the first step towards self-reliance.

ii) Reservoir Division: A Technology Dependence or Independence?

The reservoir division of KOC is one of the most

critical and vital divisions of the company since it deals with oil reservoir engineering and production. The following information, concerning the division, was provided by MR. HELMI SHIHABE, the General Superintendent of the division, in September 1982:



The above information indicates that, although the division might have been carrying out its objectives adequately, nevertheless, it lacks the adoption of a clear National Science and Technology Policy shown in terms of:

- i) The low participation of technical Kuwaiti manpower

employed (25.0%).

- ii) Heavy reliance on foreign firms for consultation and technical assistance.

KOC has to formulate a better science and technology policy for this division by encouraging the involvement and development of more Kuwaiti manpower and by decreasing its technical dependence by involving national CEDO's and computer services offices to provide services for the division.

iii) Manpower Status

Table 13.1 provides the pattern of manpower composition by nationalities and jobs in KOC for the period 1975-1979. Analysis of the table indicates that the Kuwaiti participation in the total workforce of KOC is almost half of the total workforce (55.8% in 1981) and 36.9%, 59.5%, 56.7% respectively in the Engineering, technical and administration fields. KOC is a science and technology-based establishment where science and technology are the predominant factors in its activities and development. Thus, appropriate policies to attract more Kuwaiti manpower have to be formulated and adopted by the officials of the Company. Although the employment of foreign labour is a salient feature throughout various sectors in Kuwait, the oil sector is so essential and vital to the economy that prodigious measures must be taken to employ more Kuwaitis, to improve the standard of the workforce in the Company to meet any future consequences that might force the departure of expatriates.

TABLE 13.1:

Manpower Distribution By Jobs In Kuwait  
Oil Company: Dec. 1981



Source: MR. ABDULLA AL-BANNAY, Personnel & Relations Manager, Kuwait Oil Company, July 1982.

Further comments on the manpower status in the company were expressed by MR. HAMED AL GHARABALLY, the General Superintendent of the Information Department of the company as follows:<sup>14</sup>

"The turnover of staff in KOC is not a serious problem as the annual rate is only 5%. Analysis of turnover by nationality clearly indicates that the main problem area concerns the turnover of Western expatriates:

Western Expatriates	:	21.3%
Kuwaitis	:	5.0%
Arabs	:	3.5%
Indians/Pakistanis	:	2.4%

Higher turnover amongst Western expatriates is a long established problem throughout the Gulf area and no specific plans have yet been devised to improve the situation".

The Company has continued to make every effort to attract the interest of Kuwaiti graduates, and to encourage them to join the Company. To this end, contacts have been established and maintained with them whilst attending university, whether in Kuwait or abroad.

During 1979, 56 Kuwaiti graduates were recruited by the Company, of these 14 were from Kuwait University.

A substantial number of development programmes were organised during the year with several hundred employees attending courses both in Kuwait and abroad. These covered a wide spectrum of technical matters, together with language, secretarial, supervisory and management skills. Considerable effort was also devoted in 1979 to providing training for personnel from other national companies in the Gulf areas, such as those of Bahrain and Iraq.

The wide variety of training programmes designed for Kuwaiti school-leavers again attracted large numbers of applicants. These programmes have consistently proved an admirable means of inducting young Kuwaitis into the Company and many of the present-day supervisors started off in this way in the Company. As in previous years, the Company has provided training and development opportunities for, and practical work experience to, Kuwaiti university undergraduates and students from local institutes and colleges.

iv) General Policies Adopted by Kuwait Oil Company

The management of the Kuwait Oil Company has various criteria and measures to assist in accomplishing its objectives. The following are some of these criteria as described by MR. HAMED AL GHARABALLY, the General Superintendent of the Information Department of the Company in reply to questionnaires sent to the management of the Company by the author:

"Science and Technology components in the Company include:

- Geology;
- Reservoir Engineering;
- Mechanical Engineering;
- Chemical Engineering;
- Drilling and Petroleum Engineering;
- Electrical Engineering;
- Control Engineering;
- Computer Engineering;
- Civil Engineering;
- Sciences.

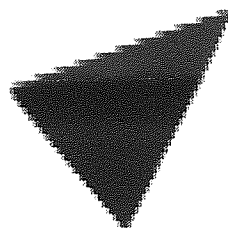
The Company has a working knowledge in all disciplines and calls for specialised assistance when necessary".

The author recommends that a Committee should be

established having members from the Company, Kuwait University: Colleges of Engineering and Sciences and the Ministry of Education to formulate plans to ensure the supply and enrolment of Kuwaitis in the fields listed above, and also in technical levels in the vocational institutes. If no such plans are developed, then the science and technology components of the Company will be vulnerable due to their sole dependence on foreign expatriates.

"... KOC is basically a working Company and the efficiency of its operation requires the maintenance of continuous contacts with and not dependency on, the internal market."

The author believes that the analysis of the above contextual framework of the Company, e.g., tenders execution, manpower, reservoir simulation, etc., is evidence that the Company is totally reliant on the international market and expatriates.



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The author believes that the Company has adopted well established training and operation criteria for its employees. Nevertheless, the author recommends that the national employees of CEDO's should be involved in the unpacking of the technology components since this is a very important step in the process of technology transfer and technological self-reliance.

"... KOC does not have an R & D unit as such, primarily because there is little need to develop, from a scientific point of view, any of the Company's products. The Company's main involvement in this area concerns R & D of production processes and practices. This task is conducted primarily within Production Development Group."

The author recommends that further employment of science and technology to develop the performance and endeavours of KOC could be encouraged by offering more opportunities to exchange scientific and technical information in oil production and processes both locally (with KISR, Kuwait University, OAPEC, etc.), and internationally with specialised companies and information centres; by introducing new regulations for technology transfer; allowing for more participation of local manpower and firms by establishing stronger links with national R & D centres, and computer programming offices.

Now that the performance of KOC, as a Company in charge of oil exploration and production has been discussed, the next section will deal with a Company that deals with the industrialisation of the oil and petrochemical sector, namely, the Petrochemical Industries Company.

4) The Petrochemical Industries Company (PIC)

The Petrochemical Industries Company (PIC) was founded on July 18, 1963 by an Amiri Decree as a Governmental enterprise. The Company was formed mainly to utilise the natural resources of Kuwait (Oil and Gas) to establish diversified petrochemical industries. Nitrogen fertilisers was the first industry established by the Company in March 1964.

The activities of the Company are as follows:<sup>15,16,17</sup>

a) Internal Activities: PIC operates the following Divisions in Kuwait:

i) Fertiliser Division: the division produces nitrogen fertilisers from associated petroleum gases, sulphur and atmospheric air. The production units are:

- Ammonia (99.5%): started in 1966 with production capacity of 120,000 metric tons/year.
- Urea Fertiliser (46% nitrogen): started in 1967 producing 792,000 metric tons/years.
- Ammonium Sulphate Fertiliser (21% nitrogen): commercial production started in 1966 with 165,000 metric tons/year.
- Sulphuric Acid (98%): the plant produces 132,000 metric tons/year.

ii) Salt & Chlorine Division: The plant was erected in 1963 to produce Chlorine, Caustic Soda, Sodium hypochlorite, Hydrogen, Hydrochloric Acid and Table Salt, mainly for local consumption.

iii) Petrochemical Division: the division was established in 1981 to execute and follow-up the erection of a petrochemical complex to produce olefines and aromatics.

Furthermore, PIC is a shareholders of the following companies:

- Kuwait Melamine Industries Co.
- Kuwait Petrochemical Products Co.

b) External Activities: PIC has established subsidiaries and affiliations in Turkey, Tunisia, Bahrain and Morocco to produce fertilisers, phosphoric acid, ammonia, methanol and sulphuric acid.

In addition, PIC is planning to construct several petrochemical industries inside Kuwait and abroad.

PIC has played a large role in the diversification of Kuwait's income. The Company exports to more than 50 countries, including India, Pakistan, Sri Lanka, Vietnam, Korea and China. However, the successful employment of science and technology for the development of the Company's output could be envisaged in relation to some of the science and technology components that are adopted by the Company, e.g., planning and feasibility studies, tenders execution, manpower, etc.

#### Employment Of Science & Technology For The Development Of The Petrochemical Industries Company

The Petrochemical Industries Company, as has been discussed above, owns and operates facilities (inside and outside Kuwait) for the production and marketing of chlorine, salt, caustic soda, hydrochloric acid, sulphuric acid, fertilisers, etc. If the development plans proceed as scheduled, then by the year 2000, the company will have established an

integrated petrochemical industry in Kuwait. The envisaged trends of these endeavours demand the proper employment of science and technology and the involvement of national cadres for full development. The industry is based on science and technology for its operation. Some of the contemporary science and technology components that exist within the company are evaluated in the next sections to assess the company's trends and policies.

i) Tenders Executed

Table 13.2 provides a list of the tenders executed for PIC during (1979-82).

Analysis of the table provides the following information:

a) The main contracts done for the Company are:

- Design and Supply of equipment;
- Feasibility studies;
- Licensor, Engineering supply and construction;
- Installation and operation of plants;
- Management consultancy.

b) The tenders were assigned to various sources:

- Switzerland      - West Germany      - U.K.      - U.S.A.
- Denmark            - Italy                    - Japan

c) The tenders did not include any manpower training contract which is a vital role in this industry.

d) The tenders indicate the absence of Kuwaiti participation, in any contract assigned by the Company. As we have discussed in the case of Kuwait Oil Company, PIC

TABLE 13.2:

TENDERS EXECUTED FOR PETROCHEMICAL  
INDUSTRIES COMPANY



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Source: "The Petrochemical Industries Co.", Kuwait, March 1982.

officials have ignored the possible participation of local construction companies and CEDO's due to:

- Complexity and sophistication of the projects.
- Lack of trust of the local companies.
- The unawareness of the existence of required capabilities in Kuwait.

In any case, the author believes that PIC has formulated and adopted a "Zero National Science and Technology Policy" in this regard and thus, the officials of the Company should give the National firms the opportunities to be involved and to develop their capabilities to sustain more of the technological self-reliant status.

ii.) Manpower Composition and Distribution.

The Company continued to implement the first part of the overall manpower strategy and plan which relates to encouraging Kuwaitis to join the Company. During 1979, 60 Kuwaiti trainees joined, including 19 graduates. The training and career development programme implemented inside and outside Kuwait, during the year, numbered 86 and embraced 452 trainees and employees; the ratio of Kuwaitis participating in these came to 55% of the total.

The Company has also organised several field training programmes during the year. Sixteen students from the Shuwaikh Training Centre, the Institute of Applied Technology and the Kuwait University took part.

The Company continued to concentrate on training

the largest possible number of employees, operators and trainees in the emergency, rescue, security and civil defence plan. The number of participants amounted to 737 employees, in addition to a further 278 employees from other national firms and bodies to assist these in drawing up their own emergency plans.

The manpower composition and distribution in PIC is provided in Table 13.3. The data exhibited in the table indicates that the overall percentage of Kuwaitis in the total workforce is 41.6% and that the technicians class (which is an important field) has a lower participation of Kuwaitis together with the majority of engineering and some of the science fields. The author suggests that the company should establish a joint committee between the Company, the Ministry of Education and Kuwait University; particularly the Colleges of Engineering and Sciences to formulate and adopt long-term plans to encourage the enrolment and hence the supply of Kuwaitis in technical, engineering and scientific studies.

iii) Planning and Technological Components in PIC

The involvement and extent of planning and technological components in PIC are expressed by MR. HUSAIN AL-JASEM, the Deputy Managing Director of PIC, in a reply to a questionnaire submitted to him by the author in January and March 1982, as follows:

"Planning is done according to the Company plans, based on strategic factors such as:

raw materials utilisation, skills and manpower development, technology transfer, Government



TABLE 13.3:

Manpower Composition of Petrochemical Chemical



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Source: Data was provided by Mr. HUSAIN AL-JASEM, The Deputy Managing Director of Petrochemical Industries Co., Kuwait, March 1982.



