8-1985

Scientific-Technological Dependency and Uneven Development: The Case of Iran

Abdullah Mehdipour

Western Michigan University

Follow this and additional works at: https://scholarworks.wmich.edu/dissertations

Part of the Politics and Social Change Commons, and the Sociology of Culture Commons

Recommended Citation
https://scholarworks.wmich.edu/dissertations/2311
SCIENTIFIC-TECHNOLOGICAL DEPENDENCY AND UNEVEN DEVELOPMENT: THE CASE OF IRAN

by

Abdullah Mehdipour

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Sociology

Western Michigan University
Kalamazoo, Michigan
August 1985
With the decline of various forms of military and economic power of the more industrialized countries (MICs) as the primary control structure for maintaining the dominance/dependence relationships with the less industrialized countries (LICs) in the international political and economic system, science and technology has emerged as a significant means for sustaining international status quo. This type of relationship, regardless of its base, has been the major source of conflict between these two categories of countries and LICs have asked and acted for some changes in such relationships.

The problem of the study was stated in two questions. First, why and how Iran (an LIC) became dependent on more industrialized countries' science and technology. Or, in other words, why and how Iran's scientific-technological capability did not concurrently evolve with its productive forces? Second, what effect(s) did Iran's scientific-technological dependency have on its social structure, and what is the more appropriate strategy for reducing and/or ending Iran's scientific-technological dependency?

The "Dependency" paradigm was chosen as the theoretical framework. Historical analysis was used to analyze and explain the reasons for and the mechanisms by which Iran became dependent on
MICs' science-technology, by examining the general condition of Iran in the context of the global political-economic system during the nineteenth and twentieth centuries. The effects of Iran's scientific-technological dependency on its social structure was also empirically tested in terms of ten hypotheses. Following the tradition of dialectical method, all chapters move from general to specific. The emphasis was more on the internal factors, for which the "Dependency" paradigm has been criticized for underestimating.

It was found that the following four factors have been decisive in the nature and direction of Iran's dependency on more industrialized countries. First, the military and economic significance of the strategic position of the Persian Gulf, which has facilitated the penetration of MICs into Iran. Second, the neighboring of Iran with the Soviet Union, which has gotten Iran involved in the international conflicts and rivalry among colonial powers and superpowers. Third, the historic role of despotic, arbitrary power of the Shah as the central authority which made the Shah's desires far beyond any systematic planning. And fourth, the development of the oil industry, and the emergence of Iran as a major oil exporting country. The results of empirical testing of ten hypotheses supported the findings of historical analysis that Iran's scientific-technological dependency has distorted its social structure by making the oil industry an export enclave.

The theoretical, research and policy implications of these findings were discussed. It was argued that "Selective Dissociation"
seems to be an appropriate policy for an LIC to achieve scientific-technological autonomy, because it allows an LIC to synchronize its attempts for reducing its dependency and for increasing its capability.
INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.

2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.

3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of "sectioning" the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.

4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.

5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Mehdipour, Abdullah

SCIENTIFIC-TECHNOLOGICAL DEPENDENCY AND UNEVEN DEVELOPMENT:
THE CASE OF IRAN

Western Michigan University

University Microfilms International 300 N. Zeeb Road, Ann Arbor, MI 48106

Ph.D. 1985

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark √.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages √
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _________ lacking when material received, and not available from school or author.
12. Page(s) _________ seem to be missing in numbering only as text follows.
13. Two pages numbered _______. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received ________
16. Other _____________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________

University
Microfilms
International

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th>V</th>
<th>VI</th>
<th>VII</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td><strong>General</strong></td>
<td><strong>Specific</strong></td>
</tr>
<tr>
<td>Qualitative Analysis</td>
<td>Qualitative Analysis</td>
<td>Quantitative Analysis</td>
</tr>
<tr>
<td>Key Issues</td>
<td>Key Issues</td>
<td>The effect of science-technology on Iran's social structure</td>
</tr>
<tr>
<td>- Is Iran a specific case?</td>
<td>- Is Iran a specific case?</td>
<td>- Method</td>
</tr>
<tr>
<td>- Iran in the 19th century</td>
<td>- Economy</td>
<td>- General hypothesis</td>
</tr>
<tr>
<td>- Economy</td>
<td>- Society</td>
<td>- Specific hypotheses</td>
</tr>
<tr>
<td>- Politics</td>
<td>- Politics</td>
<td>- Data and data collection</td>
</tr>
<tr>
<td>- Society</td>
<td>- Economy</td>
<td>- Conceptualization and</td>
</tr>
<tr>
<td>- Politics</td>
<td>- Society</td>
<td>measurement</td>
</tr>
<tr>
<td>The case of Iran:</td>
<td>Summary</td>
<td>- Test of hypotheses</td>
</tr>
<tr>
<td>1800-1941</td>
<td>Summary</td>
<td>- Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summary</td>
</tr>
</tbody>
</table>

**Structure of the study:**
- Analytical dependency and uneven development
- The case of Iran

---

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
DEDICATION

To my childhood family that nurtured me to discover my adulthood family. A larger family whose members have been struggling throughout human history to search for the real causes and ways of alleviating the centuries old inequalities, and human suffering; to challenge the responsible actors and factors accounting for inequalities to bring about the human dreams of millenia. And finally to those who feel a deep compassion for people who simply because of the facts of history and their families' social class origin are condemned to live out their lives in deprivation and suffering.
ACKNOWLEDGEMENTS

I am deeply appreciative of the long-term friendly support I have received from the members of my dissertation review committee, Drs. Herbert Smith, Lewis Walker, and Dennis Simpson. I am especially grateful to Dr. Smith for his encouragement and helpful suggestions.

Abdullah Mehdipour
TABLE OF CONTENTS

ACKNOWLEDGEMENTS ................................................................. ii
LIST OF TABLES ........................................................................... xii
LIST OF FIGURES ......................................................................... xiv

CHAPTER

I. INTRODUCTION ........................................................................ 1
   The Problem ............................................................................ 5

II. TWO OPPOSING PARADIGMS .............................................. 12
   The Modernization Paradigm ................................................. 15
      Assumptions ........................................................................ 16
      Definition ............................................................................ 18
      Theory of Achievement Motivation ..................................... 19
      Theory of Status Withdrawal .............................................. 21
      Theory of the Stages of Economic Growth ......................... 23
      Theory of Four Revolutions .............................................. 26
   General Critique of Modernization Paradigm ......................... 29
   Dependency Paradigm ............................................................ 30
      Assumptions ........................................................................ 32
      Definition of Dependency ................................................... 35
      Two Lines of Thought in Dependency Paradigm .................. 37
      Three Formulations in Dependency Paradigm ..................... 40
      New Dependency ................................................................ 40
      Dependency and Development .......................................... 42
      Dependency and Imperialism .............................................. 44

iii

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colonial Education and the Social Structure of the Colonized</td>
<td>100</td>
</tr>
<tr>
<td>The Colonial Pattern of Dependency—Summary</td>
<td>103</td>
</tr>
<tr>
<td>Neo-Colonial Pattern of Dependency</td>
<td>104</td>
</tr>
<tr>
<td>Economic Features</td>
<td>107</td>
</tr>
<tr>
<td>Conditions of Industry in the LICs</td>
<td>108</td>
</tr>
<tr>
<td>The Pattern of Sub-Imperialism</td>
<td>109</td>
</tr>
<tr>
<td>Sub-Contracting Component Industry</td>
<td>112</td>
</tr>
<tr>
<td>Cultural Aspect</td>
<td>117</td>
</tr>
<tr>
<td>The Characteristics of the Neo-Colonial Higher Education</td>
<td>119</td>
</tr>
<tr>
<td>University Structure</td>
<td>119</td>
</tr>
<tr>
<td>Knowledge-Information Monopoly</td>
<td>124</td>
</tr>
<tr>
<td>Rapid Change and Concentration</td>
<td>126</td>
</tr>
<tr>
<td>Rapid Change</td>
<td>126</td>
</tr>
<tr>
<td>Concentration</td>
<td>132</td>
</tr>
<tr>
<td>Telephone</td>
<td>133</td>
</tr>
<tr>
<td>Radio</td>
<td>134</td>
</tr>
<tr>
<td>Newspaper</td>
<td>135</td>
</tr>
<tr>
<td>Advertising</td>
<td>136</td>
</tr>
<tr>
<td>News</td>
<td>136</td>
</tr>
<tr>
<td>Political Economy of Knowledge-Information</td>
<td>141</td>
</tr>
<tr>
<td>Properties of Knowledge-Information and its Market</td>
<td>146</td>
</tr>
<tr>
<td>The Effects of the Current Development of the Knowledge-Information Industry on the Relationships Between MICs and LICs</td>
<td>151</td>
</tr>
</tbody>
</table>
### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer of Knowledge-Information</td>
<td>154</td>
</tr>
<tr>
<td>Meaning of Knowledge</td>
<td>156</td>
</tr>
<tr>
<td>Summary</td>
<td>158</td>
</tr>
<tr>
<td><strong>IV. THE EFFECTS OF SCIENTIFIC-TECHNOLOGICAL DEPENDENCY ON SOCIAL STRUCTURE OF LESS-INDUSTRIALIZED COUNTRIES</strong></td>
<td>162</td>
</tr>
<tr>
<td>Nature of Science-Technology</td>
<td>162</td>
</tr>
<tr>
<td>The Effects of Scientific-Technological Dependency on the Social Structure of the LICs</td>
<td>170</td>
</tr>
<tr>
<td>Technical Aspect</td>
<td>173</td>
</tr>
<tr>
<td>Structural Aspect</td>
<td>175</td>
</tr>
<tr>
<td>External Factors</td>
<td>178</td>
</tr>
<tr>
<td>Internal Factors</td>
<td>180</td>
</tr>
<tr>
<td>Effect on Economy of LICs</td>
<td>185</td>
</tr>
<tr>
<td>Reverse Transfer</td>
<td>185</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>185</td>
</tr>
<tr>
<td>Disarticulation of Economy</td>
<td>185</td>
</tr>
<tr>
<td>Capital Accumulation Capacity</td>
<td>186</td>
</tr>
<tr>
<td>Effect on Socio-Political Structure</td>
<td>189</td>
</tr>
<tr>
<td>Effect on Educational and Scientific-Technological Capabilities</td>
<td>192</td>
</tr>
<tr>
<td>Summary</td>
<td>198</td>
</tr>
<tr>
<td><strong>V. THE CASE OF IRAN, 1800 - 1941</strong></td>
<td>202</td>
</tr>
<tr>
<td>Is Iran a Specific Case?</td>
<td>202</td>
</tr>
<tr>
<td>External Factors</td>
<td>209</td>
</tr>
<tr>
<td>Internal Factors</td>
<td>209</td>
</tr>
</tbody>
</table>

---

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran in the Nineteenth Century</td>
<td>211</td>
</tr>
<tr>
<td>General Overview</td>
<td>212</td>
</tr>
<tr>
<td>1800-1900</td>
<td>212</td>
</tr>
<tr>
<td>Economy</td>
<td>212</td>
</tr>
<tr>
<td>Society</td>
<td>218</td>
</tr>
<tr>
<td>Iran in the Twentieth Century</td>
<td>221</td>
</tr>
<tr>
<td>The Mashruteh Revolution, 1905-1909</td>
<td>221</td>
</tr>
<tr>
<td>After the Revolution, 1909-1919</td>
<td>225</td>
</tr>
<tr>
<td>Neo-Colonialism: Pahlavi Dynasty Begins</td>
<td>227</td>
</tr>
<tr>
<td>The 1921 Coup d' Etat</td>
<td>228</td>
</tr>
<tr>
<td>How Reza Khan Became Reza Shah</td>
<td>229</td>
</tr>
<tr>
<td>The Economy</td>
<td>231</td>
</tr>
<tr>
<td>The Role of Petroleum</td>
<td>231</td>
</tr>
<tr>
<td>The Situation of Non-Oil-Economic Sectors</td>
<td>234</td>
</tr>
<tr>
<td>Demonstration Effects: Further Dependency</td>
<td>236</td>
</tr>
<tr>
<td>Banking and Financing</td>
<td>238</td>
</tr>
<tr>
<td>The Trans-Iranian Railway</td>
<td>240</td>
</tr>
<tr>
<td>Other Reforms</td>
<td>241</td>
</tr>
<tr>
<td>The Role of Petroleum</td>
<td>243</td>
</tr>
<tr>
<td>Police State</td>
<td>245</td>
</tr>
<tr>
<td>More Roads, More Factories, Less Freedom, Less Equality</td>
<td>246</td>
</tr>
<tr>
<td>Summary</td>
<td>249</td>
</tr>
<tr>
<td>VI. &quot;VICTORY BRIDGE&quot; LEADS TO MORE DEPENDENCY</td>
<td>252</td>
</tr>
<tr>
<td>Nationalization of Oil</td>
<td>256</td>
</tr>
</tbody>
</table>
Conceptualization and Measurement ........................................... 332
Scientific-Technological Dependency (STD) .......................... 332
Uneven Economic Development ............................................. 333
Economic Disintegration (or Disarticulation) ......................... 333
Sectoral Heterogeneity ......................................................... 334
Export Enclave ....................................................................... 334
Inequality Among Social Classes ........................................... 334
Class Conflict ......................................................................... 335
Economic Marginalization ..................................................... 335
Coercive Authoritarianism of the State ................................. 336
Concentration of Higher Education ....................................... 336
Concentration of Research & Development (R & D) ............. 337

Test of Hypotheses ................................................................. 337

Hypothesis 1. Scientific-Technological Dependency of Iran Has Led to an Uneven Economic Development in that Country ........................................... 341

Hypothesis 2. Scientific-Technological Dependency of Iran has Led to Economic Disintegration in that Country ......................................................... 342

Hypothesis 3. Scientific-Technological Dependency of Iran Has Led to Sectoral Heterogeneity in that Country ......................................................... 344

Hypothesis 4. Scientific-Technological Dependency of Iran Has Led to Development of Export Enclave in that Country ........................................... 347

Hypothesis 5. Scientific-Technological Dependency of Iran Has Led to Inequality Among Social Classes in that Country ........................................... 349

Hypothesis 6. Scientific-Technological Dependency of Iran Has Led to Class Conflict in that Country ......................................................... 351
Hypothesis 7. Scientific-Technological Dependency of Iran Has Led to Economic Marginalization in that Country .......................................................... 352

Hypothesis 8. Scientific-Technological Dependency of Iran Has Led to Imposition of Coercive Authoritarian Rule by the State in that Country .......................................................... 355

Hypothesis 9. Scientific-Technological Dependency in Iran Has Led to Concentration of Higher Education in that Country .......................................................... 357

Hypothesis 10. Scientific-Technological Dependency of Iran Has Led to Concentration of R & D in that Country .......................................................... 361

Analysis .......................................................... 363

Uneven Economic Development .......................................................... 364
Economic Disintegration .......................................................... 366
Export Enclave .......................................................... 367
Class Conflict .......................................................... 368
Coercive Authoritarianism of the State .......................................................... 369
Concentration of Higher Education .......................................................... 370
Concentration of R & D .......................................................... 371

Summary .......................................................... 373

VIII. SUMMARY, CONCLUSION AND IMPLICATION .......................................................... 376

Summary .......................................................... 376

Theoretical Implication .......................................................... 383
Research Implication .......................................................... 387
Research on Future Trends .......................................................... 389
Policy Implication .......................................................... 392
Selective Dissociation .......................................................... 393

x

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
LIST OF TABLES

1. Estimated Number of Radio Receivers in Use .................. 134
2. United States Newspaper Concentration .................. 135
3. Cultural Commodity Exports .......................... 138
5. Imports, Exports and the Balance of Trade: Rates of Change in Terms of Percent .......................... 214
6. The Composition of Foreign Trade: Percentage Distribution by Various Categories .......................... 215
7. Oil Revenues, Oil Export .................. 234
8. Non-Oil Exports and the Balance of Trade, 1918-26 .................. 235
15. Imported Goods by Type of Product, 1977-1978 .................. 290
20. Uneven Economic Development (1977 Data) .................. 342

xii

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
21. Economic Disintegration (1977 Data) ..................................................... 345
22. Sectoral Heterogeneity (1977 Data) ..................................................... 347
23. Export Enclave (1975 Data) ................................................................. 349
24. Inequality Among Social Classes .......................................................... 351
25. Class Conflict (1977 Data or Closest Date) .......................................... 353
26. Economic marginalization (1977 Data) .................................................. 355
27. Coercive Authoritarianism of the State (1975 Data) .............................. 358
28. Concentration of Higher Education (1976 Data) .................................... 360
29. R & D Personnel by Field of Science, As Percentage of Total R & D Personnel (1971 Data) .............................................................. 362
30. Topic Coverage of Three Major Agencies ............................................. 407
31. A Thematic Analysis of Five Major Subject Areas ............................... 408
32. Undernourishment in Iran, 1972-73: Aggregated Provincial Figures, Percentage of Population ..................................................... 433

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
LIST OF FIGURES

1. Two Opposing Paradigms .............................................. 78

2. A model of the effects of scientific-technological dependency on social structure of less industrialized countries .............................................. 199

3. A model of scientific-technological dependency and its effects on the social structure of less industrialized countries .............................................. 329

4. The effects of scientific-technological dependency of Iran on its social structure .............................................. 375
CHAPTER I

INTRODUCTION

With the decline of various forms of military and economic power of the more industrialized countries (MICs) as the primary control structure for maintaining the dominance/dependence relationships with the less industrialized countries (LICs) in the international political economic system, science-technology has emerged as a significant means for sustaining international status quo. This type of relationship, regardless of its base, has been the major source of conflict between these two groups of countries and LICs have asked and acted for some changes in such relationships.1 And re Gun der Frank (1967) reviews the evolution of dominance/dependence relationship between MICs and Less Industrialized Countries (LICs) and the emergence of technology as a forceful instrument in this way:

During the mercantilism era, the metropolitan monopoly lay in commercial monopoly; in the era of liberalism, the metropolitan monopoly came to be industry; in the first half of the twentieth century, the metropolitan monopoly switched increasingly to capital goods industry. It then became more possible for the satellites to produce light industrial consumer goods at home. In the second half of the twentieth century, the basis of metropolitan monopoly seems to be switching increasingly to technology. Now the satellites can even have heavy industry at home.... In our time, however, heavy industry no longer is enough to break out of this metropolitan monopolist domination, for the domination has to have a new base, technology. (Frank, 1967:24)

The central significance of science-technology in any development strategy is now widely acknowledged.2 While science-

1

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
technology (S-T) is an issue for MICs it is a problem for LICs with different magnitudes depending on the case. In the MICs, the growth of scientific-technological knowledge has kept pace with the evolution of their productive systems; in the LICs, these two essential components of any national S-T system have not had a concurrent evolutionary process. As part of the heritage of colonialization and neo-colonialization, the LICs have become dependent on the MICs science-technology for their industrialization (itself a by-product of the imported S-T).

The scientific-technological dependency of the LICs has been intensified through the years, as a consequence of acceptance of "scientific-technological myth", propagated by MICs, by the majority of the LICs. According to this "myth", science-technology can be substituted for social and political choices, that is, science-technology is ideologically neutral. A broader implication of this "myth" is the perception of science-technology apart from its social carriers; and this perception leads to the belief that the means of industrialization can be purchased from other countries, meaning MICs. The "myth" has been effective, not only because MICs possess superior material capabilities, but also because the "scientific-technological myth" enhances those capabilities by undermining the development process of indigenous scientific-technological capability (Mytelka, 1983). The importation of MICs' science-technology may in some instances result in increasing scientific-technological capacities (not capability) of LICs, but growing evidence suggests
that such increases in capacity all too often leads to continuing
dependence at qualitatively higher levels.\(^3\)

One example of such a case is the solar energy projects in the
Middle East. According to Sardar (1982):

Many of the solar energy projects in the Middle East have a
strong high-technology bias and rely heavily on the
transfer of technology from the West. In Saudi Arabia,
Kuwait and Libya solar research amounts to little more than
clearing the ground for the import of solar technology.
Moreover, not one major solar energy project is free from
Western control. The oil-rich countries have associated
themselves with the solar programmes of the United States
which concentrate on the needs of high technology and
ignore the very simple needs of the Middle East societies.
For example, considerable resources are being devoted to
solar cooling for concrete buildings, while the traditional
housing in most Arab countries not only optimizes the
energy intake for human comfort but has one of the most
sophisticated cooling systems. (1982:51)

He further states:

Unless the Middle East countries work to develop their own
solar technologies, the Arab world will become saturated
with solar energy systems manufactured in the West, which
are often irrelevant to local needs and cannot be sustained
with the available technological infrastructure in the
region without foreign help. If the process continues, the
Arab countries would then change from exporting oil to
importing solar energy,...[and since] biogas, biomass, wind
and fuel wood do not have the high technology attraction of
solar energy, [and] the aggressive backing of Western
commercial interests, it is therefore not surprising that
they are ignored in the Middle East. (Sardar, 1982:52)

The "scientific-technological myth" has been supported by still
other myths, such as the myth of "efficiency-equity" trade-off, and
the myth of "technology as a component of capital". According to the
former, for a time—typically of unspecified duration—equity
concerns must yield to efficiency concerns so that, in the long run,
equity can be achieved (Hveem, 1983). And for LICs, efficiency has
been taken to imply close scientific-technological association with MICs, or in other words, the dependency of LICs on MICs science-technology. The latter myth regards technology as a component of capital which is considered as a homogeneous factor of production. And the implication of this for LICs has been the treatment of transfer of technology under the concept of international capital flows—a familiar concept in conventional trade theories—according to which the "competitive" market mechanisms direct the flows.