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The author believes that PIC officials have formulated and adopted well integrated policies with respect to the development and involvement of its capabilities, with or without foreign assistance, in the planning, feasibility studies and technical development phases. The author strongly recommends the involvement of national CEDO's in these phases.



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The author believes that PIC has established an excellent Science and Technology Policy in terms of the technological components of the Company. Unfortunately, this Science and Technology Policy has a great inclination

towards a heavy reliance on foreign sources and almost no encouragement or involvement of national CEDO's. Therefore, the author strongly recommends that the Company Policies should be re-evaluated to involve national manpower and firms in its activities to further support the links with national R & D institutions and to establish an office for technology assessment due to the thorough involvement of the Company with technology for its operations. Furthermore, the following activities should be further developed to assist in promoting and increasing the performance of the Company:

Process improvements: effective use of instruments and equipment results in better yields.

Applied research: joint co-operation with internal or foreign R & D organisations would improve the products of the Company. Fertilising industries in Kuwait faces sever challenges that should be researched, e.g., corrosion of reactors, difficulties of operation and design, problems resulting from severe Kuwaiti weather and their impacts on operations, etc.

Technical service: by giving advice to customers and by understanding the nature of any new plants and products would reflect better positive impacts on the Company endeavours.

The next section will investigate the activities of Kuwait National Petroleum Company.

##### 5) Kuwait National Petroleum Company (KNPC)

The Kuwait National Petroleum Company was established by an Amiri Decree in 1961 to be the sole distributor of

refined petroleum products in the State of Kuwait. The Company was established with a capital of K.D.7.5 Million, split into 40% private sector and 60% Government. In 1968, the Company commissioned its first refinery, with a capacity of 95 million barrels per day in the Shuaiba Industrial Area. The Company's capital was raised to K.D.15.0 million at this time. The increased product availabilities allowed the Company to enter into the international product markets, in addition to its role as distributor in the local market. In 1975, the Government bought the whole private shares.

The Shuaiba refinery was the world's first all hydrogen refinery and includes the first commercially sized H-Oil unit as well as several other isocracking and unifying units.

The Corporate objectives and functions of the Company are as follows:

- i) To carry out efficient petroleum refining operations in Kuwait, producing a full range of high quality petroleum products for local and export markets.
- ii) To supply the Kuwaiti domestic, international bunker, and aviation markets with petroleum products and services, to international standards of quality.

The Company has established several subsidiaries in Kuwait and in England, Liberia and U.S.A.<sup>18</sup>

The Company's total revenues<sup>19</sup> from sales were K.D.1007.9 Million and K.D.464.4 Million in 1979 and 1978

respectively. With the profits achieved from other operations, KNPC's total net profits was K.D.156,497,650 in 1979.

A) Functional Plans of KNPC: the planning and implementation of projects were carried out over the whole scope of KNPC activities. The following is a brief account of the functional plans, projects completed, studies made and new projects initiated by KNPC:<sup>20</sup>

- i) Local Marketing: to provide and develop the continued expansion in facilities necessary to cater for the growing domestic demand.
- ii) LPG as an automotic fuel: programme is being conducted for using liquid petroleum gas as a vehicle fuel.
- iii) Mena Abdullah's and Shuaiba Refineries: studies are being done to determine the optimum crude feed and to maximise production of low sulphur premium distillates.
- iv) Conservation: studies have been undertaken to control and reduce refineries' fuel consumption and losses.

B) Manpower Development & Composition

KNPC has established within its domain a Personnel Department which is responsible for recruitment, co-ordination of long-term planning in respect of manpower requirements, preparation of job descriptions, etc. The department actively participates in implementing the company's goal of encouraging young Kuwaitis to join the company by

offering incentive and facilities to undergo further training to develop their careers and to raise the standards of their proficiency. The company also aims to develop and improve the experiences of the non-Kuwaitis as well. To attain such aims, the company is adopting the following programmes:<sup>21</sup>

- Basic Vocational training
- On-the-job training
- Preparatory & Technical training
- Summer Training
- Personnel development
- Study leaves.

The manpower composition of KNPC is as follows:<sup>22</sup>

<u>Nationality</u>	<u>Number</u>	<u>Percentage</u>
Kuwaiti	1228	26.5%
Arabs	2850	61.6%
Non-Arabs	551	11.9%
Total	4629	100.0%

The above data indicates that although KNPC has formulated and adopted a well planned recruitment and training programme and although the Kuwaitis' percentage is within the overall composition of Kuwaitis in the workforce, it has not attracted or reached the percentage of Kuwaiti that has been attained by PIC and KOC. This could be attributed to either that both PIC and KOC offer better incentives and encouragement to the Kuwaitis or that the style and pattern of recruitment and jobs in these companies are more attractive than KNPC. This phenomena should be further re-assessed by the planners in KNPC.



### C) Utilisation Of Science & Technology In Kuwait National Petroleum Company

As the oil industry depends on research, technical know-how and manpower, it is obvious that these components of KNPC and the oil sector should collaborate closely if this sector is to be expanded and developed. The following is the analysis of the involvement of science and technology in KNPC's activities:<sup>23</sup>

#### The Processing Operation at Shuaiba's Refinery

Crude oil from the Kuwait fields contains dissolved gases that are separated by a staged reduction of the oil pressure from wellhead pressure to atmospheric pressure in a conventional manner. Before Kuwait was industrialised, gas was burned as waste in the field. When the Refinery was being planned, it was decided that the field's gas would be used as feed to the hydrogen plant. The Hydrogen produced would then be utilised to upgrade high sulphur content cuts into high quality products, to remove contaminants, i.e., nitrogen and metals, as well as to produce distillate and lighter products from higher-boiler materials. As a result, the KNPC refinery at Shuaiba combines the modern technology of hydrogen processing with conventional processing.

#### Crude and Vacuum Unit

The crude oil is charged to desalters where salt is partially removed, then to a crude and vacuum distillation unit, where it is fractionated into hydrocarbon products

according to their boiler ranges. In this process, the lightest materials are taken from the top and the heaviest from the bottom of the distilling columns. In order of lightness, the streams are naphtha, kerosene, light diesel oil, heavy diesel oil, heavy gas oil and vacuum tower bottoms. Each product stream is subsequently processed in a catalytic unit in a hydrogen atmosphere at moderate to high pressure and at relatively high temperature. Processing improves the quality of the streams or converts them into more desirable materials. The converted products have boiling ranges comparable to those of materials separated in the crude and vacuum unit. Such process, undoubtedly, embodied within it sophisticated technical experiences and know-how. The latter materials, are called virgin stocks. Similar boiling materials from the hydrotreating and hydrocracking units are called synthetic stocks.

### Gas Processing and Hydrogen Production

All of the natural gas from the oil fields is now first processed to recover natural gasoline and Liquid Petroleum Gas.

The unrecovered light gases are then used as industrial fuel, and, partly to produced hydrogen. The gas, predominantly methane, is first treated to remove sulphur compounds. It is then compressed and charged to the hydrogen plant, where it undergoes several chemical reactions over three different catalysts and one treating agent. Upon leaving the plant, the gas is further compressed and emerges as a hydrogen stream of 95% purity, which is used

in processing all liquid streams leaving the crude and vacuum unit.

### Naphtha Treating and Reforming

Naphtha is unified to reduce the sulphur and nitrogen contents to a very low level. Next the Naphtha is divided into a light stream, which can be used in the production of petrochemicals and gasoline blending components, and a heavier naphtha which is then processed over a platinum catalyst at moderate pressure in a hydrogen atmosphere. The resultant gasoline blending component is equal in octane number to the best motor fuel sold anywhere in the world.

In addition to the above examples, KNPC also employs science and technology to operate and develop the following processes and units:

<u>Middle Distillate Unifiers</u>	<u>H-Oil Unit</u>
<u>Lube Oil Blending Plant</u>	<u>Merox Unit</u>
<u>Inter-company Pipelines</u>	<u>Sulphur Recovery</u>
<u>Water &amp; Air Pollution Abatement</u>	<u>Product Storage</u>
<u>Automation of Refinery</u>	<u>Water Conservation</u>
<u>Isocracker Units</u>	<u>Computer System</u>
<u>Loading Facilities</u>	<u>Refinery Products</u>

### D) Policies & Criteria Adopted By KNPC

KNPC's policy is to maximise regular KNPC involvement in project control to ensure optimal and timely project execution and retention by the company of as much technical background and experience as possible.

Project construction is executed normally by contractors. Such contractors fall into two categories: local, operating permanently in Kuwait and owned by nationals, and overseas contractors, who operate through Kuwaiti agents but do not generally maintain a permanent establishment in Kuwait.

Additional assistance is obtained, as required, from a range of companies providing specialist services in design, construction and technical know-how.

KNPC currently follows three methods of project execution.<sup>24</sup>

#### Lump Sum Turnkey

The company prepares complete specifications, scope of work and other information as to define the works in sufficient details for competitive lump sum tenders. Generally the contractor will supply all the materials, and be responsible for design, procurement, shipping, construction and start-up.

#### Lump Sum Construction

The majority of KNPC projects fall into this category. Design, specifications, drawing preparations, etc., are completed by KNOC. All or the majority of materials are obtained on open tender by KNPC.

#### Reimbursable

KNPC adopts this method where the size and period

of contract make the contractors unwilling to bid lump sum. It is also employed in complex projects where the scope of work cannot be sufficiently defined for a lump sum bid, while the project schedule demands that a contract be awarded to facilitate ordering of critical delivery items.

The author believes that KNPC adopts 50% self-reliant policies in that the company prepares design, procurement, etc., and leaves the 50% self-independent to foreign firms to construct the projects. Such 50% self-independent might be due to the sophistication and complexity of projects that could not be done by national contractors. Nevertheless, the author suggests that the company should involve local CEDO's to lessen such dependence on foreign firms.

Furthermore, several other policies and guidelines have been formulated by the company to promote its activities. Some of these guidelines and policies were conveyed to the author by MR. MAHMMOD AL-YAHYA, the Deputy Managing Director of the Company for Planning Affairs in a letter dated March 10, 1981, as follows:



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The author believes that in this, Shell is hindering KNPC in the marketing of its Products, since the appearance of Shell specifications on the covering label would considerably enhance the marketing of the lubrication oil, a trend that is not encouraged by an multinational company.

"KNPC has previously assigned feasibility studies of its projects to foreign firms, viz, Foster Wheeler, Bechtel, etc. As for new projects, feasibility studies are conducted completely in-house."

The author believes that the Company has built up a successful in-house training capability and recommends that when needs arise for outside consultation, priorities must be given to national CEDO's. Furthermore, the author ~~believes~~ that the recommendations suggested for KOC & PIC should be evaluated and adopted by KNPC due to the similarity in performance of activities in the oil and petrochemical sectors.

Furthermore, the outputs and efficiency of the refineries - which are the sole and key-operation of KNPC - could be further developed by employing science and technology by:

- i) The ability to understand complex problems associated with crude oil distillation and mainly the high sulphur content ( 2.5%). Such ~~tasks~~ require conducting advanced R & D endeavours since it plays a very important role in the development of production materials at costs. In addition, R & D could be conducted for lead-add fuel,

improvement of various stages of distillation, etc.

Such R & D activities could be done - depending on KNPC capabilities and policies, within the company, in collaboration with national institutions, i.e., KISR or with foreign establishments. The author believes that local participation produces better understanding to the problems and hence more successful results.