Although these myths have been implicitly reported by few critical scholars, there have been few comprehensive case studies on the subject, perhaps because of the difficulty in carrying out such inquiry. Even in those few conducted studies the subject has not been considered in its proper historical context. According to Charles Cooper (1973):

"Until recently there was very little analysis of the role of science and technology in the underdeveloped countries. The prescriptions were based on the most superficial kind of diagnosis, if there was any at all. No one, or hardly anyone, bothered to ask why it was that underdeveloped countries had such weak scientific institutions in the first place, or what precise functions the existing institutions served. Hardly anyone asked how all-round dependence on technologies from advanced countries affected economic and social development. After all "the underdevelopment of science and technology" could be regarded as simply a particular aspect of the general condition of underdevelopment. (Cooper, 1973:7)"

Of the few studies conducted on this issue, mostly in MICs, none deals with countries of Middle and Near East regions. It is in light of this background that the significance of studies on scientific-technological dependency of LICs and its impacts on social structure
of these countries in general, and a Near-Eastern country (Iran) becomes clear. To propose some policies in dealing with this problem, the realization of why and how the problem evolved and what its impacts are seems necessary.

The Problem

The problem of this study, therefore, is why and how a less industrialized or "underdeveloped" country, specifically Iran, became dependent on science-technology of the more industrialized or "developed" countries. In other words, why and how Iran's scientific-technological capability did not concurrently evolve with its forces of production? What impacts such dependency had on its social structure, and what policy is more appropriate for reducing and/or ending scientific-technological dependency of LICs, or, in other words, for gaining scientific-technological autonomy?

To answer these questions, the study attempts to analyze and explain the mechanisms, processes, and consequences of this dependency, and to assess the possibilities and constraints immanent as a result of reducing and/or ending this dependency. To do so, the "Dependency" paradigm seems to provide the most appropriate theoretical framework for the study. For establishing the case study of Iran's scientific-technological dependency, both qualitative and quantitative analyses are used for the following reasons:
1. The "Dependency" paradigm is an interdisciplinary approach and basically an historical perspective;

2. The nature of the study's questions requires both analyses;

3. The sources of Iran's scientific-technological dependency could be delineated;

4. Various effects of Iran's dependency on its social structure could be dealt with; and

5. The use of two methods of analysis increases the explanatory power of the study.4

The emphasis is more on the internal factors, for which the "Dependency" paradigm has been criticized for underestimating.

The proposed strategy of "scientific-technological autonomy or self-reliance" favors greater selectivity in, closer control and critical evaluation of imported science-technology. The policy for implementing this strategy is "selective dissociation". This is a transitional policy, leading to reassociation with the international system in a more autonomous and less dependent relationship by allowing an LIC to synchronize and synthesize its attempts for reducing its dependency and for increasing its capability.

The study treats the place of science-technology in the relationship between MICs and LICs based on the new approach towards technology in the international trade relations (developed by Vaitsoos in the early 1970's) according to which (1) technology is no longer transferred as a single element, but rather in the form of a "package" of elements; (2) technology is now considered as a commodity and its transfer has become commercialized under monopolistic market mechanisms; and (3) technology is no longer

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
transferred as a single transaction, but rather in the form of process, which makes continual "monopoly returns" for transnational corporations (which have monopoly powers over the control of modern technology) possible. And this process operates to the substantial disadvantages of LICs, the major recipients of modern technology (Vaitsos, 1974).

Following the tradition of the dialectical method, the study moves from general to specific in all chapters and discussions. For this reason, Chapter II is devoted to a general critical review of the two major paradigms of development/underdevelopment in LICs, namely, "Modernization" Paradigm and "Dependency" Paradigm to present the theoretical framework of the study and to provide a theoretical background for the next chapter.

Chapter III explains why and how LICs became dependent on science-technology of MICs and to argue that the present scientific-technological gap between MICs and LICs is going to increase and that the dominance/dependence relation of these two categories of countries is going to intensify at a qualitatively higher level. It is done through an historical analysis of colonial and neo-colonial patterns of economic and educational systems which have led to underdevelopment of science-technology of LICs, and through an analysis of the concentration of means of production in knowledge-information industry in MICs and speed of change in this industry as the mechanisms of intensification of scientific-technological dependency of LICs.
In Chapter IV negative effects of scientific-technological dependency on the different aspects of social structure of LICs, in general, are discussed to provide necessary background for the next chapter.

Chapter V and VI are complementary, and try to answer the questions of the study through an historical analysis of social structure of Iran during the last two centuries. Chapter V begins with a brief discussion on the controversial issue of the specificity of Iran's situation, and covers the politico-economic and socio-cultural situation of Iran from early 1900's to the end of the Second World War. Chapter VII covers the politico-economic and socio-cultural situation of Iran from the end of the Second World War to 1977. That is, the chapter ends at the time when the social movement which led to the 1979 revolution has reached its zenith.

To analyze and explain the most important issue in scientific-technological dependency, that is, the effects of this dependency on the major aspects of the social structure of Iran, in Chapter VII the following general hypothesis is constructed:

**General Hypothesis:** Scientific-technological dependency of Iran on more industrialized countries has led to the structural changes with negative consequences in Iran. The independent variable, thus, is scientific-technological dependency and the dependent variable is social structure. From this general hypothesis ten specific hypotheses are derived and clustered into (A) economic distortion,
(B) socio-political distortion, and (C) educational-scientific distortion, as follows:

Specific Hypotheses:

A. Economic distortion:
   1. Scientific-technological dependency of Iran has led to uneven economic development in that country.
   2. Scientific-technological dependency of Iran has led to disintegration of economy (i.e., a situation in which various economic sectors tend to be poorly connected) in that country.
   3. Scientific-technological dependency of Iran has led to sectoral heterogeneity (i.e., a situation in which activities occurring within various sectors vary widely) in that country.
   4. Scientific-technological dependency of Iran has led to an export enclave in that country.

B. Socio-political distortion:
   1. Scientific-technological dependency of Iran has led to inequality among social classes in that country.
   2. Scientific-technological dependency of Iran has led to class conflict in that society.
   3. Scientific-technological dependency of Iran has led to economic marginalization in that country.
   4. Scientific-technological dependency of Iran has led to imposition of coercive authoritarian rule by the state in that country.

C. Educational-scientific distortion:
   1. Scientific-technological dependency of Iran has led to concentration of higher education in that country.
   2. Scientific-technological dependency of Iran has led to concentration of research and development (R&D) in that country.
Finally, Chapter VIII presents theoretical, research and policy implications of the study. It argues that the experiences of many societies have shown that as long as the dominant mode of production at the global level is capitalism, there is limited success for LICs in reducing, much less ending, their scientific-technological dependency, in particular, and in achieving a genuine development, in general. However, the "selective dissociation" policy is viewed as the most appropriate policy for dealing with the problem of STD because it allows an LIC to synchronize its attempts for reducing its STD and for increasing its S-T capability.5

There are two descriptive terms in this study that require some explanations. The terms "More Industrialized Countries", and "Less Industrialized Countries" have been intentionally used for the two categories of countries which are commonly described as "Developed" and "Underdeveloped", because, to the author, development has a positive connotation far beyond a certain threshold level of GNP-per capita (as it is understood in orthodox economics), or a certain condition of economic well-being and autonomy (as it is understood in more liberal socioeconomic development theories). To this researcher, development is a process through which not only all social classes have equal access to the fruits of economic growth, but also have freedom and chance to influence the course of the economic growth.

The reason for the existence of various meanings of the development/underdevelopment dichotomy is precisely the same as that for the dichotomy "modern/traditional". Both dichotomies have been
generated by the "Western" scholars, who have taken the characteristics of the Western countries as their criteria for dichotomizing countries, without considering the history of imperialism as a major contributing factor in the rapid industrialization of their countries. A genuine industrialization (one without the numerous negative side-effects largely present in the Western countries) is only one aspect of development.
CHAPTER II

TWO OPPOSING PARADIGMS

This chapter provides a critical review of two dominant perspectives in sociology of development/underdevelopment since the end of World War II, "Modernization" and "Dependency". After a brief discussion of the reasons for the emergence of the two paradigms and their assumptions and definitions, several theories of "modernization" which have contributed to the development of "scientific-technological myth" and other supporting myths (discussed in the first chapter) are presented. The "Dependency" paradigm's various lines of thought and three specific formulations within it are discussed. This is followed by a brief account of the contributions of four influential writers of this paradigm and by an evaluation of the interpretation of the current changes in the global political economic system by the scholars of both paradigms. Tersely, this chapter provides a general theoretical framework for the study.

The final collapse of the colonial empires of the nineteenth century at the end of World War II ushered in a number of important changes at the global political economic system. Some of these changes are briefly outlined as follows: (a) The emergence of the United States as a preeminent economic and military power as a result of the defeat of the Axis Powers and the devastation of Britain and the European allies; (b) The emergence of the Soviet Union as the
only viable power to challenge the United States, due to its salient role in defeating the Axis Powers and its ability to influence the accession to power of socialist regimes in Eastern Europe; (c) The establishment of number of states in the past colonized lands, each claiming sovereign and independent status.

During the first five years after World War II, some important events called upon the United States (the emergent economic-military power) for an immediate strategy to revitalize the economies of Western European countries, and for an alternative strategy for modernization of the "new nations". These events included: (a) the victory of the Chinese Socialist Revolution in 1949; (b) the urgent need for implementation of some policies to satisfy the needs of preserving the vast markets for the ever-increasing productivity of the United States' industries which had started to answer the War's demands; and (c) the predominance of the attitude that Marxism presented the best and most logical path to incorporation into the modern world among the "new nations".

In the case of Western Europe, with the Marshal Plan and other massive U.S. public and private economic investments, the recovery was followed by dramatic progress by West Germany. The unprecedented growth in Western Europe and Japan not only did not recreate the political and economic system of the pre-war world, but rather because of it the very character of the international economic system was changed. Multinational corporations, mostly U.S. based, became the dominant force in international affairs. The
internationalization of capital and division of labor, with all their political economic implications, were direct consequences of multinational (or transnational) corporations, leading to the integration of polity and economy at both global and national levels.

The rapid growth of the capitalist economy in the more industrialized countries during two decades of the 1950's and 1960's, however, had unanticipated effects: pollution, destruction of unrenovable resources, excessive concentration of power, waste, bureaucratization, unemployment, consumerism, alienation, and so forth.¹ The economic depression, inflation, the international monetary crisis, the decline in the industrial countries' control over the world's natural resources, the fight over the strategic minerals, of recent years, are all indicators of the profound problems of development in the capitalist countries. Problems, which as indicated, should be viewed not only as national but also global, and not only economic but also political, social, and cultural. The issue of political economy of the development of capitalism is once more appearing as one of the main themes in the literature of sociology of development/underdevelopment.

In the case of the "new nations", U.S. scholars began to publish their solutions to the problems of these nations (Lerner, 1958; Eisenstadt, 1961). Some suggested using the same policies applied to Europe, namely, the transfer of capital and technology to spur economic growth, with the hope that it would be as successful as it had been for Europe (Lerner, 1958; Hagen, 1962). Others (Griffin,
1969; Baran, 1957) argued that the elaboration of appropriate policies should be preceded by answering some fundamental questions. For example: Why is there such a contrast between the development processes in the United States and Western Europe and the rest of the world? How could "Western" countries achieve such a high level of economic and technological development while most of the nations in other areas of the world could not? (Baran, 1957).

The answer to these and similar questions led to the development of two very different paradigms, one labeled "modernization" and the other "dependency". In the words of Valenzuela: "they originated in different areas, with different evaluative judgements, different assumptions, different methodologies and different explanations" (Valenzuela, 1979:33).

Following the long tradition of Western intellectual thought, both paradigms dichotomized the nations of the world into two categories, or two opposite poles of a continuum. For the "modernization" paradigm these two poles were "modern" and "traditional" at the beginning, changing later to "developed" and "underdeveloped". For the "dependency" paradigm the two poles were "center" and "periphery" or "metropole" and "satellite".

The Modernization Paradigm

For this paradigm, to determine the "new nations" potential for economic growth, it was essential to consider the relevant non-
economic factors. In the other words, the cultural characteristics of these nations were the major impediment to their economic growth.

On the basis of the above premise, by borrowing from studies on differences between the "colonized" and the "colonizers", and in the framework of the "traditional/modernity" dichotomy, various characteristics in the social organization and value system were attributed to the nations at two polar ends of the evolutionary process of qualitative change.

Assumptions

Looking at the present situations of the societies under investigation, the "traditional" society was described as having "a predominance of ascriptive, particularistic, diffuse and affective patterns of action, an extended kinship structure with a multiplicity of functions, a preponderance of primary groups, a relatively simple occupational system, little spatial and social mobility, low literacy rates, a deferential stratification system, mostly primary economic activities, a tendency toward autarky of social units, little outside contact, and almost no change, an undifferentiated political structure, with traditional elitist and hierarchial sources of authority (Eisenstadt, 1961). By contrast, the "modern society" is characterized by a predominance of achievement, universalistic, specific and neutral orientations and patterns of action, a nuclear family structure serving limited functions, a preponderance of secondary groups and affiliations, a complex and highly
differentiated occupational system, high rates of spatial and social mobility, universal literacy, a predominance of secondary economic activities and production for exchange, the institutionalization of change and self sustained growth, extensive communications networks, and highly differentiated political structures with rational legal sources of authority (Valenzuela's, 1979).

On the basis of these characteristics, the modernization paradigm assumes that the values, institutions and patterns of action are both expressions and causes of underdevelopment in Traditional societies and development in Modern ones. The implication of this description and use of "traditional-modernity" is that Modern meant Westernized, and the logical conclusion seemed to suggest that in order for "traditional" societies to become "modern" (westernized), they had to go through qualitative changes, by and large, similar to those that the Modernized countries had already undergone.

On this subject, Moore states:

...on the basis of what is known about the "Western" experience, we can go rather far in predicting the course of social change in major parts of the social organization and value systems of societies which are now seeking to become part of the modern world. (Moore 1968, p.375)

These values are ones which allow for "rational" decisions to maximize both individual and collective satisfactions. Moore (1977) argues that modernization is "the process of rationalization of social behavior and social organization" when rationalization or the "institutionalization of rationality" is defined as the "normative expectation that objective information and rational calculus of
procedures will be applied in pursuit or achievement of any utilitarian goal. It is exemplified but not exhausted in the use of sophisticated technology in construction and production" (Moore, 1977:34-5).

To conclude from these assumptions, theorists using this paradigm believe that the causes of backwardness and underdevelopment of "traditional" societies are their unsuitable endogenous cultural values and institutional arrangements. They also assume that the transformation of these traditional elements into modern ones would only be possible through the exogenous process of diffusion-adoptions of Western values and structural arrangements. The channels of this diffusion-adoptions process are assumed to be Western intervention, foreign business investment, foreign aid, the mass media, education, industry and science and technology. These processes of acculturation and assimilation are carried out under the leadership of modernizing elites of traditional societies.

**Definition**

Modernization has not been clearly defined, perhaps because it has three different meanings: (1) an attribute of history, (2) a concrete historical process, and (3) a certain set of development policies (Smith, 1973; Roxborough, 1979).

The modernization paradigm has been criticized by many scholars for many reasons. Before presenting an outline of general criticisms, a brief overview critique of various theories in this
paradigm that has contributed to the development of "scientific-technological myth" and other supporting myths (discussed in Chapter I) seems necessary for comprehension of issues to be discussed in succeeding chapters.

Theory of Achievement Motivation

David McClelland presented this theory as a formulation of the results of his laboratory testing based on a motivational syndrome or drive previously overlooked by Freidians. He called this drive "need for achievement" (n-achievement) and published his views in his 1961 book, "The Achieving Society". The major hypothesis of this theory is that a nation "with a generally high level of n-achievement will produce more energetic entrepreneurs who, in turn, produce rapid economic development" (McClelland, 1961:205). And the main assumption is that "it is values, not motives or psychological forces that determine ultimately the rate of economic and social development" (McClelland, 1963:17).

McClelland considers "need for achievement" as of a human need which characterises a person and determines behavior; it is created through childhood experiences; and therefore is important in the relationship between the individual and society. Like other values, n-achievement is effected by social institutions. After conducting a comparative study on the child-rearing practices in different societies, McClelland concluded that the major source of n-achievement is child-rearing practices; children whose parents teach
them to be independent early in childhood, who receive attention, and of whom much is expected, have a higher "need for achievement".

In a test of students McClelland found that, in general, the middle class in the U.S. had higher scores than the "upper" and "lower" classes. He attributed this higher score on entrepreneurship to the certain beliefs and patterns of childrearing within the family. From a study of the fairy tales of ancient Greece, pre-Inca Peru, and England (1400 - 1900), he found positive correlation between n-achievement and subsequent economic development. This finding supplemented his contemporary data. For McClelland the mediating factor between psychological measure and economic development is the presence of a number of entrepreneurs.

McClelland's theory of achievement motivation could be criticized on (inter alia) following grounds:

A. the structural causes of the need to achieve; e.g. class, kinship, family, and religion are included in his conceptual scheme, yet he claims that the need to achieve is a personality variable independent of the social structure;

B. other studies about so-called "traditional" societies have revealed evidence that refutes the implicit assumption in McClelland's thesis that pre-industrial or underdeveloped societies suffer from a low achievement orientation.3

C. preoccupation with character formation in early socialization, "since that in turn is mainly the responsibility of parents and particularly of mothers, how do mothers come by their orientation to achievement?" (Moore, 1965:42).

The implication of McClelland's theory for LICs is that the beliefs and patterns of child rearing in these societies should be changed. What is the alternative? The alternative implicit in this
theory is the beliefs and pattern of child rearing prevalent in MICs, because the experience of these countries show that such beliefs and patterns of childrearing have helped them to develop. In other words, what LICs need is more dependency. Another theory in Modernization paradigm which has contributed to "scientific-technological myth" is the theory of status withdrawal.

**Theory of Status Withdrawal**

In Everett E. Hagen's theory of "status withdrawal" the important factor for the beginning of economic growth is individuals who take leadership in innovation. The cause of underdevelopment in traditional societies, therefore, is lack of adequate number of innovators. This is so because these societies possess two characteristics: authoritarianism and noninnovating personalities. These characteristics create stability in their social and economic organizations. And "the interrelationships between personality and social structure are such as to make it clear that social change will not occur without change in personalities" (Hagen, 1961:86). The basic cause for the change in personalities is the perception on the part of the members of some social group that their purposes and values in life are not respected by groups in the society whom they respect and whose esteem they value; such "withdrawal of status respect" results in retreatism among those who suffer a loss of status. The retreatism evolves while those "subordinated groups", that have lost their traditional values due to experience of status...
withdrawal or downward mobility are striving to recapture their lost prestige by resorting to different means to achieve them.

However, "retreatism is not a dead end. As retreatism deepens in successive generations, it creates circumstances of home life and social environment that are conducive to the development of innovational personality. The historical sequence seems to be: authoritarianism, withdrawal of status respect, retreatism, creativity" (Hagen, 1962:217). The creativity, then, brings economic growth (Hagen, 1963).

Hagen's theory of status withdrawal has been criticized for:

A. viewing innovators as the link in the causal chain of "personality" and economic growth;

B. its impracticality. The theory implies the innovative personalities are not formed by "traditional" societies. The solution, then, is to withdraw status from parts of the population and wait for some years for them to innovate.

C. its inconsistency. "...within a given country, the circumstance that innovation is perpetrated by marginal groups may precisely inhibit general acceptance. The real or imagined benefits must sooner or later have a wider appeal if development is to continue" (Moore, 1965:42).

The implication of this theory for LICs is similar to that of McClelland's theory of n-achievement. That is, since LICs are not capable of producing innovative personalities and because their development process should proceed, therefore they need to rely upon the innovative personalities and innovations of those countries which can form innovative personalities, namely MICs. In the next section, another theory in the Modernization paradigm which has contributed to the "scientific-technological myth" is discussed.
Theory of the Stages of Economic Growth

Economic historian Walt Whitman Rostow wrote his major work, The Stages of Economic Growth: A Non-Communist Manifesto, at the CIA-financed Center for International Studies on the Charles River in 1960. His positions as President Kennedy's Director of Policy and Planning in the State Department and President Johnson's Chief Adviser on Vietnam, and the subtitle of his book which was presented to political leaders and scholars as an alternate theory to Marx-Engels Communist Manifesto, reveals the direction of his theory.

According to Rostow:

It is possible to identify all societies, in their economic dimension, as lying within five categories: the traditional society, the preconditions of take-off, the take-off, the drive to maturity, and the age of mass consumption. First the traditional society. A traditional society is one whose structure is developed within limited production functions, based on pre-Newtonian science and technology and pre-Newtonian attitudes towards the physical world.... The second stage of growth embraces societies in the process of transition; that is the period when the preconditions for take-off are developed; for it takes time to transform a traditional society in the ways necessary for it to exploit the fruits of modern sciences, to fend off diminishing returns, and thus to enjoy the blessing and choice opened up by the march of compound interest.... The stage of precondition arises not endogenously but from some external intrusion by more advanced societies...., the third stage in this sequence [is] the take-off. The take-off is the interval when the old blocks of resistance to steady growth are finally overcome. The forces making for economic progress, which yielded limited bursts and enclaves of modern activity, expand and come to dominate the society.... The take-off is defined as requiring all three of the following related conditions: (1) a rise in the rate of productive investment from, say, 5 percent or less to over 10 percent of national income (or net national product-NNP); (2) the development of one or more substantial manufacturing sectors, with a high rate of
growth; (3) the existence or quick emergence of a political, social and institutional framework which exploits the impulses to expansion (Rostow, 1971, Passim).