- ii) In education and training; reducing the need for importing technology experts through the use of such aids as television in schools. Training to increase technical and administrative manpower by using methods of teaching on scale models for on-the-job training instead of students going abroad.

To further organise, plan and develop the productivity and performances of Kuwait's national oil and petrochemical companies, Kuwait Petroleum Corporation was established in 1980 as an umbrella for all petroleum activities in Kuwait.

#### 6) The Emergence Of Kuwait Petroleum Corporation (KPC)

Oil resources are the country's mainstay and the source of its strength. Vast development of the Kuwaiti oil industry has been achieved, and the present refining capacity of Kuwait covers a great proportion of the oil produced. Associated gas is now fully utilised, oil and gas transported in national tankers is constantly on the increase and operational and marketing efficiency has been manifest in the field of fertilisers production. These achievements, all testifying to progress, call upon the planners in Kuwait to

maintain the accelerated pace of this progress, consolidate this development, enhance the efficiency of the Kuwaiti oil industry and eliminate any difficulties or obstacles standing in its way.

The most convenient means of strengthening this industry lies in the establishment of a single corporation which would own all companies operating in the oil industry. Such a corporation would make possible the assembling of necessary services and allow for central planning with distribution on a scientific basis of work in the various sectors among departments which would directly execute the work, or among companies wholly owned by the corporation, according to work requirements and the special circumstances of each sector. Those in charge of each sector would thus participate in drawing up the corporation's general policy and the industry's integrated plan thereby ensuring complete coordination between the various sectors.

In January 1980, the Kuwait Petroleum Corporation was formed as the umbrella for all petroleum activities in Kuwait. KNPC was vested with the Petroleum Refining activities in Kuwait and accordingly, all activities related to this activity were transferred to KNPC, such as Mina Al-Ahmadi's Refinery and the LPG Plant. Also, activities such as Marketing and Marine Operations were transferred out from KNPC to KPC.

KPC was to be supervised by the Minister of Oil and its economic character will be run on a commercial basis, taking into account long term economic factors such as the development of Kuwaiti industry and capabilities.<sup>25</sup>



KPC is responsible for the supervision of the following firms:

- i) Kuwait Oil Company.
- ii) Petrochemical Industries Company.
- iii) Kuwait National Petroleum Company.
- iv) The Kuwaiti Company for Petroleum Exploration Abroad.  
(Refer to Appendix XXXVII for more details).
- v) Kuwait Oil Tanker Company.  
(Refer to Appendix XXXVIII for further details).
- vi) International Energy Development Corporation.  
(Appendix XXXIX provides details of the company).
- vii) Santa Fe and C.F. Braun Companies.  
(Details are enclosed in Appendix XL).
- viii) Indover Petroleum Company, Oklahoma, U.S.A.
- ix) Kuwait International Company for Petroleum Investments.

The main income of the company is from the profits gained by the above companies owned by KPC, particularly the successful deal to purchase Santa Fe and C.F. Braun Companies in 1981, who have an excellent industrial reputation in various oil sectors, and processes. Santa Fe has, for example, signed a contract in May 1982, to modernise Mina Abdullah Refinery owned by KNPC. By the middle of 1986, the project aims to produce high quality petroleum products for export and to convert Kuwait crude to a higher quality and economic value products.<sup>26</sup> Furthermore, these two companies have won contracts to execute three gas-gathering projects in Saudi Arabia

and other projects worth 10-15 Million US Dollars in Qatar, United Arab Emirates, Syria, Egypt and Bahrain.<sup>27</sup>

The author strongly recommends that KPC should utilise the ownership of Santa Fe and C.F. Braun Companies to further support the industrial, techno-scientific infrastructures and manpower in Kuwait, in addition to the investment aspects. KPC has advantageous opportunities to utilise the ownership of these companies to enhance and develop various technical and industrial sectors in Kuwait to build and pioneer a technological self-reliant concept in the Arab world. It is apparent from their activities that world wide operations have exposed these companies to all kinds of problems and challenges, their complexity and depth study and the solutions found have given them highly competent experience. Undoubtedly, this transfer of technology through the training of Kuwaiti cadres can be accomplished after they have been kept in direct association with these companies. Active participation will allow Kuwaitis in due course to play major and decisive roles in projects like deep and off-shore drilling, design and construction of refineries and chemical plants, etc. Kuwait will, thus, be able to choose the areas needed for manpower development in Kuwait as well as in the Arab world.

The role and effectiveness of the Ministry of Oil in promoting the oil and petrochemical sectors are the topic of the following section.

## The Role Of The Ministry Of Oil In The Development Of Oil And Petrochemical Sectors

The responsibility of the Ministry of Oil reaches far beyond the sale of oil and gas, supervising all fields of exploration, drilling, production, reservoir engineering, transport and computer systems and of most important to concern itself with Kuwait's conservation policy. The economic affairs development looks after marketing and liaison with such organisations as OPEC and OAPEC, together with the development of human resources and the training of Kuwaitis. The Ministry has its own legal Department and calls upon the Central Tenders Committee to help to scrutinise all tenders and contracts received. In 1978, the Ministry became responsible for all the nation's mineral resources which might possibly increase due to under-sea researches. Refer to Appendix III for more details concerning the responsibilities of the Ministry of Oil.

Kuwait is well aware of her importance in having the World's third largest oil reserves and intends to hold that position by managing her resources as she wants to, not as she is asked to.

The involvement of the Ministry of Oil in the oil and petrochemical sectors is reflected by the achievements of the Technical Affairs Department in the Ministry in 1981, as follows:<sup>28</sup>

- i) Participation in technical operations carried out by the operating companies and specialised consultants.

- ii) Drawn up and development of regulations set for conservation of petroleum resources by oil companies.
- iii) Conductance of field inspection operation of oil installations, follow-up of day-to-day operations, review of the plans of the operating companies, and determined work strategies in the oil sector.
- iv) Continuation and expansion of geophysical ~~surveys~~ in land and offshore.
- v) Preparation for primary study aimed at the discovery of the country's mineral resources.
- vi) Monitoring of exploratory and development drilling by the oil companies operating in the country.
- vii) Follow-up in the repair and maintenance of the wells, the oil and gas production operations as well as the production related projects.
- viii) Performing of studies of local projects for refining and gas liquefaction.
- ix) Supervision, inspection and projects evaluation of petrochemicals industries.
- x) Studies in the field of storage and transportation.

The above accomplishments reflects the fact that the Ministry of Oil has established well diversified plans and criteria to develop and monitor operations and possess related to the conservation and enhancement of the oil and petrochemical industries in Kuwait and their liaison with

other countries and organisations.

Furthermore, the overall policy of the Ministry of Oil was expressed by His Excellency, SHEIKH ALI AL-KHALIFA AL-SABAH, the Minister of Oil, in a reply to the author's questionnaire submitted to him in June 1981:

- i) Oil & gas represent the only natural resource in Kuwait and that the industrial policy emphasises such fact in the overall development plan by restricting the level of exploitation to conserve them for future generations.
- ii) Technology forms a central pillar of such policy, thus, evaluation, selection, acquisition, absorption and utilisation of technology require careful assessment to maximise economic benefits and less negative environmental impacts. Technologies are always assessed for development or replacement.
- iii) Capital is available, but both quantity and quality of manpower is at a premium and, in some cases, supporting industrial base is not present. Manpower have to be developed by all possible means.
- iv) All proposals all subject to exhaustive investigation. When available (refining) studies are done internally, otherwise, foreign consultations are hired. Kuwaitis are totally present in the management, policy and decision-making levels.
- v) Progress ~~has been made in R & D activities and they have achieved~~ small success. No R & D unit exist within the oil sector.

Operating companies carry out limited researches geared to solving specific operational problems.

vi) Usually licensed technology is separated from the detailed design and construction responsibilities of the contractors.

The above expression of the Minister of Oil, as one of the main policy and decision-makers of this field in Kuwait, clearly illustrates that the Minister and the Policy-Makers in the Ministry have a good attitude towards:

- Political and philosophical thoughts on technical issues.
- Technology selection and acquisition.
- Problems related to technology transfer to Kuwait.
- Manpower development.
- Economic and environmental assessment of any acquired technology.
- Regional industrial and technical co-operation.
- Diversification of source of investment in the oil and petrochemical sectors.

Nevertheless, the author believes that oil policy-makers in Kuwait have not yet appreciated the potential role and importance of R & D units within the oil companies. A status that should be given much deeper thought by the policy-makers.

## 8) Recommendations

Just as oil production in Kuwait is an important sub-sector of the industrial sector, similarly oil reserves can be treated as equally important factors of its balance sheet. Production and reserves play key roles in the national economy. The neglect of source depletion gives a serious distortion to the figures on national income when compared with those of developed countries, and will give a totally false view of the comparative incomes of the oil producing countries.

The proven oil reserves of Kuwait are vast by any standards, about one eighth of the world's proven total. The relationship between output and reserves is of crucial importance for the formulation of a development strategy. Thus, the following recommendations are made in order to fully utilise and develop the oil and petrochemical sectors:

1. The prompt formulation of a policy with respect to off-shore oil explorations, to solve all the political problems related to it, to further enhance the reserves of Kuwait's crude oil and thus support her socio-economic development plans.
2. The formulation of policies to encourage and support oil-associated industries and to provide the oil-based raw materials to industry at competitive prices rather than the international market prices.
3. The formulation of policies to encourage the co-operation and integration of oil and petrochemical industries in the Gulf region.

4. Co-operation between the Ministries of Oil and Electricity & Water to curb the excess utilisation of gas for fuel and energy purposes and to encourage R & D institutions to develop non-conventional energy sources.
5. The formulation of policies to invest the oil revenues in various oil and petrochemical fields inside and outside Kuwait.
6. The formulation of integrated programmes to recruit, train and develop national manpower for technical and administrative jobs.
7. The formulation and execution of the Pollution Control Programmes, particularly in the Shuaiba Area.
8. Employing various recovery techniques (secondary, tertiary, etc.), to enhance the life span of reservoirs.
9. Beginning the operation of the College of Petroleum in Kuwait University with designed curricula to meet Kuwait needs and development.
10. Enhancement of the safety procedures in the petrochemical industries area.
11. An integrated petroleum industry is sought, to consists of:
  - i) Exploration and extraction.
  - ii) Transportation and refining.
  - iii) Distribution and sale.
  - iv) Petrochemical industries.
  - v) Fertilisers.



- vi) Plastics and rubber.
- vii) Liquefied petroleum gas.
- viii) Aromatics.

Kuwait's activities in this field include the operations of i - v and vii, therefore Kuwait could achieve a fully integrated petroleum industry (in Kuwait or jointly with the Gulf States) by the erection of Polymers and Aromatics Plants. Techno-economic feasibility studies are highly recommended before the erection of such an industry. The integrated petroleum industry is recommended to be established in Kuwait due to the availability of the three main raw materials and supporting facilities for the petrochemical industries in Kuwait, namely;

- Crude oil.
- Natural gas.
- Refined products (kerosene, fuel oil, etc.).
- Electrical power.
- Fuel.
- Water.
- Other facilities (land, port, roads, etc.).
- Manpower (could be overcome by introducing capital-intensive technology or joint-venture projects with the Gulf States).

12. Establishments of Research and Development Units within the oil companies and to collaborate and co-operate with national and international analogous R & D Centres to solve resulting problems in-house, to help by further

applying the most advanced and recent scientific and technological output to promote the qualities of their products and to improve the efficiency of their activities.

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## CHAPTER XIV

### REGIONAL AND INTERNATIONAL SCIENTIFIC, TECHNICAL AND FINANCIAL CO-OPERATION

International collaboration has long been regarded as an essential instrument for the process of national development. International co-operative efforts are mainly structured on three areas, namely:

- i) Natural resources.
- ii) Human potential.
- iii) Scientific and technical knowledge.

Thus, each country aims to fully develop and utilise these characteristics in accordance with its socio-economic-political structures and ambitions.

The State of Kuwait, which possesses abundant natural resources and lacks sufficient suitable human potential, scientific and technical infrastructures, co-operates with enormous numbers of multi-functional specialised agencies aiming to further develop her socio-economic, scientific and technical capabilities. In return, Kuwait contributes a large amount of money to these agencies.

Appendix XLI provides the names of agencies which have a scheme of co-operation with Kuwait, and Kuwait's financial contributions to them.

It is worth mentioning, for the context of this chapter, that Kuwait has joined the Gulf States to form the Gulf Co-operation Council in 1981 to promote the populace property, growth and stability through closer co-operation, to minimize foreign ambitions and to ensure the military security of the area. However, the liaisons that Kuwait has established with foreign sources to develop her techno-scientific potential were mainly with international organisations that do not belong to any country and thus have no restrictions imposed on them by Governments. Nevertheless the constant states of stresses that have been induced in the Gulf Area due to the Iraqi-Irani War, erupted civil war in Lebanon and the unsettle status of Palestine Liberation Organisation might not encourage experts and qualified manpower to be recruited in Kuwait and hence might implicate the national development programme.

#### 1) Kuwait Liaisons with Specialised Agencies

Since gaining independence in 1961, for various socio-political, economical and technical reasons, aiming for rapid development and international recognition, the State of Kuwait has haphazardly world-wide agencies, without any pre-planning to fully utilise their activities or at least to choose the necessary ones and to avoid duplications.

Consequently, this has led to the establishment of direct links between the specialised agencies and government bodies with an absence of any internal co-ordination or mutual benefit. Evidence of this can be seen in the following examples:<sup>1</sup>

- i) The Ministry of Public Works, represented by the Agriculture Department, is the sole liaison with Food and Agriculture Organisation (FAO). FAO is concerned not only in the food and agriculture sector, but also in water and sanitary sectors, fisheries, food production and marketing, etc. Its activities should be fully employed to cover the domains of the Ministries of Commerce & Industry; Public Health; Electricity & Water; Municipality, Kuwait Institute for Scientific Research, etc.
- ii) Similar activities are conducted by several organisations, e.g., environment is a subject that has been studied by the International Labour Organisation, World Health Organisation, UNDP, UNEP, etc. This duplication must be avoided.
- iii) Science and Technology Applications for Development is a topic that has been diversified among the Ministries of Planning; Commerce & Industry; Education, Kuwait University, KISR, etc. Therefore any specialised or concerned agencies would be confused about who to contact for Science and Technology matters.
- iv) Some agencies perform activities that do not have Kuwaiti equivalent authorities or are not relevant to any development programme in Kuwait; UN Fund for Infant Care, International Arab Organisation for Social Protection, Nuclear Energy, Committee for Racial Segregation, International Fund for Grass-hopper Protection, etc.

As has been indicated by Appendix XLI, which provides

Kuwait Memberships and Contribution to Regional and International Organisation, the total contribution fund for 1981 was K.D.13,395,878. This amount could be reduced and re-utilised in several Development Programmes in Kuwait, if whoever is in charge of Organisations' membership would re-appraise the role and benefits of each organisation in relation to Kuwait development and choose such involvement in accordance with Kuwait socio-economic needs rather than in an ad-hoc and haphazard fashion.

## 2) The Government Authorities and Liaison with Specialised Agencies

Several government establishments, without any co-ordination and planning with each other, have created links (or enrolled as a member) with numerous regional and international organisations, to seek assistance, or social and political status, from such organisations. The following Government establishments are the major contributors to liaison with foreign organisations:

- |   |                            |
|---|----------------------------|
| i) Ministry of Commerce & Industry      | ii) Ministry of Education  |
| iii) Ministry of External Affairs       | iv) Ministry of Finance    |
| v) Ministry of Communication            | vi) Ministry of Oil        |
| vii) Ministry of Public Health          | viii) Ministry of Planning |
| ix) Ministry of Public Works            | x) Kuwait University       |
| xi) Ministry of Social Affairs & Labour | xii) KISR                  |

Furthermore, Kuwait has sought to establish a dual co-operation at both the Arab and international levels to assist Kuwait to develop and reinforce her development plans and also to help others by exchanging technical information



and assistance in all different forms. Such co-operation would accelerate the socio-economic development objectives by offering continuous and systematic aid which is geared towards the fulfillment of the national development plans. In the next section, we shall review the dual level agreements between Kuwait and other countries.

### 3) Kuwait: Multi-level Co-operation

Aiming to further support unity and co-operation amongst several nations, Kuwait has encouraged the establishment and become the mainstay of several organisations, ventures and joint regional services for the overall benefit of Arab causes. It has liberally and faithfully contributed towards their operations and findings. Examples of such collaborations are as follows:

#### A) The Gulf Level

In accordance with the objectives of the establishment of the Gulf Co-operation Council,<sup>2</sup> and from Kuwait's desire to fully strengthen and fulfill such objectives, Kuwait has been involved into several multi-functional co-operation with the Gulf States. The following are but a few examples of this co-operation:

- i) The Regional Fishery Survey & Development Project (QATAR).
- ii) The Sub-Regional Centre of Fisheries Training (KUWAIT).
- iii) Regional Institute for Statistical Training & Research (IRAQ).

- iv) The Gulf Organisation for Industrial Consultation (QATAR).
- v) The Regional Institute for Labour Education & Human Resources Development (IRAQ).

Further examples are provided in Appendix XLI.

Moreover, there are several regional studies and projects that have been conducted<sup>3</sup> and aimed at improving technical co-operation between the Gulf States in which Kuwait has a leading role, e.g., the survey and development of the Gulf coastal area, survey of manpower and employment in the Gulf States, the regional project for agricultural research, etc. The author believes that the output of these studies, due to socio-political causes, has not exceeded the documentation and filing phase and that not actual implementation has been achieved.

#### B) The Arab Level

Stemming from Kuwait's belief in Arab unity and socio-economic integration amongst Arab States, and as an active member of the Arab League, Kuwait has participated actively in many organisations and funds in the Arab World. The following are examples of these co-operative undertakings:

- i) Organisation of Arab Petroleum Exporting Countries - OAPEC. (Kuwait). Details of the establishment and activities of OAPEC are cited in OAPEC publications.<sup>4,5</sup>
- ii) The Arab Institute for Planning (Kuwait). The institute

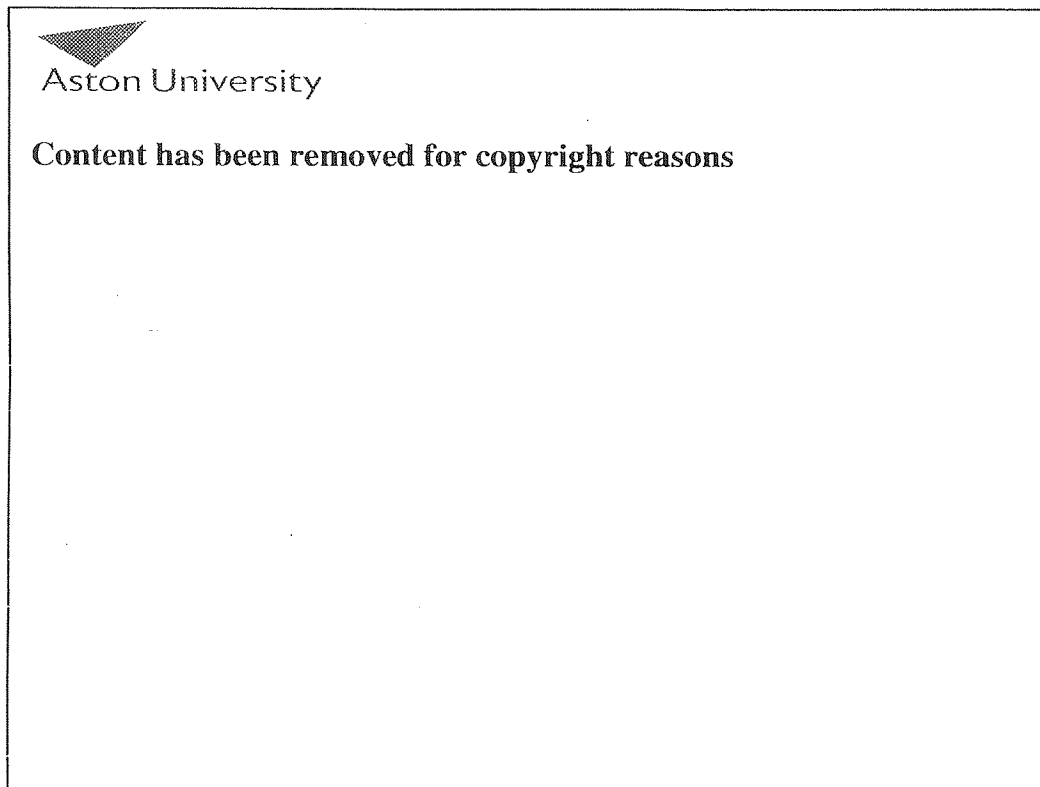
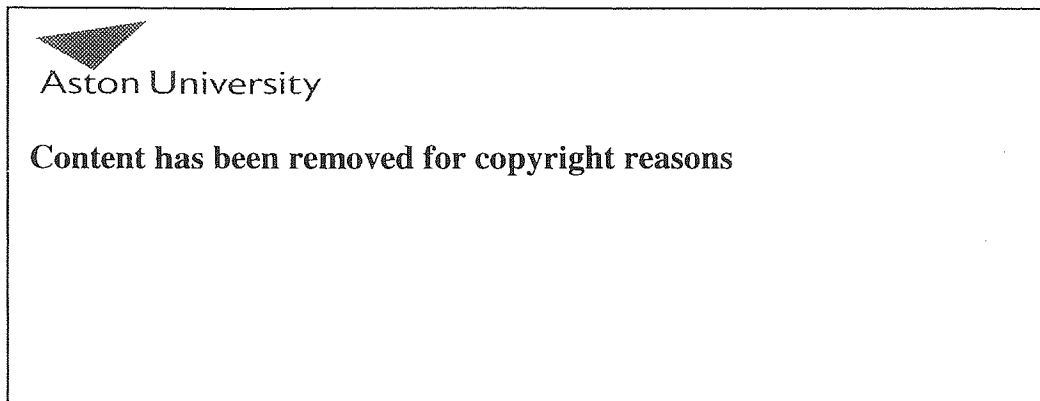
aims at training personnel and specialists in planning and the implementation of socio-economic development programmes.

- iii) The Arab Fund For Economic & Social Development (Kuwait). The fund aims at building the Arab economy on a sound basis that could meet the requirements of socio-economic progress by financing projects.
- iv) The Inter-Arab Investment Guarantee Corporation (Kuwait). The Corporation aims to encourage the investment of Arab money in other countries by guaranteeing the financial investment.
- v) General Administration For South Arabia & The Arabian Gulf (Kuwait). The administration aims to provide technical assistance to South Arabia and the Arabian Gulf States in the field of education and health.
- vi) Regional Organisation For The Protection Of Marine Environment (Kuwait).

Table 14.1 illustrates the extent of Arab joint-venture projects.

The involvement of the State of Kuwait in dual and joint-venture activities with the Arab States aims to develop co-operation and strengthen the ties and links among the participants. For example, the Arab Council for Economic Unity was constituted in 1964 with the objective of organising the economic relations between Arab States, to suit their natural and historical relations, to realise

Table 14.1: Kuwait Involvement In Arab Joint-venture Agreements





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Source: "Arab Regional Meeting For Technical Development Among The Developing Countries", (Geneva: UNDP), May 1980. Annex I. In Arabic.

the best conditions for the flourishing of their economy and developing their natural resources and to ensure the countries' prosperity, thus gradually realising full economic unity among the Arab States.