As appears from these selective passages, the characteristics by which Rostow describes traditional societies are similar to those Hagen has used, that is, low-level equilibrium economy, peasant-based, custom-bound, unproductive, hierarchical, with authoritarian personality, long-run fatalism, and traditional science and technology.

In the second stage of growth, the preconditions for take-off are developed, and this is the period of significant economic changes. The noneconomic aspect of these changes is the appearance of a new elite, who support the idea of modernization and are willing to take risk to fulfill its promises. The important economic aspects of these changes are a rise in the rate of capital accumulation above the rate of population growth capitalizing on current innovational opportunities while creating new ones, and the training for specialized large scale production.

At the third stage, although the society is still dominated by traditional attitudes and productive techniques, the growth process becomes institutionalized in the take-off stage. On the basis of the historical experience of more industrialized countries, namely, Japan, the U.S., the U.S.S.R., and Britain, Rostow concludes that the take-off stage lasts about 20 years.

In the fourth stage, the "drive to maturity", which takes about another 20 years, "an economy demonstrates that it has the
technological and entrepreneurial will to produce not everything, but anything it chooses to produce."

At the fifth stage, the age of high mass-consumption, the leading economic sectors shift towards the production of durable consumer goods and services. Basic needs (food, clothing, shelter) are no longer the main consumption concern of workers, and many resources are allocated to social welfare and security. Hence, the U.S., most of the nations of Western Europe, and Japan are in this stage, while the U.S.S.R. is ready for it.

Rostow's theory has come under severe criticism, among which are:

A. impressionistic interpretation of a number of historical experiences counted for stages, rather than a rigorous, scientific analysis;

B. the failure of the five stages to correspond to the past and present conditions of the underdeveloped countries;

C. the failure to attribute the same criterion to both developed and underdeveloped countries. He looks at the history of developed countries while denying the same thing to the underdeveloped ones (Roxborough, 1979).

Explicit in Rostow's theory are the presence of new science-technology, and modern attitudes toward the physical world in LICs as prerequisites of economic growth. Also explicit is the development of one or more substantial manufacturing sectors with a high rate of growth in LICs as a requirement for entering into the take-off stage. But how and from where are LICs supposed to acquire modern science-technology and manufacturing sectors with high rate of growth? They (LICs) have to import these prerequisites of economic growth.
growth from MICs. We, now, discuss another theory in the Modernization paradigm which has contributed to the development of the "scientific-technological myth" and other supporting myths.

Theory of Four Revolutions

To explain the development of the rich and poor countries, Piero Gheddo, a priest in the PIME Missionary Society, raised the question, "Why have some people started to move forward while others remain motionless, static?" His answer, which was published in his book, Why is the Third World Poor?, is that the Western countries have undergone four crucial revolutions while the Third World countries have not.

(1) The revolution of the idea of the equality of all persons and the dignity of each individual. The teachings of the Judaeo-Christian religion that humans were created in the image of God, that humans were the king of creation, with an end superior to that of any other creature, and that humans were free to determine and shape their own destiny, radically transformed the West.

Christianity, offering the example of God-made-man, has suggested the possibility of man's limitless ascent enabling him to share in the life of God by means of grace. This is the initial step—recognition of the dignity of each single human person toward man's progress and that of society. In other words, in the West, man and the centre of creation, thinking and acting, became the essential nucleus around which everything else is organized. When this idea, slowly maturing over the centuries, was accepted, it put an end to the immobility of society and of mentality, and started the movement toward liberty, democracy, socialism, and social justice. (Gheddo, 1973:31-32)
But in the Third World the idea that humans are the center of creation is not accepted or known; humans are a part of nature without any superiority over other elements of nature. Here, Gheddo concludes, "It is clear that starting from such a basic idea, man could not progress but remained stationary and closed in the recurring cycles of nature" (Gheddo, 1973:32).

(2) The revolution of the idea of progress. After the dominance of the first revolution, that "man" is the king of creation and is made in the image of God, then the king has the divine right to dominate nature and to exploit it to satisfy his needs. The West developed because of the discovery of "the sovereign dignity of man over all creation, the fundamental equality of all men, and the messianic vision of a better world to be constructed with his own hand and the help of others. This idea of progress has given Western culture an ideal, has broken down psychological barriers, and created a dynamic tension towards the future" (Gheddo, 1973:32).

The Christians having been made in the image of God saw their potentialities for further development as limitless. This gave them a sense of complete hope to move towards their great destiny, to make a total commitment to progress. But what keeps the Third World underdeveloped is the lack of the "progressive mentality". The reason is that history to them is a "closed circle that repeats itself like the seasons."

(3) Revolution of population growth. Population in Western societies increased, due to improvement of living conditions, in
situations conducive to efforts towards a better organization of their productive forces. This better organization, based on better division of labor, led to more productivity and greater social justice, bringing about material progress. But in the Third World, population growth has not led to more productivity and greater social justice because people of the Third World are unaware of their dignity and equality.

(4) Revolution of science and technology. The economic development of the West was made possible by the development of science and technology. Western science and technology were planned phenomena, and products of a culture built on the first two revolutions and moving in those directions.

Although the application of scientific-technological discoveries have been of crucial significance in the development of various sectors of Western economy, the greater part of the credit should go to a class that is willing to capitalize on these discoveries, i.e., the bourgeois class. The Western bourgeois class reached the dominant position through a gradual transformation of the whole society.

But in the LICs, society has remained intact, with the rigid tribal patterns, the castes, and the rulers. Therefore, it lacks a class with "progressive mentality", i.e., bourgeois. For Cheddo even the transplantation of the Western science and technology in the underdeveloped countries cannot succeed because they are unprepared.
for the break with the whole cultural past that would result from the introduction of new revolutionary ideas and new technology.

Gheddo's theory has been the subject of similar criticisms levelled against previous theories in Modernization Paradigm. If passing through these four revolutions are necessary preconditions for the LICs to develop (read modernized or Westernized) how would we explain Japan, a non-Christian, industrialized, and very traditional society in many respects.

After this brief presentation of the theories in the Modernization Paradigm we return to the general critique of the Modernization Paradigm as indicated at the outset of this chapter.

General Critique of Modernization Paradigm

The Modernization Paradigm has been criticized by a great number of scholars from different theoretical persuasions, but as might be expected more vigorously by writers associated with the "dependency paradigm". The general criticisms of this paradigm could be summarized as follows:

--It defines development as a process of modernizing the "traditional" sector, therefore it deals with pseudo-problems;

--It is apolitical. In its researches the tenet of political neutrality is prevalent;

--It is ahistorical. Writers in this paradigm have distorted Weber's emphasis on the cultural and psychological components of social change and ignored the importance of the colonial heritage. The social and economic effects of colonialization in social structure are crucial to an understanding of current LICs' development/underdevelopment;
The "dual society" thesis is an ideal type which uses institutional analysis to mask the symbiotic relationship between the "traditional" and "modern" sectors (Rhodes, 1968);

-- It deals mainly with symptoms and consequences rather than causes of underdevelopment. A necessary task if appropriate solutions are to be offered, is to look for causes of underdevelopment (Szentes, 1971);

-- Its basic assumption of a homogeneous, stagnant and traditional society is unrealistic;

-- The distinction between "traditional" and "modern" or "advanced" and "backward" are tautologically defined. The Western countries are viewed as "modern" first, and then those societies which do not possess the characteristics of the Western societies, are called traditional;

-- The qualities associated with "traditional", "modern" societies are all centered around variables which cannot be regarded as independent and determining;

-- It is reductionist, because the emphasis is on the individual and psychological traits rather than structural and sociological characteristics;

-- It focuses on internal factors of underdevelopment solely, and completely ignores external factors (Germani, 1981).

In the preceding section one of the two opposing paradigms was critically reviewed, in the next section another paradigm is discussed.

Dependency Paradigm

The "Dependency" paradigm evolved from inductive studies of a number of economists working in the U.N. Economic Commission for Latin America (ECLA). The aim of these economists was to explain
underdevelopment of Latin America by focusing on the unequal terms of trade between exporters of raw materials and exporters of manufactured goods. The result was a "doctrine" calling for a concerted effort to diversify the export base of Latin American countries and accelerate industrialization efforts through import substitution. This model of development soon faced difficulties for not paying adequate attention to internal constraints of industrialization. The new trend focused on factors such as distorting effects of unequal land tenure patterns and the corrosive results of an inflation best explained by structural rather than monetary variables. Later, a combination of these two trends was presented (Chilcote, 1974; O'Brien, 1975; Valenzuela, 1979).

The "dependency paradigm" was further developed through the incorporation of the results of studies of many scholars from different disciplines of social sciences in countries of Latin America. A variety of subjects were the focus of these studies including the close interrelation between domestic developments in Latin America and developments in metropolitan countries, structural factors of underdevelopment, and behavior of entrepreneurial elites in different social, political contexts.

The "dependency paradigm" rejects the "modernization paradigm" because of its failure to provide explanation for important "anomalies" such as Japan's (a traditional society) economic growth and because of a deliberate rejection of many of its evaluative assumptions. Scholars using the "dependency paradigm" draw on
Marxist insights and the Marxist theory of imperialism in their emphasis on the expansive nature of capitalism and structural analysis of society. However, in their analysis of underdevelopment they break with classical Marxism.7

Assumptions

The "dependency" paradigm rejects the basic assumptions of the "modernization" paradigm's proponents. The unit of analysis for studying development/underdevelopment is not the nation-state, because cultural and institutional features of underdeveloped countries are not the only factors accounting for their underdeveloped situations. The tradition-modernity polarity is of little value as an analytical concept since it does not itself explain the origins of modernity in some areas and lack of it in other areas. Therefore, the dependency paradigm assumes that the development/underdevelopment of a nation or region can only be explained in connection with its historical insertion into the worldwide political economic systems which emerged as a result of the colonialization of the world by European empires. This world system consists of two groups of countries: developed (center, metropole) and underdeveloped (periphery, satellite).8

...Both underdevelopment and development are aspects of the same phenomenon, both are historically simultaneous, both are linked functionally and, therefore, interact and condition each other mutually. This results...in the division of the world between industrial, advanced or "central" countries, and underdeveloped, backward or "peripheral" countries...(Sunkel and Paz, 1970:6).
While the "center" is viewed as capable of dynamic development and as the main beneficiary of the world system, the periphery is seen as having a reflex type of development, one which is both constrained by its incorporation into the world system and which results from its adaptation to the requirements of the expansion of the center. Therefore, underdevelopment of these countries is not an original condition. They may once have been undeveloped but never underdeveloped. The capitalist unequal development of the world began in the sixteenth century, when the center came to specialize in industrial production of manufactured goods, through exploitation and appropriation of raw materials, agricultural and mineral, from the periphery. Thus, the underdevelopment of many parts of the world was created by the same process of capitalism that brought development to the industrialized countries. This relation of domination not only has not changed, although actors might have changed, but also has gained strength through foreign corporate and governmental penetration of banking, manufacturing, retailing, communications, advertising, and education.

In contrast to the modernization paradigm, dependence analysts assume that all individuals providing the same structural foundations of the incentive system, are capable of pursuing rational patterns of behavior. Therefore, it is not inappropriate values and attitudes which contribute to the absence of entrepreneurial activities or to institutional arrangements reenforcing underdevelopment, but contextual variables, shaping and guiding the behavior of groups and
individuals. Cardoso, in his studies of Brazil, points out that it is not the values of entrepreneurs which condition their behavior but the combination of a number of internal-external factors, such as, technological dependence, the intervention of the state in the economy, their political weakness and so on (Cardoso, 1973).

Because of the interdependent nature of the world capitalist system and the qualitative transformations in that system over time, it is not possible for any nation on the periphery to replicate the evolutionary experience of the now developed nations.

The backwardness of rural areas is due to their response to urban and international market influences. This is the reason for richness of the cities and the dominant nations. The link between the urban and rural areas is characterized by commerce between landowners and merchants who form an agro-commercial bourgeoisie which is subject to market forces of a national and international capitalist economy. That is why agricultural, financial, and industrial interests are often found in the same economic groups, the same firms, and even the same families. The dominant class interests are dependent on world capitalism for the manufacture of some goods, and for foreign capital. For this reason a dependent bourgeoisie has no other choice than to accept its condition, despite probable resentment of some sectors of it against imperialism.
Definition of Dependency

It is in line with these assumptions that Dos Santos defines dependency as:

a situation in which a certain group of countries have their economy conditioned by the development and expansion of another economy, to which the former is subject. The relation of interdependence between two or more economies, and between these and world trade, assumes the form of dependence when some countries (the dominant) can expand and give impulse to their own development, while other countries (the dependent) can only develop as a reflection of this expansion. This can have positive and/or negative effects on their immediate development. In all cases the basic situation of dependence leads to a global situation in dependent countries that situates them in backwardness and under the exploitation of the dominant countries. The dominant countries have a technological, commercial, capital resource, and social-political predominance over the dependent countries (with predominance of some of these aspects in various historical moments). This permits them to impose conditions of exploitation and extract part of the domestically produced surplus. (cited in Dale'Johnson, 1972:71)

Osvaldo Sunkel (1972) elaborates on the relationship between dominant and dependent countries in more specific terms:

...foreign factors are seen not as external but as intrinsic to the system. With manifold and sometimes hidden or subtle political, financial, economic, technical and cultural effects inside the underdeveloped country... Thus, the concept of "dependencia" links the postwar evolution of capitalism internationally to the discriminatory nature of the local process of development, as we know it. Access to the means and benefits of development is selective; rather than spreading them, the process tends to ensure a self-reinforcing accumulation of privilege for special groups as well as the continued existence of a marginal class. (Sunkel 1972:519)

The mentioned assumptions and definition suggest that the process of dependency/underdevelopment can be understood only by
reference to its historical dimension and by focusing on the total network of social relations as they evolve in different contexts over time. The dependency paradigm has therefore concentrated on a careful historical evaluation of the similarities and differences in the situation of dependency of the various countries through history.

For some writers dependent relations today do not necessarily perpetuate underdevelopment across the board. To these writers, with the evolution of the world system, the impact of dependent relations can change in particular contexts. In studying contemporary Brazil, Cardoso (1973) stresses the possibility of "associated dependent development". Sunkel and Fuenzaldia (1979), also, predict increasing economic growth among countries most tied into the contemporary transnational system. The title of Peter Evans' 1979 book, *Dependent Development: The Alliance of Multinational, State, and Local Capital in Brazil*, points to the occurrence of continuous economic growth in the dependent situation and the mechanism through which such a growth takes place. And because, on the one hand, changes in the world system introduce new realities, and on the other, external-internal relations are complex, comparative study of concrete national and historical situations in the "dependency" paradigm is indispensable. In the dependence literature, therefore, more efforts have been directed towards comparative studies.

In subsequent literature, however, one could identify different strategies of research. Except for the contribution of Immanuel Wallerstein to an understanding of the origins of the world system
(Wallerstein, 1974), most scholars have focused on the current "new situation" of dependence. They contend that their studies on dependent capitalism would enrich the Marxist analysis of capitalist society. They argue that dependent capitalism is impossible and the only historically possible alternative is scientific socialism (Dos Santos, 1970; Frank, 1969; Amin, 1974).

Two Lines of Thought in Dependency Paradigm

Within "dependency" paradigm two lines of thought are identifiable. One is neo-Marxist, which began with the work of Baran\(^9\) (1957), and later schematized and extended by Frank (1967). It was further extended and enriched in the syntheses of, accumulation in, and evolution of, the world capitalist system in the work of Amin (1975), and Wallerstein (1974).\(^{10}\) The influential works of these authors are briefly discussed later in this section.

The other line of thought within the dependency paradigm is neo-corporatist.\(^{11}\) Most of these writers concentrate on socio-economic analysis to demonstrate a crisis of development in the LICs and to argue the need for planning and reform under the direction of a strong, socially neutral state apparatus. These authors are mostly from Latin America and their works are about Latin American countries. Because of the common interest of these writers in historical and structural analysis, they all have been categorized under a special name "historico-structuralism", neglecting their different theoretical persuasions. To avoid such misrepresentation,
we follow Chilcote (1974) to present the major tenets of these Latin American scholars in three formulations: (1) new dependency, (2) dependency and development, (3) dependency and imperialism.

Before discussing these formulations and the basic ideas of other influential writers (non-Latin American), we should explain why the distinction between two lines of thought in this paradigm is necessary.

Both, neo-Marxism and neo-corporatism, stress the interrelationship of development and underdevelopment in the world system, both reject liberal economics, particularly the theory of comparative advantage and international division of labor, both advocate the restructuring or breaking of the tie between the developed and underdeveloped countries, and both view a need for internal structural reform. However, they are radically different in their modes of analysis and these differences lead to fundamentally different solutions to the problem of underdevelopment.

These differences stem from their different conception of the importance of class struggle as the basic force of historical change. Neo-corporatists ignores the inevitability of class struggle, neglect class conflict in their historical analysis, and therefore exclude it from their solution to the problem of underdevelopment. For neo-corporatists, unlike neo-Marxists, it is not the capitalist class or the capitalist system that is responsible for underdevelopment in the periphery, but the way the international structure of that system has affected national development, and the weak, inefficient, dependent
capitalism of the periphery. Thus, to them the problem, unlike neo-Marxists, is more a national than international one. Following from this assumption, their solution to underdevelopment involves the construction of a strong national state capable of harmonizing various economic sectors, narrowing the distance between hierarchically structured groups, utilizing national forces efficiently, and rationally directing the process of national development. This state is supported by various national groups to confront and restructure the relationship between the nation and the international system. So, in contrast with neo-Marxists, for neo-corporatists there is no necessary class conflict within the coalition of different groups as soon as they are united against the world system.

One point that we should clarify here is that not all of the work done within the dependency paradigm could be readily categorized into these neo-Marxist and neo-corporatist lines of thought. Among these works, the influential work of one author is of central importance for our discussion. This is the controversial work of the Greek economist, Arghiri Emmanuel, who builds a powerful neo-Marxist case for a reformist and statist position compatible with LICs situation. A review of the major work of this author follows in subsequent sections.
Three Formulations in Dependency Paradigm

New Dependency

Dos Santos (1970:232) identifies these types of dependence through history: (a) "colonial dependency" in which relations between European countries and colonies were based on a monopoly of trade, in addition to a monopoly of land, mines, and manpower for the colonizers; (b) financial-industrial dependency, which emerged at the end of the nineteenth century through domination of capital in hegemonic centers and investment of capital in the peripheries in raw materials, minerals, and agricultural products for the consumption by the metropoles; (c) new dependency or technological-industrial dependency—which appeared after WWII as a result of investments by multinational corporations. Chilcote (1974:15) believes that it is from this type of dependency that much of the thrust of dependency paradigm emanates. This theory attempts to relate traditional notions of imperialism to the internal situation of countries of Latin America. Before elaborating on this point, it should be mentioned that other analysts in the dependency paradigm have distinguished different periods in the relationship between center countries and dependent peripheries. For example, Sunkel and Paz (1970) distinguish between the "mercantilistic" colonial period (1500 – 1750), the period of "outward growth" dependent on primary exports (1750 – 1914), the period of crisis of the "liberal model" (1914 – 1950), and the current period of "transnational capitalism".
According to the new dependency model, industrial development of the Latin American countries is dependent on exports. The foreign currency earned from export is spent to import capital goods. Exports are usually tied to traditional sectors of the economy which are controlled by oligarchies. Often the oligarchies are controlled by foreign capital; therefore they transfer their profits to "centers". In spite of some dependent countries' attempts to impose policies of exchange restrictions and taxes on foreign exports, foreign capital still controls the marketing of exported products. Industrial development of dependent countries, thus, is limited and conditioned by fluctuations in the balance of payments which in these countries often leads to deficits because of unequal exchange in trade relations which take place in a highly monopolized international market, the repatriation of foreign profits, and the need to rely on foreign capital and aid.

There have been extensive studies, in the early 1970's, on different areas of the new dependency. The literature on these areas could be categorized as: (a) cultural dependency, including ideology, educational systems and their impact on various aspects of socio-economic and political life of the dependent countries, such as socio-economic policies, and political orientation; (b) external dependency, defined by Cleso Furtado as "the structural situation in which a peripheral capitalism prevails in certain countries.... It may exist in the absence of any direct foreign investment, and conceivably, even in the relations of a socialist country with
capitalist countries commanding the flow of new products and processes of production.... Once the dependence has been created, the doors are open to the introduction of all the forms of economic exploitation which typify the relationships between underdeveloped and developed countries" (Furtado, 1974:4-5). The literature on external dependency deals with terms of exchange among more industrialized and less industrialized countries, and the role and impact of technology; and (c) financial dependency which covers the effects of dependency on foreign finance, on the economy of the dependent country (such as denationalization of industry, and the distortion of the process of capital accumulation).

**Dependency and Development**

Cardoso initiated the argument on the possibility of capitalist development in dependent countries. He started with the assumption that modern capitalism and imperialism differs from Lenin's earlier conceptions. He focused on the activities of multinational corporations within dependent countries. To him capital accumulation was no longer a consequence of financial control, but rather of corporate capital; investment by multinational corporations is moving away from raw materials and agriculture to industry. These corporations often comprise and control different sources of capital (state, private, and national capital) and monopolize international investment. He, then, could conclude that "monopoly capitalism" and development, were not contradictory terms, and dependent capitalist
development had become a new form of monopolistic expansion in
dependent countries. Cardoso called this form of dependent
development, "associated dependent development" which he
characterized as restricted, limited, and upper class-oriented type
of market and society. New foreign capital was not needed in some
areas where there were local savings and reinvestment of profits in
local markets. He went as far as to say that during times of
monopolistic imperialistic expansion dependent economies export
capital to the dominant economies. The reason for this is new trends
in international capitalism which have resulted in increased
interdependence in production activities at the international level
and in a modification in the patterns of dependence that limit
developmental policy in the peripheral countries of the international
capitalist system. Further, world capitalism has gained
disproportional influence in industry. Whether or not industrial
firms are owned by foreigners or nationals, they are parts of market
investment, and their decision-making structures are located outside
the dependent countries (Cardoso 1973).

Cardoso criticizes those writers in the dependency paradigm who
base their arguments on the assumptions that: (a) imperialism
unifies the interests and reactions of center nations; (b)
imperialism blocks dynamism in dependent economies.
Dependency and Imperialism

The relationship between imperialism and dependency was brought up by Lenin in his discussion about capitalism in the early 1900's. Lenin perceived imperialism as the consequence of capitalism. For monopoly capital to expand its profit-making opportunities, he argued, it needed to search for new external markets, and to export its surplus of capital. Lenin specifies the relationship between imperialism and dependency of dominated nations in this way:

Since we are speaking of colonial policy in the epoch of capitalist imperialism, it must be observed that finance capital and its foreign policy, which is the struggle of the great powers for the economic and political division of the world, give rise to a number of transitional forms of state dependence. Not only are there two main groups of countries, those owning colonies, and the colonies themselves, but also the diverse forms of dependent countries which, politically, are formally independent, but in fact, are enmeshed in the net of financial and diplomatic dependency... (Lenin, 1967:472)

Three principal forms of imperialism have been identified throughout modern history. First, there is "old imperialism", or "mercantilist imperialism" which was dominant during the sixteenth and seventeenth centuries. The second form, "new imperialism", which developed during the time of European empire expansionism and a shift from informal to formal mechanisms of control and influence in the colonies around 1870 and thereafter. The third form, "modern imperialism", covers the time of the breakup of empires and emergence of neo-colonialism.

In the theory of modern imperialism, imperialism refers to "any relationship of effective domination or control, political or
economic, direct or indirect, of one nation over another..." (Cohen 1973:15). There are two versions of the theory of modern imperialism. One version expressing the view from the "periphery" argues that imperialism has detrimental consequences for capitalist trade and investment in economies of peripheries. The other version presents the view from the "centers" and contends that imperialism is necessary for the advancement of capitalist economies.

The view from the periphery has provoked various perspectives, both Marxist and non-Marxist. According to Chilcote (1974:18) non-Marxist theories differ from Marxist theories of imperialism on two levels. "First, non-Marxist theory tends to associate imperialism with expansionism, thereby obscuring the subtle mechanisms through which imperialism has been internalized. Second, non-Marxist theory addresses itself to political and military explanations rather than to economic explanations in a context of capitalist global expansion."

Among non-Marxist theories of imperialism, Johan Galtung's (1971) "structural theory of imperialism" is the most influential one. He defines imperialism in terms of dominance and dependence. Center nations have power over peripheral nations with power based on interest interrelationships. Galtung distinguishes three phases (colonial, neo-colonialist, and neo-neo colonialist) and five types (economic, political, military, communication, and cultural) of imperialism.
Among Marxist theories of imperialism two lines of thinking are identifiable. One, initiated by Paul Baran and Paul Sweezy (1966) serves as a modern substitute for the traditional Leninist approach to an analysis of monopoly capitalism. The other, presented by Harry Magdoff (1969), looks at the history of imperialism and tries to relate the imperialist behavior of private enterprise to U.S. foreign policy. The two lines begin with different concerns but converge in their analysis of multinational corporations of modern capitalism and the nature of their home states.

The preceding review of dependency paradigm shows that despite different lines of thought and differing trends on details, there is consensus among writers, who use this paradigm, on basic assumptions and general ideas.

Dependency Paradigm: Studies of Outside Latin America

Up to now, we have been discussing dependency paradigm in relation to Latin America where it was evolved and where most of the case studies have dealt. There are, however, other studies of areas outside Latin America that have applied the "Dependency" Paradigm. A few of these studies have gained more acceptance than others, such as Walter Rodney's How Europe Underdeveloped Africa (1972), in which he offers a conceptualization of development and underdevelopment as it relates to his thesis that European colonialism led to the underdevelopment of Africa. Another example is Samir Amin's studies on Africa (1972), and particularly his
controversial work (1974) on the critique of the theory of underdevelopment. Because of the importance of this work for the purpose of our study, a brief account of Amin's main ideas on dependency and underdevelopment will be presented later. There is no major published work on Asia, except that of Gunmar Myrdal (1972) in which he only deals with underdevelopment but ignores its relation to dependency and international capitalism.

Besides Samir Amin's works, the works of three other scholars, Andre Gunder Frank, Immanuel Wallerstein, and Arghiri Emmanuel, are of central importance in comprehension of the "dependency" paradigm. A synopsis of the major tenets of these scholars are as follows.

Samir Amin

The major theme in Amin's argument is the growing inequality between developed and underdeveloped capitalist countries. Central to his analysis of this phenomenon is the concept of unequal exchange and its consequence, a process of world-wide accumulation favorable to developed capitalist countries. According to the theory of unequal exchange, which is based on the Marxist concept of surplus value as it operates in a world capitalist system, wages in the periphery, even for equally productive labor, are depressed to levels below those of the center. The reason for the difference in wages is that the capitalist mode of production tends to become exclusive only at the center (self-centered systems of advanced industrial
countries, where it produces for an internal mass market), while in the periphery (dependent systems of peripheral developing countries, where production is geared toward exports and/or toward a domestic limited market of luxury goods) the capitalist system includes and even promotes the existence of non-capitalist modes of production. As a result of this difference, international exchange between developed and underdeveloped capitalist countries inevitably involves absolute transfers of surplus value toward the center. This is the mechanism which accounts for the growing inequality between center and periphery in the world capitalist system, for the projection at two levels of the capitalist contradiction between capital and labor. Globally, there has been a polarization of wealth at the center; nationally, in underdeveloped areas there has been polarization of wealth for a minority. Since the system has been self-perpetuating, the underdeveloped countries are unable to catch up with the developed countries; that is, they cannot reach the level of self-centered capitalist development, which is the stated goal of capitalist development policies. Similarly, class differences created by the system in the underdeveloped countries cannot be overcome, on the contrary, the masses become increasingly marginalized.

After criticizing liberal and orthodox economists (for their pseudo-science in which they are dealing with meaningless, pseudo-problems and by using sophisticated techniques, trying to rationalize world inequality), regarding the opposition between modernity and
tradition, Amin argues that there are no real traditional societies today, but pseudo-traditional ones, whose role is to provide labor to the modern sector. In these societies, traditions have been deformed as the societies integrate into the expanding global system. The pseudo-traditional patterns which are left represent ways of adapting, resisting to, or surviving in conditions of peripheral capitalism.

Amin believes, according to what he calls the law of unequal development, a system is not overthrown in the center, but in its periphery. Due to the unequal development of center and periphery the internal contradiction of the capitalist system is most patent in the latter. It is therefore in the periphery where the overthrow of the capitalist system will start.

As a logical consequence of this argument Amin proposes a two-stage strategy for the development of peripheral countries: (1) a transition period during which developing countries restructure their societies at the economic and political levels. Economic changes are to center on self-reliance. Critical in this respect is the role of technology. The periphery, in Amin's view, has to develop its own technology appropriate to its resources and developing needs. Furthermore, in order to promote an intensive release of productive forces, it is essential that gains in productivity produced by technological advances be transferred immediately to the masses. Closely related to the above is the ideological mobilization of the masses through the development of social consciousness and the co-
Optation of nationalist movements by the socialist forces. (2) Therefore the second strategy is for internationalist movement to integrate the nationalist socialist states in a global socialist society. The role of the periphery in the socialist struggle is central because the periphery must invent a socialist civilization and "unalienate" humanity.

Another influential writer in the literature of sociology of development/underdevelopment and one of the major contributors to dependency paradigm is Andre Gunder Frank.

**Andre Gunder Frank**

The main tenet in Frank's early influential book (1967) is that capitalism generates and explains underdevelopment in Latin America. To him underdevelopment is a product not of "traditional" or backward structures, but of capitalist penetration and the incorporation of Latin America into the capitalist world system. This system consists of a series of metropolitan-satellite relationships, both international and national, which structure the process of expropriation/appropriation of surplus and drain it in stages toward the center of the system. Therefore, the metropoles tend to develop and the satellites tend to stay underdeveloped. In contrast to the development of the world metropoles which is no one's satellite, the development of the national and other subordinate metropoles is limited by their satellite status. Frank, then, observes that the satellites experience their greatest economic development and
especially their most classically capitalist industrial development if and when their ties to their metropoles are weakest. The regions which are the most underdeveloped are the ones which have had the closest ties to the metropoles in the past. They are the regions which were the greatest exporters of primary products to, and the biggest sources of capital for, the world metropolis and were abandoned by the metropoles when for one reason or another business fell off. Latin America was never feudal, but capitalist from the sixteenth century on; the latifundia, irrespective of whether it appears as a plantation or a hacienda today, was typically born as a commercial enterprise which created for itself the institutions which permitted it to respond to increased demand in the world or national market by expanding the amount of its land, capital, and labor and to increase the supply of its products. The decline of previously profitable agricultural enterprises whose capital was, and whose currently produced economic surplus still is, transferred elsewhere by owners and merchants who more often are the same persons or families.

Frank criticizes the liberal and orthodox Marxist social science dealing with the problem of underdevelopment, and rejects their view that Latin America has a "dual" (traditional-modern) internal structure. He contends both schools are dealing with pseudo-problems and foster reactionary political postures by aligning themselves with the national bourgeoisie, because both schools define development as a process of modernizing the "traditional" or "feudal"
sector. He believes that in these societies two sectors (traditional and modern) are linked through capitalist exploitation and surplus appropriation of the so-called traditional sector by the so-called modern sector (Frank, 1967).

Frank, looking for the dependent historical development of Latin American countries, believes: (a) since the conquest, Latin America has been economically dependent, and was incorporated into the single world system of expanding commercial capitalism; (b) colonial and neocolonial relations have changed through time, with consequent modifications in class structure and culture; and (c) as a result of this situation, it is necessary to distinguish different patterns of dependency. The dominant sector of the bourgeoisie adapts its internal policy when changes occur in the forms of dependency, trying to preserve its class privileges. This fact aggravates Latin America's dependence and underdevelopment (Frank, 1972).

The criticism of Frank's early works (1967-69) could be summed up as:

A. Underdevelopment must be understood in terms of classes. The description of class structure in Frank's works seems overly schematic;

B. Dependency is considered as purely an external relationship imposed on Latin America from abroad rather than an internal integral element of Latin American society;

C. His argument on dependency is static. It is necessary to demonstrate how the forms of dependency have changed in spite of its persistence;

D. The term dependency lacks specific and well-defined content. It must be operational (Laclau, 1971).
Frank, in his later works, has tried to define the concepts, and answer his critiques. However, his writings have remained one of the more controversial works in the literature of development/underdevelopment.

We now turn to yet another major contributor to the development and enhancement of dependency paradigm, Immanuel Wallerstein.

**Immanuel Wallerstein**

Wallerstein describes four stages in the evolution of the capitalist world system:

(1) The emergence of agricultural capitalism through the geographical expansion of the division of labor between 1450 and 1640. Wallerstein's principal thesis is that modern capitalism did not develop as a mature institution within Western Europe and then establish itself all over the world. European capitalism developed as the controlling force in the world economy because the essence of capitalism is its functioning as a mechanism of "extraction." That is, a mechanism for transferring wealth from region to region and from class to class. Development and underdevelopment have been two sides of the same coin from the sixteenth and seventeenth centuries, when the ports of this world economy—which included Europe and the Mediterranean and the new world, but not yet Asia and Africa—had already been divided into a system of interlocking zones: core, semi-periphery, and periphery. Each zone has been developing its own mode of production and its appropriate form of labor. In the core,
free wage labor engaged in skilled agriculture and manufacturing; in the semi-periphery (e.g., Russia and Eastern Europe), serfdom or share-cropping, producing grain or timber; in the periphery (in this period mainly Latin America), slavery or other forms of forced labor, engaged in unskilled cash-crop agriculture or extraction of minerals.

(2) The consolidation of the world economy and domination of England through retrenchment, or mercantilism, during the recession of 1650 - 1730. This economy was not coterminous with the boundaries of any political empire. This was the reason for dynamic expansionism and one of the reasons why Europe, not China or India, became the leader of the modern world system. Otherwise, the defense of a secure political unity would have led to conservatism. It was through intense competition within Europe and other parts of the world system, that capitalism developed. Force was used, but the development of the world economy and the division of that economy into zones did not (except in the New World) depend upon force. Rather, elites within periphery and semi-periphery were drawn towards the direction that was economically attractive and structurally conducive. Thus, a "second serfdom" was rigidified in Russia and Eastern Europe in the early modern period, as these areas became increasingly dominated by the production of grain for Western markets. Underdevelopment was the result not merely of force but of collaboration. In the beginning the differences between the zones were relatively small, but the effect of an accelerating mechanism by which wealth was transferred, vertically from class to class and
horizontally from zone to zone, would greatly increase and rigidify those differences.

(3) The transformation into industrial capitalism through further geographical expansion and structural changes within core states during the nineteenth century. The Industrial Revolution accelerated the structural relationship between development and underdevelopment and preserved the world-system from another serious contraction. In the sixteenth century the differences between core, semi-periphery, and periphery had been comparatively slight; the effect of their interlocking into the world-system was to increase the differences by accelerating the transference of wealth; and the effect of the Industrial Revolution was to widen the gap much further.

(4) The consolidation of the industrial world-economy after World War I. According to Wallerstein after the Industrial Revolution a capitalist world-system of free trade was gradually established under British leadership. In the period of the "new Imperialism" after 1870, Africa and all Asia, except Japan, became peripheral areas, while the United States after the Civil War moved into the core, as did Japan by the early twentieth century. Then came the monopoly phase of multinational capitalism, when Europeans underdeveloped the societies they controlled as colonies. The decolonization which concentrated exclusively on political and constitutional relationships, did little to alter the structural dependency that continued to accelerate. The Soviet Union achieved
core status and the United States rose to dominance. The world division of labor has undergone restructuring, and core status is presently divided among the United States (whose hegemony is in decline), the European Common Market, Japan and the Soviet Union. In this context the Russian Revolution is seen as a reaction to the threatened decline of Russia's structural position in the world-economy (from semi-periphery to periphery) instead of an emergence of a socialist state. Semi-peripheral areas are presently expanding their share of the world surplus through expropriation and nationalization (a profit-maximizing endeavor). A "triad of strata" is still maintained since the peripheral areas are further weakened by the new strength of the semi-periphery (e.g. South Africa, South Korea, Taiwan, Brazil) and by the continued expansion of the core.

Wallerstein's projection for the future is that two fundamental contradictions in the operation of the capitalist world-system will continue to weaken the system. First, the opposition between the tendencies of short-run maximization of profit (withdrawal of surplus) and of long-run production of surplus (redistribution of withdrawn surplus) will gradually "make the game for those with privilege less worth playing." Second, the process of short-run co-option of oppositional movements by "the tenants of privilege" will raise the cost of co-option "ever higher" and make the advantages of co-option "seem even less worthwhile".

Wallerstein has been mainly criticized for being "circulationist". Wallerstein regards circulation—as opposed to
production for Marxists—as a determinant of the mode of production. He considers exchange as the determinant of the capitalist world system. This and other points in Wallerstein's explanation, which have been subject to criticism, has been succinctly presented in the following paragraph by Vicente Navarro (1982).

...Because he [Wallerstein] believes that capitalist relations of exchange are the dominant ones in today's world, he concludes that the world system is a capitalist one. Moreover, because he also believes that exchange determines the mode of production or organic whole, he concludes that capitalism is the only mode of production in today's world. This belief leads Wallerstein to dramatically underestimate the conflicts between different social systems, such as capitalism and socialism, as well as the conflicts between classes in each social formation...(Navarro, 1982:83)

Another author who is frequently cited in the literature of dependency paradigm and whose theory is constructed on the unequal exchange among nations as a result of international disparity of wage is Arghiri Emmanuel, the subject of the next section.

**Arghiri Emmanuel**

The essence of Emmanuel's theory of unequal exchange is that international disparity of wages has resulted in price disparities and the reward of equal labor at different rates in different nations causing a transfer of surplus value to high wage (developed) nations from low wage (underdeveloped) nations. The gradual decline in the prices of primary products and the terms of trade of many countries whose major exports consists of these products are, therefore, the result of the enormous disparity between the wages in industrial and
primary commodity nations. Primary products command low prices not because of the nature of the products themselves but because of the country of their origin.

For Emmanuel, foreign investment is not an unqualified evil, as it is for many Marxists and dependency theorists. He believes that colonialism was an effort to turn the colonies into consumers for home country products, and actual capital investment in the colonies was minimal. The presence of foreign investment was not a hinderance to the development of colony, but it was the outflow of capital that occurred that inhibited development as the home countries imported capital to finance the balance of payments deficits.

Consumption plays a more important role in Emmanuel's analysis than industrialization. He argues that the inability to consume its surplus has hindered development in underdeveloped countries. For a nation to derive advantage from foreign trade, it must consume more than its partners. He contends that underdeveloped countries only benefit from the use of material goods and not symbolic slips of paper in a London bank which is profiting from the investment use of such paper.

Although Emmanuel defines development as the improvement of human's material well-being, he refutes the belief that industrialization is a structural condition of development; industrialization in his opinion is only the syndrome of development. He asserts that it is the utilization of machines, not their production, which aids development, and to that end mechanization and
education are vital. Therefore, all sectors of the economy must be modernized. He criticizes those scholars who center on the appropriate technology argument which he claims is inconsistent. He says these scholars believe that underdeveloped countries have been relegated to the ghetto of labour-intensive production techniques, while simultaneously claiming that multinational corporations exploit foreign nationals by introducing capital-intensive techniques. He says the latter practice is "uncapitalist", and that patents and licenses are actually undervalued, giving the underdeveloped countries the benefit of Western technology at reduced costs (Emmanuel, 1974).

Emmanuel's suggestion for the solution of the problem of international inequality emphasizes a change in global consumption patterns and more realistically, increased foreign investment in underdeveloped countries. The reason for this suggestion is that the objective base for the international solidarity of workers does not exist given the increasing nationalism of workers. As a consequence of unequal exchange, workers in developed nations are prospering, and this creates a feeling of national identification which transcends the identification of the worker as a proletarian. The struggle is between rich nations and poor nations rather than between capitalist and proletariat. Conflicts between workers and capitalists in developed countries are merely an argument over the division of the economic pie of the privileged.
The theory of unequal exchange has been criticized for being only an economic theory of the causes of underdevelopment and its perpetuation which ignores the human, ethical, or qualitative aspects of development. Emmanuel's solutions require a considerable amount of state intervention and withdrawal from international trade.

Having discussed the contributions of four influential writers of the "Dependency" paradigm, we now return to the general critique of this paradigm.

General Critique of Dependency Paradigm

The dependency paradigm has come under attack from different directions, from liberal developmentalists, and more notably from Marxist writers. There criticisms could be summarized as follows:

-- The concept of dependency is too vague to make the necessary distinctions between dependent relations involving relatively poor countries like Peru or Bolivia and developed but dependent nations like Canada;

-- The connection between dependence and underdevelopment often appears circular and noncausal;

-- The lack of concreteness in the formulation of the concept of dependency limits its usefulness in developing political strategies (O'Brien, 1975);

-- The relationship between modes of production in central and peripheral countries has not received adequate attention. The fact that colonial Latin America supplied capitalist Europe with certain commodities does not define the modes of production in Latin America as capitalist. A more productive approach to the problem would be to determine to what extent "the maintenance of pre-capitalist relations of production in the peripheral areas is an inherent condition of the process of accumulation in the central countries" (Laclau, 1971);
"Dependence" is an inappropriate and useless concept. Lall (1975) argues, since the characteristics of underdevelopment singled out for analysis by dependency theorists—the skewed and worsening income distribution, the borrowed and often inappropriate technology, the economic, cultural and political penetration by foreign interests—are, or have been, characteristic of other capitalist nations, therefore, differences between developed and underdeveloped capitalist nations are more a matter of degree than of kind, and as an analytical concept is inappropriate;

The main emphasis is on external factors of underdevelopment and it does not pay enough attention to internal factors;

The "Dependency" paradigm is static because only the form of dependency changes and because it simply assumes the continuing validity of the center-periphery paradigm, and dependency theorists usually equate imperialism with the world market, and incorrectly assume that there is a latent suppressed autonomous historical development alternative available (Warren, 1980).

Contemporary Trends in Thinking of Development /Underdevelopment

The incapability of the two major competing paradigms of development/underdevelopment, discussed in the preceding section, to fully explain the crisis of the 1970's and the current crisis15 in the world-system has resulted in both emergence of new trends, and a shift of focus in the views of some of the writers within the dependency paradigm. A brief overview of these trends and shifts, a necessary part of dialectical thinking, parallel to a dynamic world, would prove helpful in understanding what follows in succeeding chapters.

Interdependence. According to the adherents of this trend, both major approaches of underdevelopment have biases, endogenism and
exogenism, and are equally misleading. The remedy would therefore be to transcend this dichotomy and find the synthesis. In the real world no country is self-reliant, nor does any country develop merely as a reflection of what goes on beyond her borders. All countries are dependent on each other and on the system of which they are parts, but there are different forms of dependence both in kind and in degree.