Another example of Pan-Arab co-operation is the Arab-European Dialogue which aims at increasing the co-operation between the European Countries and the Arab States, to further support the Arab States' development plans by bridging and reducing the technological gap between Europe and the Arab World. The dialogue has made the Arab States realise the vitality of Pan-Arab solidarity and co-ordination to benefit from the European technological experts, in accordance with their actual needs and requirements.

An additional important example is the joint financing and participation of Arab States in the conference of Arab Ministers responsible for the application of science and technology for development which was held in Rabat, Morocco, in 1976 under the auspices of the United Nations. Pan-Arab co-operation was discussed and encouraged by the putting forward of the recommendations and resolutions of the Conference to support and develop Pan-Arab scientific and technological potentials and activities.

#### C) The International Level

The State of Kuwait, aiming to accomplish her socio-economic development plans has sought to acquire as many benefits as possible by co-operation with several

non-Arab countries and/or organisations. Each year, Kuwait invites experts in the diversified fields needed to provide assistance and expertise, to solve problems, train indigenous cadres, conduct feasibility studies, reinforce techno-scientific fields, etc. Refer to Appendix XLI for more details.

The above sections have provided the information regarding the participation and involvement of Kuwait in several joint venture projects and memberships of various specialised organisations. The effectiveness and perspectives of this liaison in assisting in fulfilling and achieving the development plans are discussed in the following section.

#### 4) Consequences Of The Contemporary Status Of Kuwaiti Liaisons With Specialised Agencies

In an attempt to evaluate the impact and consequences of the present status of Kuwaiti liaison with multi-functional specialised organisations, the Ministry of Planning in Kuwait has conducted analytical studies on the contemporary status and the best means for the relationship between Kuwait and the specialised agencies. The studies have indicated the following negative aspects:<sup>6</sup>

- i) Kuwait contributes to some organisations that have no real values and benefits to Kuwait.
- ii) Haphazard contributions are made without any evaluation or planning.
- iii) It is difficult to list, specify or classify,

organisations that have liaison with Kuwait (due to individual and un-coordinated contacts between various establishments and foreign agencies).

- iv) Some organisations receive lavish extra dues without any real contributions to socio-economic plans of Kuwait.
- v) There is repetition and contradiction among the activities of these organisations, and to some extent between the activities of sub-organisations or mother organisations.
- vi) There is duplication and discrepancies in national endeavours and attitudes toward some or, even one, organisation.
- vii) Chances of co-operation and benefits with these organisations are dissipated when they could be utilised for the country or her agencies.
- viii) Kuwait participates in tremendous numbers of non-vital or irrelevant conferences and meetings, sending large delegations for the sake of involvement with these organisations. Furthermore, when these delegations return to Kuwait they do not disseminate the proceedings or results of the seminars to colleagues.
- ix) Kuwait invites a large number of experts representing these organisations, which costs Kuwait huge allocations of finance and might not achieve optimum results.
- x) Liaison has been made ~~between some organisations whose representatives~~ fostered principles and points of view contradictory to the Kuwait position in the Arab,



Islamic or International Societies.

- xi) There is duplication and waste of endeavour by government agencies due to operating with these organisations in isolation, a situation which has also wasted the time and effort of the Council of Ministries in reading, evaluating and dealing with memoranda regarding the activities of different government authorities with the same organisations.
- xii) That the potential of Kuwait specialists who deal with such organisations is wasted since colleagues do not know about the contracts and efforts of others in national organisations.

It is worth mentioning that, in addition to Kuwait liaisons with multifunctional organisations, Kuwait has established economic aid funds to provide assistance to Arab and developing countries. Although, the funds were set up for mere political reasons, nevertheless, in the next section, we shall examine the possibility of directing the funds to support the techno-scientific infrastructure in Kuwait without altering its main objectives.

#### 5) Kuwait Fund For Arab Economic Development (KFAED)

A few months after achieving independence in 1961, Kuwait felt the need for recognition by and to sustain, her sovereignty within the rest of the Arab world. One of the principal achievements of her foreign policy was to assist in providing political stability in the Gulf Region. To do this, Kuwait established credentials as a progressive State,

compatible with the predominant current of Arab national sentiments without being involved in any quarrels. Such a policy was not merely prudent, but rather a specific, definite vision of the inter-dependence of the Arab world, a perception which was appropriately shown in establishing the fund. The historical, national tradition of Kuwait's support and assistance to others, as an Islamic nation and an internationally minded mercantile society also inspired the setting up of the Fund. The Fund was established on December 31, 1961, with a capital of K.D. 2,000,000 mainly to provide aid to the Arab countries.<sup>7</sup>

The Laws establishing the Fund were revised in 1974 to cover the supply of aid to developing countries as well. The Fund is a public corporation with an independent legal set-up under the supervision of the Prime Minister who also acts as Chairman of its Board of Directors.<sup>8</sup>

The Laws and charter of the fund and details of aid provided to various countries are included in Appendix XLII.

The extent and volume of the Fund's loans to several countries are illustrated in Figure 14.1.

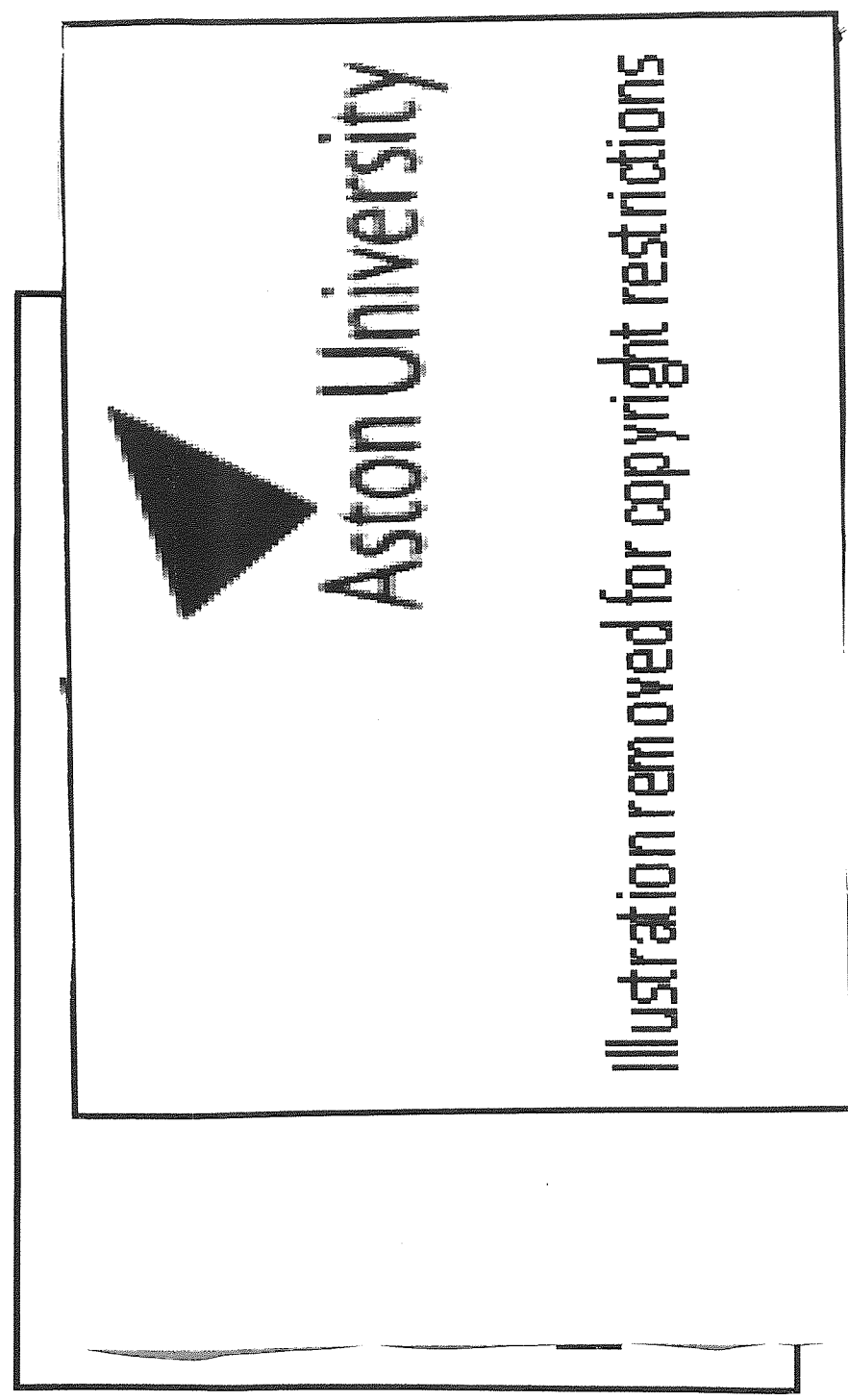
The political inclination of the Fund is seen in generous aids to various Arab, Asian and African countries, by its low interest rates (3 - 4% including 0.5% service and administration charges) and the generous repayment period (3 - 50 years).

The technical aids provided by the Fund to the

540 ↑ Fig. 14.1 : GLOBAL LOANS OF KUWAIT FUND FOR ARAB ECONOMIC DEVELOPMENT :

1962 - 1981

FIG. 14.1



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Source: Kuwait Fund For Arab Economic Development, Kuwait, Jan. 1982.

borrower countries were described by MR. BADER AL HUMAIDHI, the Fund's Deputy Director General for Operations and Finance as follows:<sup>9</sup>

- "i) They aim to provide grants to fund techno-economic studies for projects to be paid for by the Fund or any other agencies. The studies include: pre-investment evaluation, feasibility studies, projects preparation and sectoral programmes formulation. The consulting companies conducting such studies are selected by the Fund and the borrower country.
- ii) To provide technical, financial, economic and legal consulting services for various projects programmes and development policies in the borrower countries.
- iii) To provide grants to invite experts in various fields to the borrower countries.

No representation from Kuwait or the borrower countries are involved in such activities."

As we have indicated earlier, the Fund was established for mere political reasons, but the Fund should re-assess its policy to further develop and improve the status of the Kuwaiti techno-scientific infrastructures by adopting the following policies:

- i) Priority should be given to ensuring that the Kuwait Consulting and Engineering Design Offices are engaged in the feasibility and consulting studies, either totally or by allowing them to select international sub-partners in the areas that are lacking in these offices.
- ii) That the Kuwaiti Construction and Contracting Companies are involved in executing projects funded by the Fund either totally or as sub-contractors to international firms.

iii) That indigenous professional societies such as the Engineering Societies, the Economists Societies, etc., participate in and perform some of the Fund's activities.

The above views on the links of the State of Kuwait with specialised agencies and on Kuwait's financial contributions to various countries would lead us to propose some further recommendations.

## 6) Recommendations

The following recommendations are proposed to further gear the granting of Kuwaiti funds to various organisations and countries to achieve the best and utmost utilisation of such fund in the accomplishment of the national development plans:

- a) The State of Kuwait should define her scientific and technology policies and needs to develop her socio-economic goals and thus participate in the membership of regional and international specified agencies accordingly.
- b) The establishment of a Higher Committee dealing with liaisons and membership is essential to suggest objectives, define policies and co-operation programmes with specialised agencies, control methods of contributions, co-ordinate the endeavours of various government agencies and most important to evaluate the needs of Kuwait, assessing the type and number of organisations with trends that would be useful to its development and socio-economic

goals. The central body could thus be allocated the following duties:

- i) To collect all information (activities, scopes objectives, capabilities, etc.), regarding specialised agencies.
- ii) To make full use of activities and services of the regional and the international organisations - as a member state - according to their specialised line of activities.
- iii) To urge the organisations, particularly the United Nations and its specialised agencies, to become thoroughly involved and exert more effort to developing the technical infrastructure in Kuwait.
- iv) To evaluate all technical assistance needed by government bodies, (i.e., consultation, experts, projects, etc.), and to allocate the specialised organisations accordingly.
- v) To evaluate the government bodies which have liaison with the organisations in order to co-ordinate them, to avoid duplication, or incongruities among them or between their needs and general development goals.
- vi) To programme technical assistance into short, medium and long term schedules in accordance with development programmes.
- ii) To recommend the necessary financial allocations to

participate in specialised organisation.

- viii) To monitor and follow up the execution of agreements and joint activities between national bodies and the organisations, by co-ordination with these bodies.
  - ix) To recommend and prepare for Kuwaiti participation and attendance in the organisation's relevant programmes of conferences, etc. The body should also be responsible for furnishing establishments concerned with pertinent information required to attend these events and to study and evaluate the outcomes of Kuwaiti participation. The body should be the sole organ to be consulted before any commitments are made or there is any participation or enrolment with specialised agencies.
- c) The Kuwait Fund for Arab Economic Development should involve the Kuwaiti Consultancy and Engineering Design Offices, the Construction and Contracting Companies and the concerned professional organisations in executing totally or partially its funded projects.

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## CHAPTER XV

### CONCLUSION AND RECOMMENDATIONS

Science and technology are the buttress and tools, rather than a component, of the national development plan. It plays an important role in improving the socio-economic structure. For the full achievement of national development plan, efforts of science and technology policy-makers and socio-economic planners should be linked together to formulate, supervise and execute science and technology policy that is in consonance to the financial, physical and human resources of the country. Such policy should regulate, for example, the import of technology and enhance bargaining ability of her manpower by allowing them to attend related seminars and training courses and introduce them to the experts of the fields. The policy should also balance the entire characteristics of all the industrial and productive sectors in order to design a set of flexible policies and strategies accordingly, taking into consideration the size and function of the industry, type of technologies employed, the extent of their technological activities, the involvement of indigenous cadres at all levels, market outlook, any structural deformation, etc.

An integral part of science & technology policy is the formulation and adoption of appropriate R & D policy.

For such policy, endeavours should be oriented mainly towards identifying the specific needs of the country to solving problems facing her development, to regenerating technological activities, to establishing development priorities, to improving technological independence, to disseminating information relevant to the technology and technology transfer, to cooperate with industrial and productive sectors, to conserving natural resources and to investigate alternative ones, etc.

Arab countries have had unsettling changes in leadership, military unrest, a colonial past, together with rapid growth changes, all of which have contributed to the lack of correct leadership in drawing up policies. Science and technology policy is a term often wrongly associated with a statement of what, with hindsight, seems a positive Government action. Each Arab country is at a different level in learning the correct way to go about implementing a science policy and technology policy.

No two nations will approach the question of a science and technology policy in the same way, as such policies are closely related to political and cultural institutions, themselves, peculiar to each individual country. Searching for ways to solve political problems in order to achieve national goals is in effect building up political, economic and cultural institutions. A society which is in a healthy enough state, i.e., where freedom of thought and action prevails, that is aware of its historical and cultural heritage, is able to approach problems in a rational fashion and is able to evolve effective policies and the means to

carry them out. Moreover, countries which have high GNP and a small population as in most of the Gulf States are forced to draw policies that are different from the ones drawn by countries with lower GNP and high population as in Egypt. If the poorer and labour intensive countries, for example, the policy-makers might envisage the development of capital saving and home-made intensive technologies. As for the other class, the policy-makers would prefer capital-intensive and labour-saving technologies to improve their technological status and to minimise the import of foreign labour and its resulting negative social impact. However, such policies' assumptions are in conformity of <sup>with</sup> almost all the literature that have been dealing with science and technology policy for development of nations in that the policy which might be drawn to Arab countries which have lower GNP (i.e., US\$.100-300) and are dense in population are in conformity to policies drawn for similar countries such as India and some of the Latin American States.

A country could have a zero National Science and Technology Policy if she exclusively uses technology-free turnkey contracts, or a 100% policy if it utilises its own national firms and institutions to research, plan, design, erect, operate, manage and manufacture all inputs to any activity it conducts. Practically speaking, no country in the World has either of these extremes and, rather, all countries of the World have a percentage (higher in the advanced World and lower in developing countries) of national policy. The author believes that the advanced World might have developed 70 - 90% self-dependent policy, whereas this ranges from 0 - 10%

in the Arab World, and to some extent, in most of the developing countries.

Policy-making in the field of science & technology for the purpose of analysis as well as for decision-making depends on comprehensive quantitative and qualitative information. A distinguished or illustrious survey of the country's National Scientific and Technological Potential (STP) will assist the planners to acquire this quantitative and qualitative information. For STP consists precisely in collecting, updating and analysing the significant data (administrational, functional and statistical) on resources that are related to all scientific units in the country. But since STP survey only provides part of the information required for science & technology policy-making, socio-economic as well as international data should also be taken into consideration.

STP may be regarded as an interacting system comprising human, financial, material, informational and management factors. This diverse order of magnitude, structure and combination of factors in different Arab States give rise to highly differentiated patterns of scientific and technological development in the region. One of the significant goals of national policies in the field of science and technology is to rationalize the growth of STP and to strengthen the effectiveness of its impact on overall socio-economic development.

The significance of human resources for the development of science and technology is boundless. The necessity of the implementation of plans gives rise to the realization

of the shortage of trained manpower. So, in order to satisfy the need for trained manpower, education and training became a part of the development system. But it should be linked with comprehensive improvement of social conditions, for the achievement of the full target.

However, some countries might give relatively high priority to the production of middle and high level manpower at the expense of the improvement of basic education for development of human resources. Such policies might produce negative impacts which create burden for the national development plans, e.g., over-supply of highly trained manpower which cause migration to developed countries.

As for Kuwait, as a rich country with the highest GNP in the world situated at the tip of the Arabian Gulf and enjoying a rather large oil reservoir which is expected to be the main source of income. As has been illustrated in chapter II, Kuwait has a unique class of development in that she is neither in toto developed nor in toto developing, which in turn might expose Kuwait to several implications. The constitution of Kuwait and the various (unendorsed) five-year development plans have called for the the development of the physical and human resources and any physical structures and institutions needed to assist in the fulfillment of these plans. One of the main overriding long term objectives of these plans is economic diversification to make Kuwait less dependent on oil. The author believes that such objective could be achieved by strengthening and development of industrial, services and agricultural sectors and by investment of income in and outside Kuwait.

The attainment of the development plans necessitate the employment of science and technology as an instrument of development and as a way of thinking since the lack of a scientific atmosphere in the country is considered as a real constraint facing the development.

As a consequence of these needs, several scientific and technical establishments have been established to act as an infrastructure for science and technology endeavours in Kuwait; amongst these establishments are:

1. Ministry of Planning
2. Ministry of Commerce & Industry
3. Kuwait University
4. Kuwait Institute For Scientific Research
5. Kuwait Institute Of Applied Technology
6. Water Resources Development Centre
7. Department of Agriculture.

However, as has been discussed in the previous chapters, the following main facts have emerged regarding the socio-economic and technical status in Kuwait:

- i) Kuwait is a rich country with high GNP, striving to employ science and technology to fulfil her development plans.
- ii) Kuwait is an extensive importer of foreign technology with no evidence of any design, planning or manufacturing of local technology.
- iii) Kuwait is solely dependent on oil and plan to diversify

her income and economic activities.

- iv) Kuwait is heavily reliant on expatriate (over 75% of total workforce), and has established several institutions to develop indigenous manpower.
- v) Kuwait has established R & D institution and research-financing foundations which do not perform or sponsor research activities which are in conformity to the national development plans.
- vi) Kuwait is one of the very few Arab States which has elected Parliament, nevertheless, the Parliament did not form any standing committee for science, technology and industry.
- vii) Kuwait has not ~~formulated or promulgated any explicit~~ national science and technology policy.

Therefore, Kuwait is faced with a challenge of employing science, technology and industry to diversify her economy and to assist in fulfilling her national development plans nevertheless, Kuwait has not formulated any explicit plans which united them in a coherent fashion together.

Logically, any reasonable and rational R & D activities must necessarily be addressed to the problems of the general characteristics of the country. Thus one would expect that research efforts to be directed towards the utilisation of land in what may be called desert vegetation, or the development of energy resources, such as oil and petrochemicals. Unfortunately, in most cases, research

efforts were of limited success so far, a fact which may be attributed to the relatively late start in research activities and the unawareness of linking research efforts to the national development plan in Kuwait.

The main reason, however, is perhaps, a result of the manner in which R & D has been conducted. In the efforts to produce meaningful results, research activities have been scattered and shallow. There has been no real impact on any specific area of the vast technological advancement in the world which could benefit Kuwait. As an example of such argument is research performed in the oil and petrochemical sectors. Little and limited efforts have been done in the various technologies of oil such as production, refining or petrochemicals. The transfer of technology endeavours have failed to produce any "domestic" technologies, or even to develop the "acquired" technologies.

It is reasonable to assume that the "transfer of technology" could be achieved especially since most of the well established process and/or construction companies are willing to produce a prototype (or pilot) plant that may be erected by them in Kuwait. Such accomplishments would allow researchers and engineers to learn more about the actual plant and thus benefit from experimentation on a small scale. Successive training of such trends would encourage them to modify certain aspects of the process in the pilot plant and hence in a way, entering the yet undisclosed world of processes.



As in the construction sector, there is a great demand for tropical building materials and for proper road construction. Petroleum and its heavy products stand as the logical raw materials for building purposes and road paving. Also, related to the petroleum industry, is the problem of maintenance and materials handling, due to the severe weather conditions of Kuwait. This would require a proper research team in the corrosion prevention and corrosion control field with adequate knowledge in materials selection and chemical treatment. Unfortunately, no proper research efforts in corrosion have yet been done. Since Kuwait relies to a large extent on sea water as a source of drinking water, it would have expected that certain efforts would have been directed towards the study and development of desalination techniques through joint ventures - in pilot plant work - with some companies who are known to be advanced in this field, and those who have won contract jobs to construct desalination plants in Kuwait or in the Arab world.

Another research topic which deserves real and serious attention concerns desert plant life, desert vegetation and food resources. In particular, a combination of conditions must be looked into, i.e., production of vegetables and food in an arid area, with limited fresh water supply but with an abundant supply of brackish water and in a country where the characteristics of the soil could be easily rendered useful for growing crops, as was proved to be true from various early studies. Technologies must be started and applied in Kuwait and in neighbouring countries for the development of food industries based on sea-food, palm trees,

vegetables and fruits, livestock and poultry, etc. To date activities in the area and related industries have been non-existent.

As for the concept of "appropriate technology" and its application in Kuwait. The concept illustrates that a country should either encourage the design and manufacturing of local technology to meet the demand of the country or that the country should import the technology that produce positive impacts (environment, employment, economy, etc.), should be appropriate for the environment of the host country and which is suitable for the country's goals and objectives.

As for the first option, the discussion throughout the thesis has indicated that Kuwait lack, the manpower and physical infrastructures and experiences which allow her to manufacture indigenous technology, and if so, several policies such as educational industrial and population have to be revised and reformulated to progressively introduce this concept and apply it by establishing the required infrastructure and education. However, the scientist and engineers involved in the generation of appropriate technology should absorb and/or generate the required preferences, guidelines and paradigms essential for the development of the apt technology. Such trend increases the intellectual burden on scientists and engineers and thus compel them to understand the economic, social and environmental ramifications and implication of their societies. Therefore, the second option would seem to be preferable for Kuwait, providing that the acquired technologies are adopted in accordance to Kuwait's environment and socio-economic structure. Such technologies

should be geared not only to develop the advanced pace of their development plans but should utilise the available raw materials (gas & oil), to minimise the dependence on expatriates and to be appropriate for the Kuwaiti climates. This last task is an essential one since, as has been declared to the author by an official in the oil and petrochemical sectors, Kuwait spends intensive capital annually to maintain the imported technologies which were made originally to suit the European and American climates. The best method to minimise such cost is to modify the technologies to be operating in Kuwaiti climates with minimum repair and maintenance. Thus, the first decision to be made is to choose technology for a particular project or range of activities. The option should involve a range of alternatives which would increase efficiency.