There are different interpretations of this trend. One is that "interdependence" is a refined form of the dependency paradigm, expressing a more complicated structure of the world-system than suggested by the simple center-periphery dichotomy. Examples of this complexity are the rivalry within the center (Western Europe being more dependent than the U.S., Eastern Europe more than Soviet Union), the industrialization of the center, and the emergence of new regional powers (Brazil, India, Mexico, Nigeria). Another interpretation is that the idea of interdependence suggests a common predicament for the peoples of the world, one version of "we are all in the same boat", disregarding world class and power structure (the passengers in the boat neither travel in the same class, nor they have equal access to the insufficient lifeboat). It appears that this interpretation fulfills an ideological purpose on behalf of MICs. The concept of interdependence, therefore, is a vague concept and does not have explanatory power to account for underdevelopment of LICs and ever increasing international inequality (Alechina, 1982).
In line with the interdependence trend, during 1970's, several manifestations of a new global consciousness appeared which tend to assume the existence of one strongly integrated world. In the academic arena, theories of the "world system", "global modeling", and "world order models" were intensely discussed. On the diplomatic scene, "group of 77" led to New International Economic Order (NIEO), and later the Brandt report became one of the main topics in the United Nations periodicals.

Another Development. Another Development is an attempt to rethink development based on new values stemming from the problems created by orthodox strategies, including poverty, dependence and pollution. This alternative type of development tries to avoid creating such problems by learning from the past. Development, hence, ought to provide for basic needs, strive for self-reliance, and be sustainable in terms of limited resources and ecology (ecodevelopment). Another Development is, therefore, a process in accordance with contextually defined human needs and values. This trend, however, does not ask whose needs and whose values?

The constituent ideas of Another Development have been around for decades. The idea of self-reliance\textsuperscript{17}, for example, has been discussed by Mahatma Gandhi, Mao Zedong, and recently Julius Nyerere. The basic needs\textsuperscript{16} in various forms have been part of strategies of national development plans in both centrally planned and free market countries. Ecodevelopment is a later concept which calls for

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
specific solutions to particular problems in particular regions in
the light of cultural as well as ecological data.

A point of importance here is that the concept of Another
Development, implying small-scale solutions, ecological concerns,
popular participation, etc., has met with some enthusiasm in rich
countries, particularly Western Europe, while it has more or less
been rejected in poor countries. One of the reasons given is that
small may be beautiful, but it does not entail power (social power,
state power, military power). The masses in the LICs will certainly
never reach the standard of living presently maintained in the West
(and by LICs' elites) even if the urban middle classes in some areas
may, at least theoretically, achieve this. The rejection of Another
Development in the Newly Industrialized Countries can be attributed
to the fact that their ruling elites are growing increasingly
antagonistic in their competition, and therefore feel the need for
gaining power in the international scene through large-scale
industries. Another Development does not seem to be on the agenda in
LICs today (Alechina, 1982).

But why such interest for Another Development in capitalist
industrialized countries? There are two answers to this question.
One, which has been presented as a critique to E.F. Schumacher's
controversial book, Small is Beautiful, A Study of Economics as if
People Mattered, 1975, contends that encouraging LICs to pursue a
national plan of development based on small-scale industries is part
of a conspiracy on part of the scholars of the more industrialized
countries, to keep LICs underdeveloped and inferior in the international competition. Another answer is that the collective consciousness in the industrially advanced countries is now going through a process of transformation. The two opposed frameworks are in a dialectical process: a new framework (alternative or another development) is negating the old framework (predominant development paradigm). The new framework could be characterized by its ideals: "physicoratism" in the sense that the earth and the natural resources constitute the ultimate preconditions for human existence, "ultrademocraticism", in the sense that people exercise control over their own situation, and "structural undifferentiation" in the sense that the division of labor is within humans rather than among them. The old framework (modernity) could be characterized by "industrialism, urbanism, centralism, professionalism, eliticism, etc."20

The interest of a number of intellectuals from both developed and underdeveloped countries in Another Development has been the basis for the belief that LICs' populism and the present upsurge of neo-populism in Western Europe may be seen as a manifestation of Another Development. It should be welcomed as a constructive intellectual collaboration between scholars from developed, and underdeveloped countries, working on an idea which is rooted in traditions of various countries.21 This is on ideological background to the well-known concept of "man-centered development."22
New Directions in Marxism

Three new directions could be identified in recent literature of neo-Marxism. First, is "mode of production analysis". Laclau, in his 1971 criticism of Frank and the dependency paradigm for being "circulationist", referred to the relevance of this analysis for the problem of underdevelopment. By identifying various modes of production, it provides a theoretical explanation of the coexistence of different modes, such as feudalism and capitalism in each economic system, and how they together form a specific economic system. In this analysis, the basic assumption of blocked development of the dependency paradigm is retained, since imperialism rather than pioneering capitalism could preserve archaic modes of production (Chilcote, 1983).

Secondly, there is "the internationalization of capital." In contrast to the mode of production analysis which starts from the national economy and emphasizes internal factors (rightly so, because it criticizes the over emphasis of dependency paradigm on external factors), this approach stresses a global scope. It argues that political economy should explain the emergence of the total international capitalist economy, rather than the underdevelopment of one part of the world. Accordingly, the dynamics of a world capitalist economy cannot be understood with reference to a single country. Lastly, is the "state as mediator analysis" which focuses on the state, and views it as mediator between local and global forces. In this approach the state is more firmly in the context of
class analysis. The role of the state in LICs is ambiguous since it cooperates with transnational corporations while at the same time tries to maintain a certain autonomy.

In addition to these contemporary trends in thinking of development/underdevelopment which is a demonstration of dissatisfaction with the two dominant opposing paradigms the following factors seem to have invoked some of the influential authors (whose works were reviewed earlier) to change their focus: (1) a need for some changes or at least reformulations of development/underdevelopment theories in light of new insights (reviewed earlier); (2) numerous crises in the global political economic system in the 1970's and early 1980's; and (3) criticisms against the dependency paradigm. The following is a brief presentation of such changes in focus of these authors in order to bring our discussion up to date.

**Elaborations in Dependency Paradigm**

Frank has published three books and an essay on the crisis in the world economy and in the LICs since 1980. In these works, Frank uses the concrete historical analysis to explain the nature of global crisis. He analyzes capitalist expansion in terms of long waves, based on concrete historical realities, to account for the historical specificity of each of the ascendent phases and the structural crises that succeed them. For Frank the crisis signaled a step in the expansion of the capitalist system toward the the LICs.
In analyzing the social reality and tendencies at work in the South, Frank (1983) demonstrates the specificity of peripheral capitalist expansion, through a number of examples, ranging from the semi-industrialized (or newly industrialized) countries to the "fourth world". He shows that (1) in the periphery, capitalist expansion is always based on superexploitation, whereas in the center the fraction of national income claimed by labor tends to remain constant; (2) this tendency is exacerbated during phases of crisis by the world redevelopment of capital which is, in effect, an expression of the attempted capitalist solution to the crisis; (3) the bourgeoisie in the South, because it too derives benefits from this overexploitation, has neither the will nor the desire to "de-link".

Frank also analyzes the East (the Soviet Union and China) as:
(a) non-socialist (or quasi-capitalist); (b) never having "de-linked" from the world capitalist system, save for relatively brief periods and even then out of necessity not choice; (c) presently already integrated (or "reintegrated") into the system and anxious to integrate itself still further; (d) an element in the solution to the crisis to the extent that its further integration into the system can be anticipated.

For Frank, the future is therefore the future of relations among the developed capitalist countries, which is an uncertain one. There are both trilateral commission through which these countries coordinate their overall policies toward the rest of the world, and the conflicts which are presently dividing the United States, Japan,
and European Common Market. Will the general interdependence of the more industrialized capitalist world give way to a mutual distancing and a protectionist confrontation (without necessarily leading to a war as in 1914 and 1939)?

Amin, in his books of 1980, *Class and Nations: Historically and in the Present Crisis*, and 1983, *Future of Maoism*, and an essay on "Dynamics of Global Crisis" argues that during phases of structural crisis, capital goes on the offensive and attempts to restructure itself by taking advantage of the cheap labor pool available in the periphery and—as is the case today—by reducing real wages in the center. This is its "solution" to the crisis, hence the persistence of the crisis. How or whether this impasse will eventually be broken depends on the ways in which the various conflicts exacerbated by the crisis—conflicts between classes and states, including the inter-imperialist and MICs-LICs rivalries—are resolved. Different responses to these phases of acute conflict are possible in the West, namely, left revolutionary upheavals, left reform, or worker-oriented reform (Amin, 1983).

Amin contends that the bourgeoisies of the Third World, even in the most advanced instances of the nationalist movement (Nasserism, Tanzania, Angola) have never delinked from world capitalist economy. The bourgeois radical tendency, which sets as its objective the construction of an autocentered, non-de-linked economy, is doomed to fail and, ultimately, the "comprador" tendency, which acquiesces to subalternization, will prevail over it. This "recompradorization",

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
spearheaded by finance capital in its newest guise—the IMF-World Bank—strikes not only the poorest countries (of which some, moreover, have never even attempted to disengage themselves from their neocolonial, comprador status), but also and especially the semi-industrialized countries (witness the near bankruptcy situation of Mexico, Brazil, etc.) in late 1983 (Delamaide, 1984). Amin asserts that the revolt of the peoples in the Third World is against "transnationalization/compradorization" which is still in a confused and equivocal state. The reason for this is the historical limits of bourgeois radicalism and of the left which has rallied around the same banner. This in part explains the "religious renewal" in some Third World countries. The future, for Amin, is uncertain, as it is for Frank.

Wallerstein, in his more recent works, elaborates on strategies for development. Whereas the possibility of a genuine independent development through breaking with the capitalist world system and a socialist revolution is implied in much theorizing on dependency, this development path is ruled out by Wallerstein. According to Wallerstein we are now living in the historic world transition from capitalism to socialism, but it will take 100-150 years yet to complete it (Wallerstein, 1982). He argues, there are today socialist movements controlling certain state-machineries, but no socialist national economies within the framework of the world economy. No reforms, however radical, can establish socialism in one country, because the rest of the world system is not prepared to let
it happen. There are only three strategies open for development: "The strategy of seizing the chance," "the strategy of promotion by invitation" and "the strategy of self-reliance" (Wallerstein, 1982). The first strategy is a classical one, roughly identical with the state capitalist strategy, since it involves aggressive state action to transform the structure of comparative advantages. Since not all countries can seize the chance at the same time, only a few countries can develop through this strategy, at a specific period of time. Development by invitation is based on existing comparative advantages, such as low wage level and a general hospitability of LICs. Again, not all countries will be found hospitable enough, and thus, only a few would develop at a time. Self-reliance deviates from both of these strategies by its inward orientation. However, in the context of the present world system, it is the most unlikely strategy to succeed.

One of the changes in the global political-economy in the late 1970's and early 1980's which has attracted more attention among theorists of sociology of development/underdevelopment is the position of Newly Industrialized Countries (such as Brazil, Mexico, South Korea, and Taiwan) in the international arena, and their overall internal conditions which has, interestingly enough, generated similar reactions in different schools of thought in sociology of development. A short review of these reactions sheds light on the issues in the agenda of theorists in sociology of development.
The Reaction to the Newly Industrialized Countries

Modernization Paradigm

The rapid economic growth of number of capitalist developing countries during the 1970's brought enthusiasm to the modernization circle, those who think this rapid economic growth defies the recommendations of the dependency paradigm. They look for empirical support in those countries and advocate export-industrialization and encourage modernization. The adherents of "Modernization" Paradigm focus their attention on the so-called capitalist miracles of East and Southeast Asia. First is Japan, second the "four little dragons": South Korea, Taiwan, Hong Kong and Singapore, and third the more doubtful cases of Malaysia, the Philippines and Indonesia. They are doubtful because the contradictions of the capitalist path are more obvious and the future of these countries uncertain.

These countries are referred to as cases contradicting the basic thesis proposed by the dependency paradigm. That is, the problem of blocked development associated with a dependent position. But a closer look at these cases reveals that first, economic growth is treated as development, and social, political, cultural, and ecological factors are neglected; second, the experiences of these countries are not easily generalizable, and they differ substantially among themselves. Hong Kong and Singapore are city-states, and therefore atypical. Hong Kong's apparent prosperity comes from her dependence on the Chinese market. The military component of
Singapore's economic growth is becoming more conspicuous, a factor which is of central importance for her future political stability (the massive demonstrations of the late 1983 attests to this claim) (Hettne, 1983).

The cases of South Korea and Taiwan are also specific and cannot be regarded as models for other capitalist LICs. These two countries are located in geopolitically sensitive areas, and have been favoured by strategic considerations as buffer zones for hegemonic purposes of the U.S. The nature of their political systems, repressive military regimes, is an important factor for understanding their situations. Recent evidence shows that their "economic miracles" resulted from a particular set of historical factors: hypermilitarization, ultra-dependency, and massive U.S. aid combined with popular anti-communism. One cannot rule out the argument that their closeness to Japan has made them participants in the Japanese growth process (Halliday, 1983).

The short period economic growth of these and other Newly Industrialized Countries (NIC's), on the basis of massive foreign debt, which led to the great fear of these countries' default in capitalist world financial circles, showed how premature the ecstasy of modernization advocates was. The economic success of these countries is basically a reflection of a structural change in the world-economy, a relocation of industrial production because of the internationalization of labor and capital. This is also an indication that some countries have been chosen for their
geographical location, stability, and favorable conditions, namely, cheap raw materials and labor. This is exactly what the dependency paradigm brought to our attention as its problematic, the analysis of such phenomena in the content of the changing world-system.

The advocates of Modernization paradigm were not the only one who reacted to the NICs' short period economic growth enthusiastically, some of the neo-classical marxists showed similar reaction.

Neo-Classical Marxism

The success stories of capitalist industrialization in the Newly Industrialized Countries generated similar reaction among "neo-classical Marxists", who have returned to the classic Marxism perception of progress. The more controversial works in this trend is Bill Warren's Imperialism: Pioneer of Capitalism (1980) in which he tries to revive the original Marxism idea of imperialism as the pioneer of capitalism. Warren restates the conventional wisdom of the 1950's and 1960's, and repeats the orthodox Marxism theory of development in underdeveloped countries, namely that the industrialization of the West initiates and accelerates development in the rest of the world. Thus the least industrialized countries of today can see in the Newly Industrialized Countries an image of their own future. This view not only contradicts the dependency paradigm but also much of Lenin's work on imperialism. It is subject to the same criticisms as the modernization paradigm, namely, the treatment
of economic growth as development, the emphasis on capital accumulation, and the neglect of social, cultural, political and ecological factors. Furthermore, as Munck (1982:169) indicates "Warren's work is in fact, an elaboration of Kay's (1975) earlier witticism that 'capital created underdevelopment not because it exploited the underdeveloped world but because it did not exploit it enough'".

**Historical Analysis Versus Statistical Analysis**

Following the first major cross-national study to test the "dependency paradigm" and related theories of international inequality by Chase-Dunn (1975), a substantial number of quantative, cross-national studies have been conducted. These efforts have become a polemic among adherents of the dependency paradigm and those who advocate quantitative studies, despite the modest support of these studies for dependency arguments. The arguments of the latter group against (or their criticisms of) quantitative study of dependency could be summarized as:

1. Dependency is not a variable that can be measured. It is a conceptual framework for the analysis of Third World countries emphasizing the interplay between the forces of international capitalism and internal forces of each Third World country;

2. Dependency is a situation (or a collection of structurally comparable situations) embracing many features of Third World countries;

3. To measure dependency is a difficult task because all aspects of Third World countries are confounded with dependency in some way; and because dependency manifests
itself differently in different contexts; in some contexts dependency can be managed, making dependency-linked economic growth possible;

4. The economic development of Third World countries cannot be distinguished from dependency because development is dependency based, that is, all aspects of the development in each developing country are derivative of dependency;

5. Quantitative tests violate the spirit of dependency paradigm and are implicitly developmental;

6. The quantitative tests are narrowly economic. The most harmful effects of dependency are long term distortions of class and state structures. Therefore, it is absurd to focus exclusively on short term economic fluctuations, for there is much more to development than GNP per capita increments;

7. Quantitative tests fail to capture the complexity and the multidimensionality of dependency. Dependency is more than a specialization in the export of raw materials or a dependence on foreign investment. It embraces a variety of features internal to dependent countries, a nexus of conditions that is best understood as a configuration or syndrome;

8. Quantitative tests of dependency ignore changes in the world economy and their effects on the relationship between dependency and development. Quantitative tests focus on relatively short period (10 to 20 year intervals) and, thus, ignore the dynamic features of the world economy;

9. The causal logic of statistical techniques (namely, multivariate analysis) used in a number of quantitative studies contradicts the logic of dependency paradigm (Bach, 1977; Caporaso, 1978; Palma, 1978).

The critics of quantitative studies, prefer qualitative historical case study on specific dependent countries during specific historical periods or comparative analyses of a number of dependent countries.

The advocates of quantitative study, on the other hand, argue that: (1) While it is true that historical case study has value, it
is also true that the basic descriptive questions addressed in quantitative studies (e.g., do the most dependent countries suffer the slowest rate of growth?) are meaningful and that answers to these questions are of value (Szymanski, 1981). (2) Descriptive uses of quantitative cross-national data (predominant among the cross-national tests) assume no causal metatheory. The techniques have been used to answer simple descriptive questions, not to construct causal models of the world system or of international capitalism.

Summary

Modernization and dependency are two competing paradigms with the claim to provide conceptual and analytical tools capable of explaining, primarily, the relative underdevelopment of Latin American countries. Except for the subject of inquiry, they differ substantially in all aspects: assumptions, methodological implication and strategies for research. Figure 1 summarizes these differences.
Figure 1. Two Opposing Paradigms
<table>
<thead>
<tr>
<th>Modernization</th>
<th>Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumptions:</td>
<td>External, including control structures. The operational mechanisms of these control structures have changed from direct form as follows:</td>
</tr>
<tr>
<td>1. Main factors responsible for the underdevelopment of the periphery or traditional societies.</td>
<td>a. Colonial era, direct military force (formal political subjugation).</td>
</tr>
<tr>
<td></td>
<td>b. Neo-colonial era, indirect economic form, such as foreign investment, foreign aid and trade relations based on a vertical division of labor, which results in:</td>
</tr>
<tr>
<td></td>
<td>1. Exploitation of the periphery by the center, which drains resources needed for its development through: decapitalization, unequal exchange, and transfer value (profits on foreign investment and interest on credit) from the periphery to the center;</td>
</tr>
</tbody>
</table>

(Figure 1. Two Opposing Paradigms)
<table>
<thead>
<tr>
<th>Modernization</th>
<th>Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Structural distortion of the periphery through: specialization in raw material production (low integration), and the creation of a pattern of resource, such as capital-intensive technology, which maintains a state of dynamic underdevelopment;</td>
</tr>
<tr>
<td></td>
<td>3. Suppression of autonomous policies in the periphery by creating a political situation in which elites in the periphery are linked to the interests of the center. This prevents the emergence of autonomous forces seeking to mobilize balanced development. The ruling groups, therefore, are able to obtain a large share of the national income and to prevent income redistribution because their power is backed up by alliances with the center.</td>
</tr>
</tbody>
</table>

(Figure 1. Continued)
Modernization | Dependency
---|---
2. The path to development. | Different strategies have been suggested including:
   - Adoption of modern technology, work habits, organizational forms, attitudes and consumption preferences which stimulate economic development;
   - Foreign investment, in any productive activity generates demand for inputs from other activities and this contributes to economic growth;
   - Foreign credit, finances public infrastructure needed for development. Foreign investment and credit also expand the wage earning working class and the salaried middle class which enlarges the middle of the income distribution and lowers overall inequality.

3. Relationship between the center and the periphery or "modern" and "traditional" societies. | Symmetrical
(Figure 1. Continued) | Asymmetrical
<table>
<thead>
<tr>
<th>Level of analysis</th>
<th>Modernization</th>
<th>Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral or micro-sociological</td>
<td>Structural or macro-sociological</td>
<td></td>
</tr>
<tr>
<td>National society</td>
<td>World system</td>
<td></td>
</tr>
<tr>
<td>Not crucial</td>
<td>Crucial</td>
<td></td>
</tr>
<tr>
<td>Individuals behave differently because they are different.</td>
<td>Individuals behave differently because their social contexts are different.</td>
<td></td>
</tr>
</tbody>
</table>

- **Conception of change**
  - Change is a product of innovations.
  - Change results from dependency relations over time.

- **Methodology**
  1. Synchronic, and deduction from impressionic observations;
  2. Comparative study
  1. Diachronic, and case study;
  2. Survey research

(Figure 1. Continued)
In reaction to the crisis in the world economy during the last decade, a number of trends have emerged in the literature of development/underdevelopment. One is the concept of Another Development (e.g. basic needs, self-reliance, and ecodevelopment), which consists of intellectual endeavors from both more industrialized and less industrialized countries. This development strategy, advocates small-scale industries, ecological concerns, popular participation, and gradual process of independence. This approach has mainly been dominant in agencies of the United Nations, but has not had much appeal to the LICs. As a response to the increasing gaps between MICs and LICs, and ongoing global crisis, the dominant trend in latter countries is populism, a reaction against "modernity", i.e., industrialism, urbanism, centralism, professionalism, etc.

Another trend is the reaction of both modernization advocates and orthodox or neo-classical Marxists to the "economic-miracle" of the newly industrialized countries (NIC), namely, Taiwan, South Korea, Brazil, Mexico, and Singapore. The adherents of the modernization paradigm saw this rapid economic growth as a base to revive their arguments that the only way out of backwardness and misery for the LICs is emulating, assumingly prosperous more industrialized countries, on the one hand, and to regard the event as a refutation of the basic tenet of some of the authors in the rival paradigm, that is, the impossibility of development in dependent capitalist countries, on the other. In neo-classical Marxism, Bill
Warren's (1980) attempt to revive the original Marxism idea of imperialism as the pioneer of capitalism stands as an example of such reaction. Warren argues that the industrialization of the West initiated and accelerated modern development in the rest of the world, hence, the least industrialized countries of today can see in NIC's an image of their own future. Both groups misread the "demonstration effect" and were surprised when they later saw most of the NIC's at the edge of default, and entangled in the debt trap (Payer, 1975; Delamside, 1984).