Needless to say that adopting the second option, e.g., reliance on acquisition of foreign technologies, would increase the technological dependence of Kuwait unless proper policies are proposed and adopted. The proposed policies are to minimise technological reliance phenomena should realise that technological dependence concept induce with it the following negative impacts:

Cost: There is no easy or direct way to calculate the precise cost Kuwait incurs when importing foreign technology. There are obvious expected costs, e.g., direct payments for purchasing the technology, licence fees, payment of royalties and salaries for accompanied manpower, etc., all of which are further complicated by the system of over and under invoicing

tax purposes. However, there are costs that are difficult to define, e.g., the suppliers' insistence that spare parts for the imported technology can and should only be bought from a source they stipulate, eventhough a more competitive purchase could be obtained elsewhere. Often the supplier insists on foreign personnel being employed to use and maintain the technology, thus strengthening the importers' dependence on them. Analysis of various sectors in Kuwait (refer to the thesis) indicates that the above two stipulation do not exist and are not acceptable by officials in Kuwait, which illustrates that at least Kuwait does not pay indirect cost as mentioned above.

Lack of Control: The technological dependence of Kuwait on one supplier might force her to fall in the economic and political orbit of this country. Furthermore, foreign investment inside Kuwait might also increase such links. However, interviews with various officials reflected that Kuwait diversify her source of importing technologies and when allowing a foreign investment, the Government stipulates that foreign entrepreneurs' shares must not exceed 49% to allow control of the venture by Kuwaiti entrepreneurs.

Lack of Effective Indigenous Scientific and Innovative capacity:

If foreign engineers and other personnel are required to fit, operate and maintain the imported technology, Kuwait is not learning anything, and is in fact merely increasing her technological reliance. Interviews with various officials in Kuwait, as illustrated in the context of the thesis illustrated

two distinct trends:

- i) Some firms stipulate that their indigenous cadres should be involved in the blue-print process, design and operation of the technology and allow only for national cadres to maintain the technology, but do not conduct any innovative or R & D activities on the technology. Such trend play good role in developing the Kuwaiti manpower and call for more attention to R & D and innovative endeavours.
- ii) Other firms rely heavily on foreign firms to design and construct the technology (turnkey process) and involve local manpower (whenever available) in operating the project.

Therefore the author believes that the best approach towards self-dependence concept is to formulate policies which involves the creation and establishment of capabilities for the management of scientific and technical knowledge by development of indigenous infrastructure particularly manpower and industrial sector, and by integration of the scientific and technological infrastructure with institutional and societal needs on one hand and with the policy-makers on the other.

The author has conducted <sup>how many</sup> ~~ten~~ interviews with various officials (in different political levels) in Kuwait who have alluded to him that science and technology should be the backbone and guiding concept of the national development plans and not a mere component of it. However, as has been shown in chapter ~~three~~<sup>three</sup> of this thesis that there exists no explicit science and technology policy in Kuwait which

make difficult to ascertain the degree to which science, technology and industry contribute to the formulation of the national development plan. Realising that science, technology and industry are not only the tools, but the buttress and driving force in development, the various ways and means in which science and technology are affecting change and progress, planned or not, in Kuwait are fragmentary and haphazard, depending on the degree of impact produced by science and technology on the socio-economic-industrial structures. The implications of the absence of defined science and technology policy on several sectors in Kuwait have been discussed throughout the thesis, amongst which are:

- 1) Lack of appropriate development of the potential of Kuwaitis in Industry, Scientific and Technological fields.
- 2) The scarcity of qualified manpower and of scientists will result in Kuwait remaining almost completely industrially, scientifically and technologically dependent for a long time.
- 3) Difficulties in apprehending and adopting R & D in Governmental and non-Governmental Laboratories.
- 4) Lack of Science and Technology consciousness and appreciation in Kuwait's cultural environment.
- 5) The need to develop and improve utilitarian links between industry with R & D institutions and Universities.
- 6) The need to establish concrete Industrial, Technological and Scientific Infrastructures.

- 7) To eliminate or reduce the delay of the introduction of science-based industries and productive firms.
- 8) The lack of conformity of R & D projects to the national priorities.
- 9) The lack of awareness of the role to be played by CEDO's in the development of technical manpower and transfer of technology. Thus, no measures have been taken to involve them in tenders executed in Kuwait. Such offices could participate in one or all of the following activities:
  - Feasibility Studies
  - Site Selection
  - Criteria Development
  - Facilities Design Programme
  - Budget Development
  - Architectural Development
  - Space Planning
  - Interior Design
  - Initial Inventory
  - Procurement
  - Materials Management
  - Construction Management
  - Computerised Scheduling
  - Quality Control
  - Financial Management
  - Operator Selection
- 10) The absence of a Centre to plan for the selection of the appropriate technology for Kuwait's harsh environment to conduct technology assessment and to choose the best channels for technology transfer.
- 11) The absence of any legislation, regulations or orders relating to technological issues, i.e., technology transfer, adequate patent systems, CEDO's participation in tenders executions, etc.
- 12) The absence of a methodology for the popularisation of

science and technology and their role in the development of Kuwait.

- 13) The need for a scheme for well-planned R & D activities to maintain high levels of agricultural, animal and fish production by means that will be environmentally acceptable and profitable to the farmers and consumers.
- 14) The lack of proper channels of communication with the public to allow their involvement in the choice and utilisation of the acquired technology.
- 15) Duplication of links and liaisons between various Government's agencies and foreign scientific organisations.
- 16) The absence of plans and schemes to create indigenous capabilities to generate technological know-how and to gear foreign and local technology to fully utilise all the accessible national physical and human resources.
- 17) The absence of science and technology policy research endeavours. It is well known that one of the most difficult decisions a developing country has to make is whether to try and develop their own technology, or whether to bring it in from abroad. A variety of factors have to be taken into consideration here - what the level of development actually is within the country, what resources - in terms of finance, manpower and materials are available, what its national goals are, how far it is aware of technology available abroad, and whether long-term solutions or short-term solutions are being sought. Although deciding whether to buy or produce locally is of particular importance to



developing countries, advanced countries also have to make a similar choice.

All things considered, Kuwait often have no real choice in the matter - whilst they might prefer to produce locally, circumstances force them to import technology from abroad. From here on in they must strive to place themselves in the best bargaining position possible and try and ensure that the technology they are importing is indeed most suited to the country's individual requirements.

- 18) One important factor that should be taken into consideration is, although a great amount is spent on science and technology, there is hardly anything like functional state budget for R & D activities. However, it should be made clear that this aggregate budget should not be constant but rather ~~simultaneously~~ increased with the acceleration of scientific activities in the country.

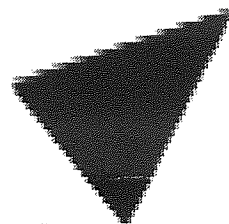
In conclusion we can say that the slowly rising of science and technology policy in Kuwait will have to be well integrated or united with and defined in terms of National Development Planning. Science and technology will remain static if there is no good response from the long-term science and technology planning and short or medium-term socio-economic planning. There is much gap between social development and science & technology progress. This lead to the formation of "two cultures" in many modern societies obstructing the relation between science and technology on one hand and social development on the other. Thus, the development of science

and technology policy is the way to exclude the above mentioned implications.

The future technical and scientific opportunities in Kuwait lie in the adoption and development of the following activities:

1. Information and communication systems which enable Kuwait to follow up the development and fluctuations of the international business markets where Kuwait wishes to invest.
2. Improvement of oil reserves, petrochemical and chemical industries, catalysts and oil raw materials based industry.

The contemporary world recession of oil markets is a warning sign for Kuwait to develop and encourage alternative sources of income, particularly to enhance and support the oil-based petrochemical industries. Such a sign has been declared in the Financial Times issue on January 25, 1982, page 16, as follows:



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- 3) Solar energy utilisation.
- 4) An agricultural policy which allows for Kuwait's harsh environment and scarcity of water and which would increase the Kuwait self-reliance for food consumption (sea food, livestock, poultry, fruit, vegetables, palm tree and any other food source to be developed by green-houses or any other technical methods).
- 5) Corrosion inhibition: A tremendous amount of money is lost annually due to the corrosion of pipes carrying oil or water.
- 6) Conservation of energy.
- 7) Housing Research (climate modelling).
- 8) Pollution Programme (to include weather and climate control, waste treatment, impact of pollutants on the environment, environment management, control and protection, climatology, control of industrial pollution, etc.).
- 9) Cost benefits and cost effectiveness studies for health care: to define health policy rather than supplying medical services (the influence of lifestyles, i.e., working conditions, diet, pollution, etc., on the health of various groups of the inhabitants). Industrial environment or any ecosystem disturbance will definitely affect the long-term health of the people.
- 10) Increasing the economic revenue from non-depletable resources (investment, industry, shipping, etc.).

- 11) Remote sensing for resources assessment (land and sea).
- 12) Traffic and Road Control.
- 13) Only industries with high profitability should be accepted or if they are not able to offer a high profitability, they must be able to present clear social benefits and import substitutions.
- 14) Special areas in the export market for which Kuwait's situation is not too much of a handicap, should be located. Kuwait should then try to compete in that market, co-operating in the first instance with foreign firms who can provide the technology.
- 15) With regard to manpower, a long-term policy for development is required. A sufficient supply of manpower who have skills in the right areas, are needed as a foundation on which science and technology can develop. Illiteracy needs to be eradicated, and programmes of adult education, where needed, implemented. Modern teaching equipment is required, together with more trainers. The development of manpower is dependent upon the development of education. There is a close relationship between the number of specialists, managers, etc., and an increase in production.
- 16) The Government should have a clear picture of how they wish to see the economy develop so that the correct technology can be purchased. There is a definite need for a logical base upon which criteria for selection of technology can be centred.

17) Co-operation arrangements with other Gulf States worthy of consideration by Kuwait in terms of industrial planning and technology may take the following forms:

- a) Co-operation in developing national capabilities for evaluating, establishing and managing technologies and projects.
- b) Co-operation arrangements for dealing with foreign suppliers, technology, and equipment whether through licences, patents or joint projects.
- c) Co-operation in selecting projects that are, or could be, interdependent in terms of supplies and requirements from resources available in the markets of other Gulf countries.
- d) Co-operation in setting up and supporting scientific policies that serve technological policies of the parties concerned.

Therefore, as there is no clearly expressed Science and Technology Policy, per se, in Kuwait, there is a need for an adequate and well established Science and Technology policy, aiming to create scientific and technological leadership capable of administrating and organising scientific and technical activities to meet the country's needs and challenges by total involvement with research problems related to Kuwait and its neighbours and then by establishing research priorities.

The author would recommend that the decision-makers in Kuwait should formulate national Science and Technology Policy by making it as wide-ranging as possible and consequently establish a policy-making body responsible for the formulation of this policy.