Another trend consists of three lines of thought: first, the mode of production analysis, which identifies various modes of production in each socio-economic formation, and focuses on their relationships; second, the internationalization of capital, which argues that political economy today should explain the emergence of the total international-capitalist economy, rather than the backwardness of one particular part of the world; third, an approach that takes the state as its principal focus as mediator between local level and global forces.

Finally, the last line of thought is the shift of focus of the influential writers in dependency paradigm. In their attempts to establish a theoretical framework for understanding the worldwide expansion process, these authors, have recently shifted their focus to global crisis and capital accumulation.
CHAPTER III

SCIENTIFIC-TECHNOLOGICAL DEPENDENCY

In chapter two, two opposing dominant paradigms in the literature of development/underdevelopment of the Less Industrialized Countries (LICs) were discussed, and the dependency of these countries on More Industrialized Countries (MICs) in general was emphasized to provide appropriate theoretical background for the present chapter. This chapter deals with the scientific-technological dependency of LICs on MICs in particular and attempts to achieve two goals: (1) to explain why and how LICs became dependent on science-technology of MICs; and (2) to present support(s) to substantiate the argument that the present scientific-technological gap between MICs and LICs is going to increase and consequently the dominance/dependence relation of MICs and LICs is going to intensify at a qualitatively higher level.

The idea that the West has been far advanced in science-technology since the fifteenth century is now well documented. The role of science-technology in the history of imperialism, or in relationships between LICs and MICs during the different historical epochs, however, has not been given the attention that its importance deserves. To this author, perhaps this is because (1) in most cases Western science-technology has been regarded as neutral (Rahman, 1981) and therefore its impact on all aspects of LICs social life has not been adequately appreciated; (2) science and technology have
been seen as separate entities; and (3) science-technology have been viewed only as forces of production, not as relations of production. To fully realize how and why LICs became dependent on Western science-technology, it is necessary to acknowledge first the characteristics of Western science-technology, and its philosophical and epistemological bases, and, second, the mechanisms and processes of scientific-technological dependency in the historical context of relationships between these countries. For this purpose first the patterns of LICs dependency on MICs science-technology in colonial and neo-colonial periods are discussed and then the various dimensions of the ongoing trend is emphasized.

The Characteristics of Western Science-Technology

In this study science-technology is conceived as both a force of production and relation of production (more on this later). The forces of production (or techniques) have two components, hardware (tools) and software (skills and knowledge). The relations of production are manifested in various dimensions, politico-economic, social, cultural, and cognitive (i.e. deep-lying assumptions about reality) (Galtung, 1979). According to Galtung (1979) this force of production (i.e., technique) carries certain messages and expresses relations not confined to a specific aspect of forementioned dimensions. For example, whenever a technique is developed, deployed, and/or transferred, certain messages and relations are expressed irrespective of whether it is a technique for production,
distribution, or consumption. Galtung (1979) cites an illuminating example in this regard:

The family vehicle, the car, carries a message: it says something about the size of the unit that can travel in the car with comfort and, hence, something about the size of the family. The car does not only limit the family to a maximum of three children; it also indicates the structure of the family—with the parents in front and the children at the back, the father being the instrumental leader turning the wheel, the mother watching, commenting, taking care of the internal relations in the car, the boy peeping over the shoulders of the father to learn the tricks, the daughter sitting behind the mother doing likewise. The car is an expression of a certain attitude to other human beings (regulated competition) and to nature (depleting and polluting nature but running away quickly from the scene).

(Galtung, 1979: 283-84)

The total pattern of relationships built into Western science-technology can be understood in terms of its components. The politico-economic message expresses itself in those who have power to make decisions, their collaborators, and their opponents. The former are capitalists and specialists, that is, researchers (specialists in predictive general laws), and managers, bureaucrats, administrators (specialists in prescriptive general laws), and the latter are those subject to decisions, namely, the industrial proletariat. In other words, Western science-technology can function only where there is a concentration of such a social elite. It follows the logic of capitalism as the dominant mode of production. It therefore needs to be capital intensive, research intensive, organization intensive, and labor-extensive to preserve its power and continue to grow. The concentration of these elements in a number of small groups and the
need for decreasing this number for further growth inevitably leads to ever increasing inequality (Galtung, 1979).

The social message of relationship built in Western science-technology is that of dependency—formation. It has been argued (Stewart, 1974; Morehouse, 1979) that once the technology is implanted, an everlasting demand structure is created for spare parts, more knowledge and skills and for new technologies. This pattern of dependency formation extends to the relations between center and periphery within a given society. The vertical hierarchy embodied in the nature of Western science-technology has numerous implications. On one hand, the capitalists in the center exploit scientists and technicians by paying them fees for their patents and licenses, and selling their work products as commodities. On the other hand, because of the virtual monopoly on the means of intellectual production, the center conditions the periphery by imposing its own tastes and by defining what products should be produced by utilizing the existing techniques.

Galtung (1979) argues that Western techniques of production and consumption tend to be fragmenting and segmenting. In the former, they can be carried on without much interaction or mutual help between the producer and the consumer. Workers in a factory may be tied together with the visible and invisible ties of that particular form of organization, but they are not necessarily in direct interaction of mutual dependence. The same applies to consumption. For instance, two persons watching TV are tied together by that medium, but they are not necessarily watching together in the sense of interacting. (Galtung, 1979:285)
In the latter, "people participate in it with only a small part of their personality, often referred to as specialization or compartmentalization. Thus, Western technology tends to drive wedges between and even within people" (Galtung, 1979: 285). One could conclude that one major element in the political struggle for power is the choice of techniques, determining who should be in the center and who in the periphery.

The cultural-cognitive message in Western technology could be traced back to the cosmology of Medieval Europe. Five components of Western cosmology that are important for our discussion are:

1. The tendency to see geographical space in centre-periphery terms with the West as the centre;

2. The tendency to see time as linked with progress, increasing in a linear, and preferably in an exponential manner;

3. The tendency to think of reality in terms of units abstracted from the whole, of which they are parts, and relate them to each other causally and mechanically so that changes in one will imply changes in the other;

4. The tendency to see vertical and individualistic relations between human beings as the normal and the natural; and

5. The tendency to see human beings as the masters of nature, with unlimited rights.

These tendencies are not always explicitly formulated as open ideologies; they go deep, constituting the basis for defining something as normal and natural and something else as abnormal and unnatural (Moraze', 1960).

It should be clear now, why adherents to Modernization Paradigm (discussed in Chapter II) believe LICs are "traditional" and that in order to become part of the modern world they must become
"modern", that is, they must adopt Western science-technology. And there is no problem in becoming modern because the "modern world" is willing to "transfer" the needed technology to LICs. One may conclude that to these scholars, any science-technology that does not produce more and more, does not engender master-servant relationship and exploitation of nature, and is not analytic, is not normal and natural and therefore must be rejected (as traditional). With the same token, what is inappropriately called The transfer of technology is actually a structural and cultural invasion of LICs; an invasion possibly more insidious than apparent colonialism and neo-colonialism, because such invasion has not always been accompanied by a physical presence of the West. This situation is similar to the case of the Trojan horse, an invasion welcomed even by those who reject the West in all its aspects, namely, the nationalist elites of some LICs. Western science-technology has been a major actor in the tragedy of the history of imperialism, sometimes active backstage and sometimes in the forefront. It is this point that we are turning to now.

The Colonial Pattern of Scientific-Technological Dependency

Economic Dependency

Scientific-technological dependency (STD) has been a major element in the relationship between MICs and LICs, and consequential in the process of their development/underdevelopment.
To understand STD, it is necessary to analyze it as part of the overall relationship between these countries, that is, the dependence/dominance relationship. The distinctive feature of colonialism was a global division of labor in which the periphery functioned as supplier of raw materials, extracted by the use of cheap labor, for the center's industries, and to a certain extent as a secondary market for the products of those industries. This division of labor, transformed the colonies and semi-colonies into dependent societies by degrading their cultural values, and technical knowledge, and turning their economies into an export economy. This later led to single base or mono-production economies in the periphery (Zahlan, 1978). The examples are numerous: cotton in Egypt and the Sudan, rubber in Malaya and Indonesia, tin in Bolivia, copper in Peru, Chile, and Congo, oil in Venezuela, Iran, Iraq, etc. (Annerstedt and Gustavsson, 1975).

The basis for this dependency lies in the ownership and control of mines, plantations, export-import trade, and financial institutions by the colonial monopolists and large corporations in close cooperation with states in the periphery.

The characteristics of the large foreign-controlled companies in the periphery could be described as follows: First, they were owned by large corporations in the center. Second, these companies limited their activities to exploration for raw materials. Third, these companies did not integrate with the periphery's economy; but formed enclaves, producing for export. Fourth, their usually very large
profits were not reinvested in the companies, but were taken to the center in the form of rents, dividends, commissions, etc., and therefore did not benefit the periphery.

In some peripheral countries, farmers were forced by the original and the local agents of colonizers to turn to cash crops for export. This process resulted in such a concentration on one agricultural product that even the periphery in the periphery had become largely dependent on foreign imports for its food supplies, as well as the center in the periphery.

These operations in the periphery by colonial agents not only did not have any development effect in the periphery, but because of the appropriation of surplus value, that is, blocking the capital accumulation process, they (the operations) also distorted the economies of the periphery in a special way. They divided the economies into unrelated sectors, mainly export-enclaves, and import-enclaves⁴, and created an underdeveloped economy with such characteristics as: (1) considerably uneven productivity between the different economic sectors; (2) a disconnected economic structure; and (3) structural, foreign dependence (Amin, 1972).

Cultural Dependency

To perpetuate its domination and expansionism, the center needed some bases more enduring than economic control. It was embedded in the economic expansionism itself. Expansionism was conditioned by ethnocentrism, the idea of supremacy of European whites. To
inculcate this idea into the minds of people in the periphery, a new indirect means seemed necessary, because people normally like the comfort of their old habits and resist changes. Secular evangelism sought to spread Western civilization, to end ignorance and "barbarism", to bring the torch of European enlightenment to "dark and backward" societies. Religious evangelism was also committed to the spread of the Gospel and the expansion of Christendom. Christian missionaries became not only the carriers of the new means but also a major lobby in Europe urging continued imperialism (Magdoff, 1979).

If economic penetration, with time, found expression through large companies, cultural domination manifested itself in educational institutions, at this stage mainly primary schools, and churches. These institutions have different dimensions and consequences. Educational institutions have, inter alia, political and economic dimensions and consequences, and economic institutions have political and cultural dimensions and consequences. The characteristics of schooling in the colonized societies illuminate this.

**Characteristics of Colonized Education**

The schools which emerged in the periphery (colonies and semicolonies) reflected the power and the educational needs of the center (colonizers). If the established educational systems served any needs of the indigenous population, it was an indirect result and unintended. In rare cases, colonial administrators were concerned with training literate clerks who could staff the lower ranks of the
civil service. Some of these administrators felt that offering any education was a mistake, while others felt schooling would promote colonial policies. Missionary groups often had substantial control over educational policy, seeing it as a religious duty. Rarely did anyone of the indigenous population have membership in councils planning education\(^5\) (Ashley and Anderson, 1962). Therefore, through all planning of colonial education there was neither contribution nor participation of the colonized.

The relationship between school and society in the colonized societies contrasts with that of noncolonial schools, for in the colonial situation the school was detached from indigenous cultures in the languages and in the social values they taught. Colonial schools were set up as alternatives rather than as complements to the colonized's educational practices. Colonial schools never held out the prospects of integration into indigenous culture to those who attended them; neither did they prepare the colonized for leadership in their own society...(Altbach and Kelly, 1978:3)

The colonial schools were suspended between two quite different societies and cultures. They belonged neither to the society and culture of the colonizers nor the colonized. They were adapted to the preconceived mentalities of the colonized, or appeared to be distorted reproductions of the colonizers' institutions. Thus, they were alien institutions, and whatever they taught had nothing to do with the society and culture of the colonized. The colonizers developed specific curriculum for the colonies, and instead of teaching vocational or industrial skills, taught spear-throwing, herding, basket-making, and their cultures and histories as perceived

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
by the colonizers. The negative psychological effect of learning in such an alien situation is enormous.\textsuperscript{6}

**Organization of the Schools**

The organization of schools in the colonies was an imitated model of that of the centers. They were age specific hierarchical, and class-based (public for the poor, private for the rich). However, in the periphery there were schools to serve only the children of the colonizers, offering one form of education, metropolitan elite education, and usually channelled their students to Europe for secondary and higher education. Schools for the colonized were controlled by the colonizers. Schools for indigenous education that were outside government control were watched by government authorities for fear of subversive influences.

Colonial school systems were primarily systems of elementary education. The most common forms were three- to five-year schools, most of which gave elementary rather than primary education (elementary education being three years of schooling). These schools were thought to provide all the education deemed necessary for the youth and, hence, were disconnected from primary and postprimary education. In urban areas, however, five- to nine-year primary schools existed, serving the children of the rich who could afford to pay expenses. These schools taught in European languages and would lead to postprimary education. Some of the primary schools offered academic preparation, others, vocational training.
Postprimary education developed after World War I when European manpower, due to depletion during the war, became scarce, and the depression necessitated the use of local laborers, who were paid lower wages. These schools served the colonized from distinct cultures and classes, for they were few in number and set up to serve colonial territories rather than one colonized nation. The multinationality of the postprimary schools had various consequences. First, it became more difficult to adjust the school curriculum to the locality. Second, while the diversity of the student population forced these schools to resemble European schools, at the same time it tended to disconnect them from the primary education that had adapted to the nationalities it served.

With the exception of India, where higher education developed in the nineteenth century, higher education was very limited in most colonies until World War II. As might be anticipated, higher education in these countries was not integrated into the rest of the educational system. The university did not require either completed local higher primary or secondary education for admission. They implicitly required degrees from schools associated with the colonizers' educational systems.

The result of such requirements in higher education was an increase in alienation from the indigenous society, since students had to imitate the colonizers. The requirement of imitation was not confined to education, but would extend to the expected positions in government. The levels of education and income which were higher
than indigenous people, but less than the colonizers, would give these partly educated locals a place in society apart from both indigenous people and traditions and from the colonizers. One reason for development of such a suspended personality with contradictory impact was that the structure of colonial education was distinct from noncolonial education. First and foremost, it:

lacked the organizational coherence of metropolitan education. This meant that the ability of an individual to obtain educational parity with the colonizer was severely constricted, for one had seemingly to start from scratch at each level if one were to "make it" through all these levels. This "starting from scratch" entailed changes in language medium and curricular offerings as well as a change in environment and culture. Going from one level to the next meant leaving successive cultures behind. A child from a rural area might begin education in his native tongue and learn the rudiments of what the colonizer thought was the child's way of life. If the student were talented and/or his family wealthy, he could perhaps finish primary education in the city, the European's domain, learning the European's tongue and something about the culture of the "African" or the "Indochinese." If he fared well on exams, he could travel still farther to postprimary schools, where students were given something approximating European education and where indigenous culture simply did not exist, either within the school's curriculum or perhaps even the school's student sub-culture. (Altbach and Kelly, 1978:10)

School Curriculum

Certain curricular characteristics could be distinguished in the colonial schools. Among the important ones are languages taught and the type of knowledge imparted in these schools. In most of these schools language instruction and moral education were emphasized. The schools also taught "practical" subjects—namely, Western hygiene (often called general sciences), computational skills, agriculture or
some kind of craft or manual labor, and history. In a few schools where indigenous languages were taught, they were taught only in the first three years.

The point of importance, here, is the degree to which the languages of the colonized and the colonizer were taught. Indigenous languages were taught (a) only at the most rudimentary levels and were considered transitional to learning European languages; (b) in schools serving students who were assumed would go to school for only two or three years. European languages, on the other hand, became (a) the educational medium of students who were assumed either would live in urban areas or would take leadership roles in either indigenous society or in the colonial order; (b) the language of instruction for those who went to urban schools and/or beyond three years of education. However, even in these cases only a version of the colonizer's language and culture was taught that was adapted to the colonized (Basu, 1984).

In the overall discussion of curriculum in colonial schools, two subjects are of importance for the purpose of this study. One is the teaching of history, another is the teaching of science. While in most European schools students were required to know the history of their own society, even at the primary levels, in colonial schools history was rarely taught at the primary level and it was never included within the degree or school entry examinations. If it were taught, (a) only a short time was devoted to it (e.g., only a half hour a week, in contrast to three hours a week in European schools);
(b) indigenous cultures were devaluated; (c) if touched on, the colonized's past was only the history of the colonized since they were ruled by Europeans; (d) if precolonial history was touched on, it usually emphasized (through chronology) civil wars, tribal conflicts, famines and barbarism in order to contrast them with the peace and orderly progress under colonial domination (Jones, 1965).

The science taught was adapted to the colonized's needs as the colonizer perceived them. Science became instruction in domestics and personal hygiene at the primary level and practical and applied sciences—biology, botany, plant raising, animal husbandry, and some chemistry at the postprimary level.

What all this adds up to is that the curriculum of the colonial schools:

....while not an outgrowth of the society from which the child came, was not an outgrowth of the colonizer's society either. It was not merely a diluted version of metropolitan education; it was something else. It represented a basic denial of the colonized's past and withheld from them the tools to regain the future. The schools omitted the child's past, as in history instruction, ...and at the same time denied him skills for anything other than what he had traditionally done—farming and engaging in crafts—except in the area of hygiene. The implications of this are enormous, for what occurred in colonial education was a simultaneous obliteration of roots and the denial of the wherewithal to change, except on limited terms. With this education, one might become a secretary or interpreter; one could not become a doctor or a scientist or develop indigenous cultures on their own terms. (Altbach and Kelly, 1978:15)
Colonial Education and the Social Structure of the Colonized

Colonial education had a determining impact on the social structures of the colonized societies. By determining, we mean the force of changing the pace and direction of the normal process of development. Colonial education in this respect distorted the social structure of the colonized. The analysis of this distorted impact is as follows. Colonial education was, in most cases, tied to employment outside indigenous occupational structures like farming, fishing, and handicraft. Those who went to school long enough to be functionally literate learned to read and write the colonizer's language and became qualified to work in the colonial government, private industry or trade, or in missionary or government schools. They worked, almost always, in subordinate positions and were paid salaries a third that of Europeans doing similar work. The demand for such jobs, however, would exceed the supply. Furthermore, colonial powers would prefer to intervene, manipulate and, in general, rule indirectly through indigenous bureaucratic structures and leaderships regardless of whether that leadership had received colonial education. The aim was to preserve the status quo and to direct the inevitable changes to the interests of colonizers. The activities of France in Vietnam, and that of British in Nigeria are two of such cases (Sloan, 1971).

The discrepancy between the number of jobs and number of graduates shows the contradictions inherent in colonial education and
the conflicts resulting from it. For the poor in the colonized countries, Western education was a means of social mobility and economic betterment. Children were sent to school with the hope that they would be able to get a relatively well-paying job with the colonial administration. Otherwise they were not sent to schools that were so foreign and often so much at odds with their societies. The children of the rich and indigenous elites went to school in the hope of maintaining their status, because education had begun to become necessary for holding elite positions. And since elites had more opportunity to go to better schools, their chance of maintaining their positions was much higher than losing them to the education from the poor. Nevertheless, despite the fact that in most colonies only a low percentage of all school-age children entered school and a high percentage of those who did enter dropped out before completing primary education, the number of positions available was smaller than the number of applicants. What it implies is that while colonial education has been an instrument of upward social mobility and participation in the small modern section of economy, in many colonies only a minority of educated individuals have been successful. One reason for this is that control of the upper levels of colonial society was in the hands of Europeans, and they could manipulate the situation to their advantage, that is, preserve the status quo.

As it is the case for almost all social phenomena to have positive-negative impact(s) and intended-unintended consequences,
colonial education also had positive and unintended consequences for the colonized. In colonies where nation-states had preceded foreign domination, such as those in South-Asia, the foreign rule and apparent permanence of domination generated doubts in many of the nationalist indigenous people about the viability of their culture and traditional institutions. One way to revitalize their societies, return to autonomy and strengthen nationalism, seemed to be learning Western science-technology. In other colonies where nation-states had not developed coinciding with European-defined borders, such as those in Africa, education was seen as a way of learning new ways and developing autonomous states. Education, thus, became a route for developing nationalism.

Generally speaking, colonial education was both accepted and rejected by different groups in the colonized societies. It was accepted both by traditional elites, who thought if their children were properly trained they could take their place, and by individuals without much status in indigenous society, who thought they could gain status through colonial education. It was also welcomed by women who could gain some independence through missionary schools that would redefine authority. The rejection was expressed by those who considered education as a means of domination and a fundamental threat to the society's traditional values and institutions. Also, religious zealots saw colonial education as an agent of Satan to spread blasphemy. The importance here is that these various responses were an indication that the colonized were not free to
determine the direction of education and had only the choice of rejecting or accepting what the colonizer offered. However, since there was no comparable alternative under the domination of colonial powers, colonial education was actually imposed on the colonized.

The Colonial Pattern of Dependency—Summary

We have in this section attempted to analyze a distinct set of relations in the periphery and between the center and the periphery under colonial domination. We have elaborated on the institutions through which penetration found expression. In the economic sphere the penetration manifested itself pre-eminently in the large companies which typically engaged in mining, in selling Western products, or in growing cash crops for export. The results of these activities in the periphery were underdeveloped economies characterized by (1) considerably uneven productivity between the different economic sectors; (2) a disconnected economic structure; and (3) structural, foreign dependence. In the cultural sphere domination was reflected in the periphery's educational system.

We have discussed several distinctive characteristics of colonial education: (1) the content, medium, format, and use of education were determined by the colonizer; (2) the schools, regardless of the reasons for their establishment--bureaucratic manpower needs, the missionary desire to do good works and save souls, exploitation of the resources of the colony, or a simple desire to bring progress to so-called backward areas--were set up by
the colonizer on his own terms to meet the colonized needs as the colonizer had perceived them; (3) it was separate from most elements of the colonized social system; (4) it was not equal to the colonizer's educational system but an adapted model of the colonizer's working-class education; and (5) it was stratified and developed a distinct class bias, paralleling to some extent the class biases of the colonizer's education, with the exception that differentiation, besides economic grounds, had ascriptive and ethnic bases (in order to account for cooperative indigenous elites).

There is agreement between social scientists and governmental authorities in the periphery that the colonial pattern of dependence is still the dominant pattern for most of the relations between the MICs and the LICs in the capitalist system, despite political independence of the LICs. It is this largely unchanged colonial pattern of relations in an era of political de-colonization which has been called neo-colonialism, and has been defined as the persistence of foreign control despite seeming political independence. In other words, old colonialism in new forms is the subject of our following section.

Neo-Colonial Pattern of Dependency

Despite the formal political recognition of the LICs as sovereign state-nations, they are still bound in a network of relationships with the MICs. These relationships are the heritage of the colonial past, and of the great economic and scientific-
technological advantages to the MICs. These relationships, as long as the world system remains capitalist and unequal, continues to remain in relationships of dependence and domination. Neo-colonialism is about the deliberate policies of the MICs to maintain this relation of dependence/domination. Various means are used for this purpose, technology-transfer, technical advisers, foreign-aid programs, educational institutions, and publishing firms. These elements are discussed later.

Neo-colonialism has been a dilemma for both former colonizers and the colonized. The attempts to cover the dilemma by the illusion of independence has been a failure. For the colonizers, the dilemma is their attempt to appear as friends of the ex-colonized by providing assistance and supposedly aiding their development plans, on one hand, and doing all they can, using all the direct, indirect means available to them to ensure the endurance of their dominant positions on the other. The colonizers are aware that the structures built up under colonialism continue to operate in the ex-colonized. The essential structures of economic and educational systems are perhaps the most dramatic examples of the continuing impact of colonialism in this study. The dilemma of neo-colonialism for the governments of the ex-colonized is either to admit that their liberation struggle for independence and autonomy with enormous loss has resulted, in part, in a different kind of domination, which would weaken their legitimacy at home; or to put their ruling powers at risk by engaging in a new phase of struggle to change the status quo.
However, since the governments in the ex-colonized are closely linked with the economy and culture of neo-colonialism, it is not in their interest to go beyond rhetoric for change.

This dilemma is one of the reasons neo-colonialism has become part of a policy aimed at maintaining global inequality. In other words, the continuation (if not deepening) of the global inequality is in part a result of remaining elements of the specific colonial heritage in LICs of the particular colonial European country, and of the unequal trade relationships, the domination of the MICs because of more advanced technology and superior military, and substantial differences in standards of living (Chinweiza, 1975).

The distinctive features of neo-colonialism are the indirect mechanisms by which control and domination are exercised and maintained. These mechanisms, in particular, and the less direct reasons for neo-colonialism, in general, is clear when we apply the dependency paradigm, which was discussed in the second chapter. The MICs constitute "centers" of international educational and intellectual life, by virtue of their wealth, scientific-technological advancement, well established educational and research institutions, leading universities, publishing houses, and journals. The LICs are at the "periphery" and are dependent on many of the products of education and modern technology. Further elaboration on the distinctive features of economic and cultural aspects of neo-colonialism highlights this discussion of how and why the LICs became dependent on the MICs science-technology.
Economic Features

It was indicated earlier that one of the reasons for the MICs to maintain their domination over the LICs is their need for raw materials. There are enough data to show that the central economies are still dependent on raw materials from the periphery. There are also adequate reports, in this connection, that the plundering of mineral resources and the devastation of forests are, in most cases, still carried out in the same old colonial way and that these activities often lead to the development of enclaves.8

However, despite the fact that the old pattern is still present, a new pattern for the international economic division of labor has emerged. In other words, modern imperialism, due to its flexibility and dynamism, has found new ways for the exploitation of the LICs, and new means for keeping its dominant position in their economies. It is the emergence of this new form of international division of labor that Nicos Poulantzas (1974), in his analysis of the state in the capitalist countries, takes as his point of departure "the new forms of the imperialist division of labor".9

The issue of a new type of division of labor has been the subject of numerous studies and long discussions by the scholars in the dependency paradigm. Quijano has summarized the main arguments of these studies and discussions in the following paragraphs:

The present stage of imperialist domination in Latin America is characterized by two overlapping tension-filled and contradictory implicit models. The first is what may be called "traditional" imperialism, with the United States as the hegemonic power operating in the economic field
largely through enclaves, i.e. enterprises totally controlled by imperialist capital and with relatively few ties to the rest of the economies of the host countries.

The second pattern is of more recent origin, dating from approximately the Second World War, and consisting of a progressive shift in the axis of domination from agro-extractive sectors to the urban industrial sector. Simultaneously with this shift there has taken place (1) a relative decline in U.S. hegemony and concomitant rise in the weight of other imperialist powers, especially Germany and Japan, and (2) a tendency for old forms of financial domination to be replaced by new monopolistic conglomerates on the one hand and "cosmopolitan" or "supranational" nuclei within the imperialist bourgeoisie on the other. All of these changes have gone along with and partly resulted from the so-called scientific-industrial revolution which of course has affected the different imperialist powers and different branches of industry unevenly. (Quijano, 1970:4)

In the same vein Dos Santos, after examining the direct investment of the U.S.A. in Latin America, argues:

The data...show that American investment (and foreign capital in general) not only have tended to penetrate more deeply into Latin America, but also have become more and more thoroughly integrated in the industrial sectors (....) Foreign investment is gradually ceasing to be a colonial-exporting enclave and is changing the old international division of labor: the production of raw materials by underdeveloped countries and the production of manufactured goods by developed countries. (Dos Santos, 1968:97)

Understanding the impact(s) of this new pattern on the inherited colonial infrastructure of the LICs is of pivotal importance for the purpose of this study.

Conditions of Industry in the LICs. The failure of the "import-substitution" policy to industrialize the LICs entails explanation and suggestion of alternatives. In import-substitution policy most of the attempts had gone to substitution for imported
consumption goods. But this mostly had been illusory, since the percentage of imports in total sales has not decreased. There have, however, been some changes in the structure of imports from manufactured goods to semi-manufactured and capital goods. The ideal case of import-substitution requires an integrated industrial structure that includes the development of production of the "means of production". Among the LICs only a few have been successful in achieving such an ideal, and the story of the rest is indicative of the failure of the whole strategy of industrialization through import-substitution. The reasons for this failure are (1) the fact that industrial investment has primarily been made by large foreign corporations under "infant industry" protection, using a highly capital-intensive technology which must be imported; (2) the emphasis on luxury consumption goods for a small segment of the population; and (3) the fact that the market is too small, that is, the distribution of income is uneven (Frank, 1973).

The alternative, the export of manufactured or semi-manufactured industrial goods, has been recommended from within the capitalist system. From this recommendation two different patterns for the export of industrial goods from LICs have emerged: the pattern of sub-imperialism, and the pattern of sub-contracting component in industry.

The Pattern of Sub-Imperialism. The pattern of sub-imperialism refers to a situation of intimate cooperation between some LICs with
higher rates of industrial growth, so-called Newly Industrialized Countries (NIC) such as Brazil, South Korea, Taiwan, and South Africa, and international monopoly capital (Petras, and Morely, 1981). Economic policy in these countries starts from the assumption that the majority of the population shall be excluded from economic growth. Sub-imperialism not only implies a policy for social segregation but also leads to it. The result is a large number of marginalized population, and consequently a situation of under-consumption, requiring expansion outside the country. An expansion to other parts of LICs (Roxborough, 1979).

The marginalized population, generally, consists of three groups of people. The first, that segment of population which still lack possibilities of access to the fruits of economic growth, those still within the pre-capitalist economy. This group covers unpaid labors, within or outside agriculture, ranging from unpaid laborers in the countryside to small-scale subsistence farmers. The second group is emigrating from the countryside to the cities, where they are unable to sell their labor on a stable basis. The third group consists of those portions of the labor force previously employed and now out of work or forced to retire (Petras, 1978).

To turn the NICs into the expanding exporters of industrial products has been the main goal of the pattern of sub-imperialism. This goal has, in most cases, been achieved through the massive direct investment by an alliance between the military dictatorships, imperialist powers and multi-national corporations. The export

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
companies in these countries have been receiving considerable subsidies and benefits. The impact of this extraordinary attention to the industrial sectors has been a remarkably fast rise of the share of industrial products in total increase in export (for example, for Brazil this increase was 2000% during 1964-1972) (Annerstedt and Gustavsson, 1975). The expansion in the industrial sector has mostly occurred in durable consumption goods (e.g. automobiles) for the small, affluent elite, at the expense of mass consumption goods, such as shoes, textiles, and clothing. Some of these countries have even concentrated some of their resources in the military industry and have been exporting weapons (e.g. Brazil and Singapore). In these countries production is carried out with imported, ultra-modern, capital-intensive technology (Annerstedt and Gustavsson, 1975).

As was indicated in the second chapter, the euphoria of the advocates of this policy did not last long. At the international level, the sub-imperialist countries were at the edge of financial collapse, for huge amounts of foreign debts (mainly to the MICs, their financial institutions and international banks) by the early 1980's. They were finally entangled in the debt trap. At the national level, the condition of inequality not only had not improved but even had deteriorated. A picture of Brazil during the 1960's would illuminate the case:

...per capita income in the top one percent of the population rose by 112%, while income for the lower half (50%) of the population rose by only 7.5%. According to other estimates, the incomes of 80% of the population went
down, and 15% were unchanged, while only 5% increased. In any case, 50% of the active population had incomes that fell below the official government minimum wage. Corporations in Brazil consider only 2.5 million of the almost 100 million inhabitants to be the real market for the consumption goods industry. (Annerstedt and Gustavsson, 1975:25)

The characteristics of sub-imperialism may be summed up as: (a) economic expansion outside of the country; (b) political and military expansion in the country's immediate geographical region; (c) relatively strong central government with a developed military organization; (d) increasing socio-economic inequality; and (e) split of the economy into two parts, "advanced" which is related to exporting industrial sectors and "marginalized" which is related to internal colonies. 10

Sub-Contracting Component Industry. The model of sub-contracting component industry refers to a situation in which the industries in LICs serve as sub-contracting producers of certain components for the trans-national corporations (Annerstedt and Gustavsson, 1975). The rationale for the proposition of this model by The World Bank and a number of UN organizations are the following facts: the home markets are too small, unemployment is too high, and capital-goods industries are too capital-intensive. The recommendation, therefore, is concentration on labor-intensive export-directed industries which temporarily cuts down on the unemployment figures. For the poverty-stricken, hopeless people of LICs, however, it is a tranquilizer, a temporary relief of symptoms, but not the cure which a near-to-death economy needs.
As it is the case in the propositions suggested by the experts from MICs for the economic development of LICs, to be accompanied by some sort of praise statement, this model has been praised as a "promising path" in this fashion:

The opportunities for attracting private foreign investment in this type of manufactured exports (i.e. "component industries") have been created in recent decades by the emergence of huge multi-national corporations producing sophisticated engineering and electronic products. Because of the rising wages for certain types of easily trainable skilled labour in the advanced countries, these corporations are interested in locating certain parts of their productive processes producing components in the underdeveloped countries, where a similar type of labour can be obtained at lower wages. In other words, they are interested in making use of the human resources of the under-developed countries in producing a part of the complex manufactures goods for the world market. Singapore and Taiwan have so far succeeded in attracting such types of foreign investment in the field of electronics and engineering. The domestic policies required to attract such type of investment appear to be the provision of suitable infrastructure, including land in conveniently located industrial estates; the attempt to create "islands of efficiency" in the form of free trade zones to avoid the corrosive effects of bureaucratic malfunctioning and corruption and the availability of a suitable labour supply which can be readily trained in the required skills and is prepared to accept the necessary disciplines of such type of work. (Mylnt, 1972:102-3)

These conditions have been materialized in southeast Asian countries, as indicated in the second chapter. The main motive for this localization of component-production was the transnational corporations needs to a cheap and compliant labour force, as a reaction to the raising wages and the militancy of the labour unions in MICs (Szymanski, 1981). There is, in southeast Asian countries, a cheap and compliant labour force, because the labour supply was
abundant due to the operation of the reserve army of labor of displaced peasants, and the repressive measures of the anti-labor dictatorships that prohibit or greatly constrict strikes and independent unions, could exert pressure on the supply side of the labour market and keep the rate of increase in wages behind that of labour productivity. Wages in South Korea and Taiwan were 10–20 times lower than in the U.S.A. for the same work. It was the same for Hong Kong, where child labour (12–14 year-olds) was common (Murray, 1972). In Mexico’s “border industries”, the wages in comparison to the U.S.A. were between 1:4 and 1:6. In the West Indies (as Jamaica and Haiti) the difference varied between 1:5 and 1:12. Productivity was, in general, comparable to what it was in the U.S.A. The wage differences were not so great when compared with Japan but they were different enough to justify Japanese localization to Korea and Taiwan, and other places (Halliday and McCormack, 1973).¹¹

The sub-contracting component industry model was not genuine and seemed to be a part of “demonstration effect”. It was only certain stages in the industrial production processes that were carried out in LICs. Most often semi-manufactured products would come to the given Less Industrialized Country to be worked on and to be exported back to the mother company or to some other part of the company in another country.

The desirability of the idea of a suitable division of labor between the nations of the capitalist world was raised by
transnational corporations and, not surprisingly, by the capitalist governments. In an annual report of a West German organization, it is said:

Moreover, a highly industrialized country such as the Federal Republic (of Germany) cannot avoid the transfer of labor-intensive production with high costs for wages to the developing countries and to concentrate production (at home) on goods which are based on modern technology and large capital inputs....this will be the best way of furthering the division of labor in the world economy and the stability and growth of the (West) German economy. (Annerstedt, and Gustavvson, 1975:29).

The model of sub-contracted production of components for export that first occurred chiefly in Southeast Asia and Latin America, later spread to other LICs, including Ireland, Finland, Spain, Portugal and Yugoslavia in Europe; Morocco, Tunisia, etc. in Africa, and so on. The industries included in the model were foremost within the fields of electronics, for example radio-TV; fine instruments, e.g., cameras; automobiles; toys; cloth and leather works. These components, more often, were brought into MICs, duty-free or with duties only for the value added outside of the country (Murray, 1981).

The governments of the LICs had to meet some conditions, often under the programs of the World Bank, UNIDO and ILO, in order to be eligible for the establishment of component industries (Hettne, 1983). There was even rivalry among LICs for attracting this new form of foreign intervention by offering more incentives; by ensuring peace and stability, meaning suppressed, non-militant labor unions; abundant reserve of cheap labor (unskilled, semi-skilled, and
skilled); tax-exemption (sometimes for several years or a decade followed by long gradual raises of business taxation, or substantial tax reductions); and no restriction on the transfer of profits. Some of these LICs have been more successful in attracting more companies and foreign direct investment by opening up all their frontiers (the open door policy) and supporting a national policy of continuous concessions to foreign capital interests.\footnote{13}

The limitations imposed by this path of development on countries accepting or, at least, not resisting this new way of foreign intervention are numerous. First, countries seeking sub-contracting component industries pay a very high price for their industrialization; the payment, in its different forms, to be paid in the future.\footnote{14} Second, the "free trade areas", whether a whole country or smaller zones, mean substantial reduction in state incomes. Third, the distribution of the total profits of the industrialization is managed either within the transnational corporations or on their terms. Fourth, component industries, within the sub-contracting system and placed in different parts of the capitalist world, open up immense possibilities for internal price setting on semi-fabricated and fabricated products, making all calculations of price per unit and profit questionable. And fifth, the component industries strengthen direct and international dependence, since they are in essence enclaves, totally integrated into a specific company, thus directly dependent on that particular company.\footnote{15}
The advocates of this way of industrialization emphasize the "education effect" offered through new industries, and its role in solving the LICs problem of finding markets for their industrial products. On these points, it can be argued that the "education effect" is limited because the work is relatively less skilled, monotonous, and assembly-line production, and that solving the problem of market-finding in this way is too costly (Rosenblatt, 1979).

Cultural Aspect

In the first part of this chapter, under the cultural aspect in the colonial era, the characteristics of colonial education with particular emphasis on the primary and secondary schoolings and their roles in the mechanisms of maintaining and strengthening domination/dependency was discussed. In this section, the cultural aspect in the neo-colonial epoch, the focus is on higher education, and its broad domain as the background for scientific activities and consequent innovations, inventions and overall scientific-technological advancement. The reason for this partition of education into primary, secondary and higher, is that colonial education was mainly concerned with primary and secondary schooling, and that higher education gained its importance and popularity in neo-colonial time. Besides, colonial education continued into the neo-colonial period in the former colonized countries.
The university is the more common manifestation of higher education and has been the most sophisticated instrument of cultural dependency. The university has been viewed as a multi-national corporation, an analogy signifying the relationships between economic and cultural domination, dependency.16

Almost all African universities started as overseas extensions of European metropolitan institutions, and decisions about priorities for educational development followed the dictates of parent cultural corporations in Britain, France, or Belgium. The cultural goods the universities sold were not necessarily relevant to the new African clientele. (Mazrui, 1978:331)

This view, of course, does not deny the positive impact of the university. In fact, in some countries, specifically since 1960, universities have been the only place for dissemination of anti-imperialist ideas and for congregation of progressive, revolutionary groups. The universities in most colonial countries have been a potential force in liberation movements, and have initiated (sometimes have led) decisive political unrest that has raised the spirit of nationalism, and have contributed to independence movements (Mazrui, 1978). The points of significance are that first, these consequences were not intended by imperialists and second, these universities were, simultaneously, capable of being both mechanisms for political liberation and agencies of cultural dependency. Since these universities have been an incomplete imitated version of the universities in imperialist countries, their graduates have been the most culturally dependent. These graduates have, more often, been the offsprings of feudals, bourgeois
compradors, and wealthy merchants who could afford the high cost of higher education. One result of this has been elitism, because the acquired titles (e.g. engineer, doctor) usually have replaced the inherited ones (landlord, merchant, deputy, etc.). Because of the dominant elitist ethos, the university graduates have shown little respect for indigenous culture, being language, literature, aesthetic experience, or modes of entertainment. In a word, disgrace for whatever is indigenous and respect for whatever is Western have become status symbols, or only valuable currency in the market created by the Westernized elite for all the people (Illich, 1969).

The Characteristics of the Neo-Colonial Higher Education

The perpetuation of cultural dependency has been taking place through various mechanisms, the realization of which, is only possible by understanding the characteristics of these instruments of dependence.

University Structure

Universities in the LICs have never been autonomous. They were established on the basis of this general modernization assumption that if a "traditional" society is going to be "modern" it is both necessary and sufficient to follow the same trial to modernization (Westernization), as the "modern" (industrialized) societies have gone. Hence, a university system appropriate for the MICs could also be appropriate to serve the LICs without major modification.
The universities in the LICs were mostly created as overseas colleges, or official extensions of universities in the MICs. Although they have, to some extent, been adapted by the LICs, they remain essentially Western in background, ethos and orientation, only transplanted into those countries.

One of the most important elements in cultural dependency through the university has been the language of instruction which has been an European language. As the continuation of general colonial policy in which the colonizers imposed their language on their colonies and used this language in most governmental functions, the commercial spheres, and the educational system, the language of instruction in universities became that of the colonizers. Over time, however, with the bulk of newspapers, journals, and books being published in this language, the given European language became the language of elites, therefore a status symbol.

The continued use of the European language had many implications. It guaranteed that the colonial center would have some impact on the intellectual development of the periphery. It blocked the process of systematically building vocabularies for certain new areas of national life such as the law courts, parliament, and scientific research centers, often a necessity as a result of the diffusion of new ideas and inventions. The prestigious journals and books in professional and scholarly areas published in the MICs are books exported to the LICs. More often, authors in the LICs would send their manuscripts to the MICs to be published for two reasons:
the prestige of the publishers, and the available facilities in the MICs. The imported books, particularly for use in the schools were not relevant to the needs or desires for cultural independence of the LICs. These points are discussed in more detail under the monopoly of knowledge production and knowledge capitalism, later.

The faculties of the universities in the LICs were either the faculties of the mother universities, or indigenous people with training and diplomas from the mother universities. In most cases the only qualification for teaching was a certificate of training in relevant areas. The texts were often too old, going back to the time of the faculty's university training, or if, in rare cases, there was any text in the native language, it was an incomplete translation of the texts which the faculty had read and were familiar with. Because of the problems of cost and publication facilities, the text would come in stencil, too little, too late, sometimes in the middle of the semester. The lack of texts and educational technologies consistent with the borrowed curriculum, on the one hand, and the importance of acquisition of a degree from higher education institutions as the basic qualification for prestigious, remunerative positions, and upward social mobility has resulted in paper quality syndrome or diploma disease.18

In some areas, like Africa, where the majority of universities were originally branches of the mother universities, requirements for admission were specified by the mother universities. Lecturers and
professors were appointed by the mother universities. On the extent of limitations of these universities, Mazrui (1978) writes:

Although there was consultation between London and the African branches, London approval was needed even for syllabuses and examinations. Examination questions were first formulated in the colleges in Africa and then submitted to London for criticism and revision. Once the questions were approved in London, they were printed, sealed, returned to the African campuses, and not opened until the actual taking of the examination. If changes had been made in London, they were discovered by the professor too late to do anything about it. Consequently, African faculty had little control over their courses. (Mazrui, 1978:334–5)

The story of such an extensive control did not end at procedural, administrative and instruction levels, it went as far as ignoring well established historical personalities. Mazrui’s personal anecdote is only one of numerous examples.