What is needed from such a policy-making body is the establishment of science and technology policies in the form of plans directed toward serving the overall development of the country. If we look at the organisational structures of some developing countries, we can see the importance attached to science and technology for development by the sophistication of the agencies established, their accountability to only the highest authorities of the State and their close working relationships with the top agencies of economic and social planning. Government provides these scientific and technological agencies with extensive facilities to enable them to develop long-range strategies. Among the functions of such agencies is the co-ordination of scientific and technological researches between the various institutions of the country for the purpose of integrating them and directing them toward serving the overall development of the country. In certain countries we can also see that these agencies report to specific Ministries (such as those of Higher Education and Scientific Research) or to the office of the Head of State. Science and technology agencies may be in the form of councils or committees at the Ministerial level, which would represent those sectors directly concerned with science and technology (such as agriculture, industry, planning or education), or

they may be in the form of councils at the highest political level. Such agencies serve to designate the national objectives and policies of science and technology.

In order to establish a well-defined natural science and technology policy, the author would recommend that the execution of such a policy and the policy-making body should be achieved in two phases:

- 1) Phase One - (2 - 3 years): to establish a National Science and Technology Advisory Body linked to the office of His Highness The Crown Prince and Premier to survey the national potential (in terms of manpower or institutions), to assess the R & D activities, to prepare for the draft-formulation of the National Science and Technology Policy, and to conduct some of the objectives assigned to the body of phase two.
- 2) Phase Two - (3 - 5 years): to promulgate a Law allowing for the establishment of the National Science and Technology Policy-Making Body. The Body should be chaired by His Highness The Crown Prince and Premier. The Body should consist of the following members:
  1. The Minister of Defence.
  2. The Minister of Electricity & Water.
  3. The Minister of Oil.
  4. The Minister of Education.
  5. The Minister of Public Health.
  6. The Minister of Public Works.
  7. The Minister of Commerce & Industry.

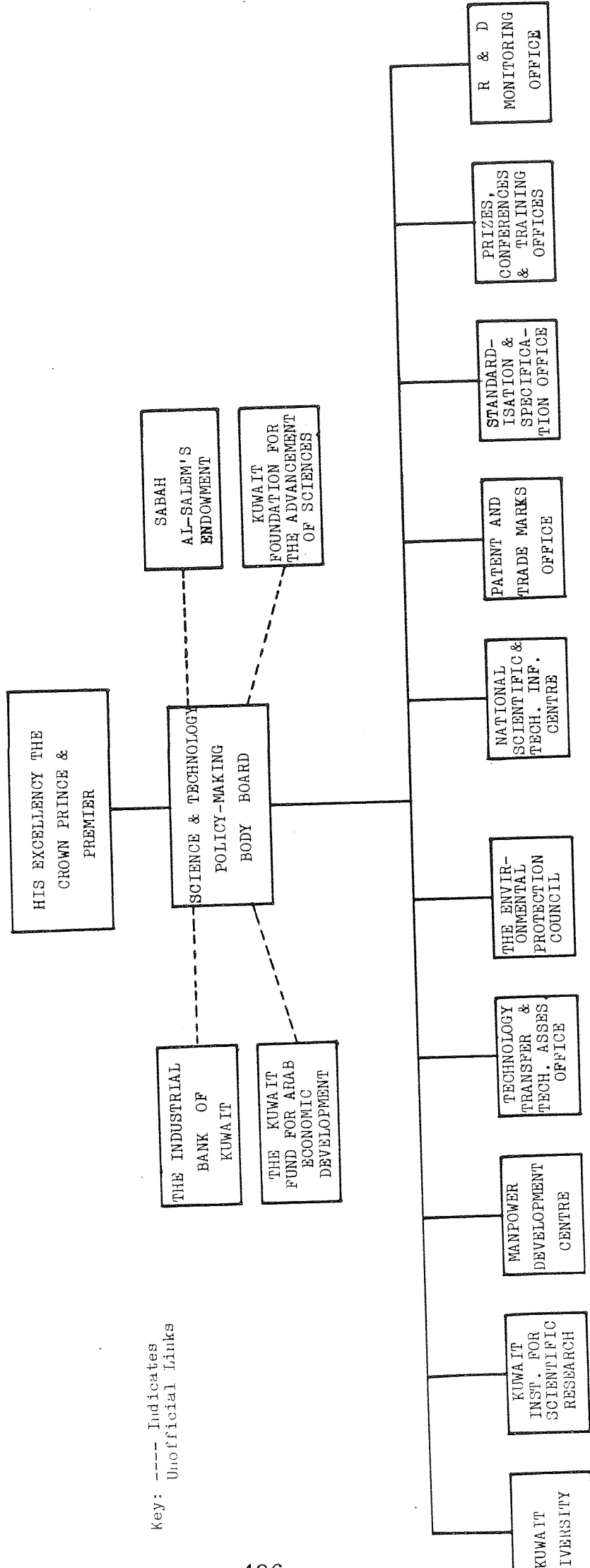
8. The Director of the Body (to act as a Secretary for the Body).
9. The Chairman of the Industrial Bank of Kuwait.
10. The Chairman of the Chamber of Commerce & Industry.
11. The Director of KFAS.
12. A Representative of SABAH AL-SALEM's Endowment.
13. A Qualified Kuwaiti in Legal Affairs.
14. A Qualified Kuwaiti Scientist.
15. A Qualified Kuwaiti Sociologist.
16. A Qualified Kuwaiti Economist.
17. A Qualified Kuwaiti Environmentalist.
18. An Experienced Industrialist.

The proposed hierarchal structure is illustrated in Figure 15:1.

The link of the body to His Highness The Crown Prince and Premier, although His Excellency might not have enough time to spare for the body, is to give a political status to the body to ensure that its conductances avoid any routine procedures and delay to ensure the implementation of their recommendations and plans, to have the authority to control programme implementation, to have the power to integrate their policies and plans with other policies, e.g., industrial, manpower development, educational, etc., to be guaranteed certain measure of stability in discharging their functions and fulfilling their long-term objectives and to receive proper political and financial support from the Government. However, there exist in Kuwait several councils that are headed by His Excellency, i.e., Higher Defence,



Fig. 15.1: The Proposed Organisational Chart For The National Science & Technology Policy-Making Body In Kuwait



Key: - - - - Indicates Unofficial Links

Civil Service, Higher Petroleum, etc. Interviews with some members of these councils confirmed to the author the importance of linking such body to His Excellency to assure political and financial prestiges.

The choice of the Ministers of Ministries and Chairman of establishments which are involved with science and technology to be members in the SPMB, has two purposes:

- i) To allow them to discuss and present to the body all matters, problems and challenges facing application of science and technology in their scope of activities to discuss collectively the solution or approaches to solve them.
- ii) To ensure that any matters or issues proposed by the body to their establishments would have priority and serious approach.

Furthermore, the involvement of qualified experts, e.g., scientist, economist, etc., is to ensure that the body has amongst his members personnel which have experiences in the field related to science and technology. Such members might have contacts with local or foreign organisations to be used as key-references whenever needed.

Revision of various literature surveys published by IDRC, UNESCO and SPRU showed that global experiences for either developed or developing countries - in employing science and technology for development was best achieved by establishing an autonomous body (council, ministry, etc.) to be linked to a high political person in the country. The

council should consist of department which deal with science and technology policy issue such as technology assessment and forecasting, manpower development, R & D policy, etc., and should establish unofficial links with private organisations which deal with science and technology, e.g., research-financing foundations, industrial bank, environmental protection societies, etc.

An important issue for establishing such body in Kuwait is that it is possible in principle and practice to do so in Kuwait according to her socio-economic situation for the following reasons:

- i) Kuwait is heavily extensively employing science and technology for development and hence such efforts need an organising body.
- ii) Interviews conducted by the author with officials and concerned public in Kuwait avow the necessity to establish such a body to organise, monitor and formulate proper policies.
- iii) Kuwait has formed good experiences in establishing successful higher councils linked to His Excellency The Crown Prince and Premier such as: Higher Petroleum Council, Civil Service Commission, Higher Defence Council, etc.

Therefore, in order to fully develop and utilise scientific and technical activities in Kuwait, the author suggests that the SPMB in Kuwait should be assigned the following responsibilities:

- 1) To formulate the National Science and Technology Policy in consonance with Kuwait's requirements, priorities and her overall National Development Plans.
- 2) To implement and monitor the application of the National Science and Technology Policy after its approval.
- 3) To co-ordinate the research and development activities, particularly applied research, throughout Kuwait, to adumbrate the necessary measure and criteria to encourage their performance and to allocate and distribute funds to R & D as an increased percentage of GNP.
- 4) To integrate the National Science and Technology Policy Plan as a part of National Socio-Economic-Industrial Plans.
- 5) To enlist the active participation of scientists, technologists and engineers in the formulation of the National Socio-Economic-Industrial Plans and to draw up schemes for meeting the needs of such personnel in various sectors.
- 6) To formulate adequate plans with a view to guaranteeing a minimum of 1,000 qualified scientists and engineers engaged in R & D per million inhabitants, taking into consideration methods and policies to raise the number and standard of medium-level specialists and technicians employed in scientific, technical and industrial activities. Measures should be formulated to retain foreign and Kuwaiti technicians, engineers and scientists by improving their material and financial situation and upgrading their professional standards.

- 7) To be the sole Body in Kuwait dealing with all issues and aspects related to science and technology.
- 8) To formulate necessary measures needed to guarantee the initiation and continuation of mutual co-ordination and harmonisation of National Science and Technology Policy and in the field of R & D in context of equivalent Arab Policies particularly the Arabian Gulf States.
- 9) To adopt a policy to acquire and disseminate scientific and technological information and to regard it as a vital and integral part of the National Science and Technology Policy.
- 10) To set up a specialised centre for the training of specialised personnel in the various technical and technological fields such as technology transfer, technology assessment, technology forecasting, patent system and trademarks, scientific technological popularisation and education, etc. Such institutions will also develop mechanisms to improve capabilities in the search, selection, negotiation, adaptation and assimilation of foreign technologies.
- 11) To propose plans to promote domestic productions, increasing the export markets and diversifying the economic resources.
- 12) To propose an institutional structure, as well as financial, legal and administrative mechanisms which will allow an accelerated scientific and technological development.
- 13) To formulate policies to stipulate the involvement of

National Contracting Companies and Consultancy & Engineering Design Offices in the execution of tenders in Kuwait.

- 14) To propose reasonable awareness of future tendencies in science and technology as a necessary background for long term planning, for defining gaps to be compensated by transfer and for development of educational training systems.
- 15) To pursue the progresses of science, technology and research results in the world and provide scientists, engineers, technologists and technicians in Kuwait with necessary facilities to keep pace with such advancements.
- 16) To organise State Prizes for science and technology and any other means of encouraging the efforts of potential personnel in the scientific, technical and industrial sectors.
- 17) To formulate policies regarding the organisation of, and participation in, scientific and technical seminars, training courses and workshops.
- 18) To advise the Government on any issues related to science and technology, and to inform the Government on the R & D activities and results in the public, private or mixed sectors and any other concerned matters. The Body should submit an annual report to the Government concerning its activities.
- 19) To adopt schemes to establish the needed number of technical

and vocational institutions to provide and train the lower and middle level of national personnel in agricultural, industrial, chemical, technical and commercial activities.

- 20) To design a methodology for mobilisation of experts, engineers and scientific cadres between industry and university and R & D establishments.
- 21) To participate in plans formulation (with concerned authorities) to assure a high rate of economic development by further improvement of major economic resources, conserving depletable resources and optimising oil revenues.
- 22) Minimise the internal brain drain, through various economic, scientific and social measures to Kuwaiti scientists and engineers, particularly those engaged in R & D activities.
- 23) Encouraging the private sector to allocate a percentage of profits for R & D activities and the development of scientific and technological potential.

Furthermore, the author suggests that the National Assembly should form a Committee for Science & Technology to act as a shadow committee for the Body.

In addition, the Body should form an internal Committee headed by the Director of the Body with members of the head of the establishments attached to the Body and any other members sought the need for.