When I was an assistant professor in the department of political science at Makerere (Makerere College in Uganda), the faculty wanted to introduce Marx in a course on political philosophy. On receiving the recommendation, London questioned whether Karl Marx was a political philosopher at all but, in the end, permitted his works to be included in the syllabus. (Mazrui, 1978:335)

Integration with the metropolitan university system deeply affected the priorities of the scholars in the periphery. In some countries no indigenous language could be studied at the university level, because the emphasis was on the Greek and Latin languages. Contemporary literature and history were rarely studied, in fear of covering the “sensitive and inflammatory” issues, or agitating student unrest (Mazrui, 1978). In the case of Iran, the author has observed that as a result, the attention of scholars and students focused on their ancient histories and classic literature which were mostly
uncritical and irrelevant to the current affairs, creating an unnecessary, illusive and false national pride. These histories and literature said nothing about the causes of the present inferiority and misery, serving as the opium to passify the rebellious, change-oriented energy of the youth.

The priority distortion, of course, was not confined to the indigenous language, history, and literature. The indigenous music, dance, and story-telling which are full of proverbs and songs with important lessons of social commitment, and have significant functions in a highly oral society were also absent from the university curriculum. These cultural elements play important social roles in the workplace, in reassertion of the significance of collective identity, in fostering economic solidarity, in reminding of the hazards of disloyalty to one's community and overall in all aspects of the socialization of the young, particularly economic socialization involving teaching of values and skills necessary for the society's economic survival (Mazrui, 1978).

The graduates of these universities were more strangers to their own culture and society than to the invader ones. Thus, to work for foreigners, being either university or company, was more appealing than working with indigenous institutions. The pull of the attractiveness and superiority of the Western lifestyle (higher salary, better insurance and bonuses, better housing, more freedom and greater facilities for self-development) was, for many, stronger than the sense of obligation to one's own country. The sense of
loyalty to the betterment of life in one's own country was also being diminished by the bitter fact that the repressive governments would crush any progressive movement with the aim of transforming the total social structure, on the one hand; and, on the other hand, the skepticism over the willingness or readiness of the potentially revolutionary social classes, the workers, the peasants, and the petit bourgeoisie to participate in uprising and armed struggles for fundamental change, and/or over the existence of the objective and subjective conditions necessary for revolution. This, of course, has not been the only reason for "brain drain", or students going abroad to study (an important element of scientific dependency which will be discussed in detail later). Another major reason has been the West's monopoly of production and distribution of knowledge-information.

Knowledge-Information Monopoly

The discussion of knowledge-information monopoly is not possible without the inclusion of educational system, since the creation, dissemination, utilization of scientific-technological knowledge, and quality education is a precondition of quality research. It is, as well, imperative to include the channels over which knowledge-information is transmitted. These channels include not only printed media (books and journals, magazines and newspapers) but also audio-visual media, artistic creation, and communication, telephone, telegraphs, and the postal services.
The state of education in LICs was reviewed in the preceding pages. In what follows attention is paid first to the factors responsible for MICs monopoly of knowledge-information production and dissemination; and second to the reason for the existence of the domination/dependence relationship between MICs and LICs, that is, the political economy of knowledge-information. But, before so doing it should be clarified what it is meant by knowledge-information. This necessitates a glance at the semantic and conceptual relationship between knowledge and information because these two terms are usually used interchangeably. To clarify, it should be noted that:

The verbs "to inform" and "to know" have different meanings: informing is a process or activity, whereas knowing is a state of mind. To be consistent, one would use the noun "information" to denote the process or activity, and the noun "knowledge" for the state of knowing. On the other hand, both nouns are used also for contents (the sense, not the size) of what people know or are being informed about. With reference to the contents, dictionaries define "information" as certain kinds of knowledge, but never "knowledge" as a kind of information. Thus, one speaks of general and enduring knowledge but of particular (concrete) or timely information, often of only transitory relevance. Some writers who dislike subtle distinctions use the two words as equivalents. Others would prefer to speak of "stocks" of knowledge and "flows" of information, a usage more in conformance with the verb forms of the words. (Machlup, 1984:5)

Among factors responsible for MICs monopoly of knowledge-information, two factors are outstanding, the concentration of means of knowledge-information production and dissemination in MICs, and the rapid change of these means.
Rapid Change and Concentration

Rapid Change

The spectacular growth of the knowledge-information industry in the 1950s, which started by the development of the computer and electronic data processing, is now shifting toward optoelectronics or integrated optics (laser, optical fibers, etc.), which will lead to the replacement of electrons by photons in communications. The realization of the incredible rate of development of knowledge-information technology, its future potentials, its great impact on all levels of knowledge-information production, particularly research and publishing, all activities and situations from research to design, to production, to services, to organization, to free time and so forth in the MICs, is of great importance because the paperless information industry has already become and undoubtedly—for its enormous development potentials—will be the main arena of rivalry among the MICs, and because it is becoming the major factor in the ever-widening scientific-technological chasm between LICs and MICs (Goldhaber, 1980).

It is now widely acknowledged that knowledge-information is a matter of survival at all relational levels: individual, familial, communal, societal and intrasocietal. It is estimated that human beings spend 70% of their time on exchanging knowledge-information (communication) (King, 1982). For this reason, MICs due to the enormous increase in the number of people engaged in creation and dissemination of knowledge-information (researchers, scientists,
technologists, teachers, planners, communication system workers, people employed on electronic or non-electronic informatic systems) have been undergoing a transition to information societies over the past century. In 1980, 50% of the workforce in the U.S. was employed in knowledge-information activities (Machlup, 1980). Porat (1976) shows that this figure was only a few percent a hundred years ago. In MICs, information and intelligent automation technologies are spreading exponentially throughout all sectors of the economy because of their efficiency, simplicity, low cost, and unprecedented potentials.

What has rightly been called the information revolution was a result of the development of solid state electronics, which had originated 35 years ago with the invention of the transistor. The unimagined rapid progress of electronics was made possible by semiconductor technology, through the process of miniaturization, starting from simple components (such as diodes and transistors), moving to integrated circuits (IC) then to large-scale integration (LSI) and, finally, very large-scale integration (VLSI). By this process, the integration of more and more components on a single silicon chip was possible resulting in cuts in cost and improvement in reliability (Colombo and Lanzavecchia, 1982).

This progress in miniaturization has been paralleled with significant progress in the integration of memory elements, expressed in number of bits per chip. Colombo and Lanzavecchia (1982) believe that:

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
The capacity of RAM bipolar memories, which allow extremely high speeds to be attained, has increased 4 times every 5 years, while that of MOS dynamic memories has increased 4 times every 3 years. At the moment the memories with the greatest capacity are the bubble memories. Integration has allowed the cost per bit of memory systems to be reduced. At present, MOS memories cost less than 1/100 of the old core memories and should drop to less than 1/1000 in a few years' time. (Colombo and Lanzavecchia, 1982:5)

On the basis of such a rapid progress in solid electronics, the cost of electronic digital computers has dropped 10 times in 10 years. The advent of micro-computers has made it possible to buy a micro-computer for 100 dollars with the same performance as a machine once worth a million dollars (King, 1982). According to Porat (1976) this change by power of 10 does not just mean a drop in prices, but opening up market prospects that were considered impossible up to a few years ago.

The projections for the near future (next decade) focus on the further development of computers in both quantitative and qualitative terms. In the quantitative term, the projection is the completion of the so-called fourth generation computers, based on VLSI, for the general purpose and super computer (or vectoral processor) versions, high speed, specialized computers for specific scientific use. In the qualitative term, it is projected that:

the development of fifth generation computers, will use gallium arsenide or Josephson Junction VLSI. The purpose of the logical structure and applied software of these computers will be not so much to improve quantitative factors (such as speed) as to bring qualitative factors closer to the operation of the human brain (for example: capacity of association and deduction; existence of intelligent interface for man-machine dialogue, etc.). (Colombo and Lanzavecchia, 1982:10)
This is the beginning of "artificial intelligence", in which Japan has the leading position (Feigenbaum and McCorduck, 1984).

The projection for the long-term, in the continuation of the informatic revolution, are for technologies that are not only of a physical nature, but also biological and chemical (Colombo and Lanzavecchia, 1982).

Among the long-term projected technologies of a physical nature is optoelectronics or integrated optics (laser, optical fibres, etc.), which will lead to the replacement of electrons by photons in communications (as indicated earlier). Colombo and Lanzavecchia (1982) present the advantages of this development:

1. Possibility of using much higher frequencies (with a gain of 10) and hence of transporting much more information;

2. Large reduction in disturbance;

3. Adoption in all telematics networks (telephone, television, communication between cities and countries, within continents and intercontinental by means of transoceanic cables);

4. Use in processing (large and small computers, information storage, office automation);

5. Use in transport (automation and control), in electricity production (photovoltaic conversion), in material processing (with the laser), in image processing, as well as in medicine, etc. Some have gone as far to describe the 21st century as the age of light, whereas the 20th has been the age of electricity and the 19th that of steam. (Colombo and Lanzavecchia, 1982:12)

And among the long-term projected technologies of a biological and chemical nature is one based on transmitters and receivers,
storers and information vehicles of a molecular or ionic nature (Colombo and Lanzavecchia, 1982). This will be an extraordinary evolution in biological information systems, able to convey an enormous quantity of information in a single molecule. This is conceived to be done through bio-technology, genetic engineering or gene splicing. We were at the edge of producing chips measuring 5mm containing at least a million bits of information in 1983, a capacity that had been estimated in 1982 to be achieved in 1990. Now, in July 1984, there is news on the progress of the development of souped-up silicon—several chips in a compact—or parallel processing measuring 1mm containing 1 million bits of information, of a bubble system with a capacity of 4 million bits of information, and of magnetic bubble video-disk storage with a capacity of 1 billion bits of information (Wolkmer, 1984).

According to Wheale (1984):

Molecular biochemistry and microelectronics have recently combined to produce the "biochip"—a combination of organic materials and microelectronics which generate artificial intelligence systems—in 1982 a U.S. firm, EMV, patented a simple biochip. The implications of this innovation are that genetic engineering may be used to construct genes which are able to instruct a human cell to build microcomputers out of proteins. The creation of organic-electronic brains is theoretically possible—the robots of the future may be capable of internal growth, self-programming and organic change in the light of experience. (1984:107)

The prediction of the speed of change in this exceedingly fast-growing technology is only a matter of guess. There are numerous examples of the extent of the rapid development in this field. One example is the extent of miniaturization which is illustrated by
computer development. The first electronic digital computer, named ENIAC, was introduced at the end of WWII. It was a bulky installation containing 17,000 vacuum tubes, 1500 relays, 70,000 resistors, 10,000 capacitors and 6,000 switches. It consumed 174 kilowatts when it was turned on, weighed 30 tons and occupied 1,800 feet of floor space at the University of Pennsylvania (Shurkin, 1984).  

The next generation, that of the transistor, was considerably reduced in bulk and today’s silicon chip generation is 300,000 times smaller, 10,000 times faster, much more efficient in its use of power and at the same time, much more reliable. This trend is likely to continue until the home computer is within the means of almost everyone. (King, 1982:37-8)  

Another example of the extent of rapid development in information technology is instantaneous, global point-to-point communication that has been made possible through space technology, satellites, and optic fibers. The United States established Intelsat, in 1965, and the Soviet Union created Intersputnik, in 1971, for worldwide information exchange. Having the capability of carrying voice, video, and all forms of data transmission, Intelsat V (the improved satellite) can transmit approximately 12,000 simultaneous two-way telephone circuits plus two television channels as well as computer data (Stover, 1984).  

The speed of change in the optic fiber is even more impressive. While, now, a finger-sized optic fiber cable can carry 40,000 telephone calls at once, systems are now being developed that will be able to send 274 billion bits of information per
second—a speed of transmission which would allow a twenty-four volume encyclopedia to be transmitted from one point to another in approximately six minutes. The optic fiber telephone exchanges have already been installed in parts of cities in the U.S. In addition to the impacts of the satellite and optic fiber—namely, enhancing two-way communication and data transmission, and improving the speed and capacity of delivering information anywhere in the world—a profound change in all aspects of human life, as a consequence of coupling such high speed flow of information with computers, is predictable. With this technology available, those who have access can perform various activities, such as shopping, working, banking transactions, and so on, without having to leave the place they desire to be. Distance will no longer be an obstacle, for it is now possible to have an instantaneous communication system which links any two points in most parts of the world. The emphasis, in the relationships among people, is no longer distance but time, which has been changing from months to days, from minutes to microseconds (King, 1982; Wolkmer, 1984).

Concentration

The concentration of means of production and dissemination of knowledge-information, both at national and international levels, is not a new phenomenon. The subsequent centralized power and control over further production and dissemination of knowledge-information is also not new. The "new" in our time is a shift of concentration of
this power from the exclusive control by nation-states to sharing it with powerful transnational corporations, some of which have annual budgets far exceeding those of many LICs. The important issue, in the context of relationship between MICs and LICs, is that these transnational corporations, which have formed oligopolies and monopolies in the gathering, storing and disseminating of knowledge-information have been concentrated in MICs.

The significance of this concentration of the means of production and dissemination of knowledge-information stems from the fact that it includes all forms which, in this study, have been categorized into written and audio-visual. The written form, which is more traditional, includes books, journals, magazines and newspapers; the audio-visual form, which is relatively new, includes broadcasting, film, telephone, television, disk, etc. The following statistics for both national and international levels show the state of concentration.

**Telephone.** Of approximately 400 million telephones in the world in 1979, 80 percent were located in ten countries of Europe and North America, and close to one-half were in the U.S., where some cities have more telephones than people. Africa has only 1.2 percent of these telephones, South America only 2.1 percent, and of the 33 countries having more than one-half million telephones, only one is in Africa, and that one is the Republic of South Africa. In total, LICs with a population of two billion (50 percent of the world's population) have only seven percent of the world's telephones.
Radio. Radio is the most widely used mass media, mostly because of two features: (1) reaching people instantaneously; (2) relatively inexpensive cost both of receivers and broadcasting transmitters. For these features, that is, economy, and capacity to reach large audiences, radio has grown rapidly. While in 1950, there were fifty countries with no broadcasting facilities, in 1973 there were only three. Although there were approximately one billion radio receivers in the world in 1979, the distribution is, like other media, uneven between MICs and LICs, as Table 1 shows.

Table 1
Estimated Number of Radio Receivers in Use

<table>
<thead>
<tr>
<th>Areas</th>
<th>Years</th>
<th>Total Number (millions)</th>
<th>Per Thousand Inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>1965</td>
<td>251</td>
<td>1,173</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>476</td>
<td>1,951</td>
</tr>
<tr>
<td>Europe (including USSR)</td>
<td>1965</td>
<td>184</td>
<td>273</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>335</td>
<td>450</td>
</tr>
<tr>
<td>Latin America</td>
<td>1965</td>
<td>34</td>
<td>138</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>105</td>
<td>252</td>
</tr>
<tr>
<td>Asia</td>
<td>1965</td>
<td>42</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>169</td>
<td>108</td>
</tr>
<tr>
<td>Africa</td>
<td>1965</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>35</td>
<td>77</td>
</tr>
<tr>
<td>Advanced Countries</td>
<td>1965</td>
<td>460</td>
<td>449</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>924</td>
<td>801</td>
</tr>
<tr>
<td>Less Developed Countries</td>
<td>1965</td>
<td>64</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>1979</td>
<td>216</td>
<td>97</td>
</tr>
</tbody>
</table>

Source: UNESCO Statistical Yearbook 1981, Passim
Note: Data does not include China.
According to Stover (1984:40):

Since 1940, the number of newspaper groups—ranging in size from two to 80 daily papers controlled by the same owner—has risen from 60 to 168 in the United States. Newspaper "chains" now own more than 60 percent of America's daily newspapers, and the trend has accelerated, as indicated by the following table:

Table 2
United States Newspaper Concentration

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Dailies</th>
<th>Number of Chains</th>
<th>Number of Chain-Owned Dailies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1923</td>
<td>2,036</td>
<td>31</td>
<td>153</td>
</tr>
<tr>
<td>1930</td>
<td>1,982</td>
<td>55</td>
<td>311</td>
</tr>
<tr>
<td>1935</td>
<td>1,950</td>
<td>59</td>
<td>329</td>
</tr>
<tr>
<td>1940</td>
<td>1,878</td>
<td>60</td>
<td>319</td>
</tr>
<tr>
<td>1945</td>
<td>1,749</td>
<td>76</td>
<td>368</td>
</tr>
<tr>
<td>1953</td>
<td>1,785</td>
<td>95</td>
<td>485</td>
</tr>
<tr>
<td>1960</td>
<td>1,763</td>
<td>109</td>
<td>552</td>
</tr>
<tr>
<td>1966</td>
<td>1,754</td>
<td>156</td>
<td>794</td>
</tr>
<tr>
<td>1971</td>
<td>1,749</td>
<td>157</td>
<td>879</td>
</tr>
<tr>
<td>1976</td>
<td>1,765</td>
<td>168</td>
<td>1,061</td>
</tr>
</tbody>
</table>


The concentration in newspaper publishing is not confined to the U.S. In other MICs the trend is the same. In Britain nine of the country's total 111 newspapers account for 60 percent of the daily...
circulation. In Japan, three Tokyo-based newspapers with their subsidiaries in five other cities account for 50 percent of all newspaper circulation, 27 million copies daily. In the Federal Republic of Germany, the number of independent newspapers (measured by editorial control) dropped from 225 in 1960 to 134 in 1973 while the number of newspaper copies sold increased. In ten years, the number of daily newspapers dropped by approximately 30 percent in Belgium, Denmark, and Switzerland, and 20 percent in France (Stover, 1984).

Advertising. Advertising has become a worldwide activity with an annual expenditure estimated to over $64 billion. More than half of this is spent in the United States. Britain, France, the Federal Republic of Germany, Japan, and Canada produce yearly more than one billion dollars each in advertising. In the 1960s and 1970s, the number of United States advertising agencies with overseas operation increased from 59 to 260, and 24 of the largest 25 advertisers in the world are American transnational companies (MacBride, 1980).

News. Nowhere is the concentration and transnationalization of knowledge-information economy as influential and evident in daily events as in news dissemination. The major Western wire services—Associated press, United Press International, Reuters, and Agence France-presse—have dominant position in news reporting. These new agencies plus some other minor ones—Anglo-American film agencies, Visnews, Universal Press International Television News, and CBS—have
a near monopoly in the international dissemination of news. Approximately 80 percent of world reports come out through New York, Paris, or London. For instance, the Associated Press transmits from New York to Asia an average of 90,000 words daily, while Asia sends to New York only 19,000 words. Although the transmission from New York is supposed to contain news from the rest of the world, it is heavily oriented to news from North America and Western Europe. UPI Television News sends approximately 150 filmed news stories per month from the West to Asia, while its output from Asia averages about 20 per month. Visnews transmits 200 stories from London to Asia each month in contrast to 20 from Asia, plus an additional ten from Japan (MacBride, 1980).

The corollary of the concentration and transnationalization of news has been summarized by Mort Rosenblum:

The Western monopoly on the distribution of news whereby even stories written about one third world country for distribution in another are reported and transmitted by international news agencies based in New York, London and Paris amounts to neo-colonialism and cultural domination. (Rosenblum, 1977:816)

In May 1973, Kekkonen, President of Finland, in a speech which became a founding text in the movement towards a New International Information Order, argued:

Globally, the flow of information between states—not least the material pumped out by television—is to a very great extent a one-way, unbalanced traffic, and in no way possesses the depth and range which the principles of freedom of speech require.
Of course, the concentration of knowledge-information in MICs has not led only to one-way flow of news. The flow of other elements of this industry—often called "cultural commodity"—is also one-way as Table 3 indicates.

Table 3

Cultural Commodity Exports
(Percentage of World Total)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Exports From Advanced Countries</th>
<th>Exports From Less Developed Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printed matter</td>
<td>94.8 90.8 95.5</td>
<td>5.2 9.2 4.5</td>
</tr>
<tr>
<td>Printed books</td>
<td>93.0 90.9 95.1</td>
<td>7.0 9.1 4.9</td>
</tr>
<tr>
<td>TV receivers</td>
<td>94.9 95.3 85.6</td>
<td>5.1 4.7 14.4</td>
</tr>
<tr>
<td>Radio receivers</td>
<td>87.8 79.8 68.1</td>
<td>12.7 20.2 31.9</td>
</tr>
<tr>
<td>Sound recorders, phonographs</td>
<td>98.8 92.8 93.2</td>
<td>1.2 7.2 6.8</td>
</tr>
<tr>
<td>Photo, camera supplies</td>
<td>98.7 98.0 98.6</td>
<td>1.3 2.0 1.4</td>
</tr>
<tr>
<td>Developed cinema film</td>
<td>79.6 78.4 87.4</td>
<td>20.4 21.6 12.6</td>
</tr>
<tr>
<td>Automatic data processing</td>
<td>97.8 97.2 97.9</td>
<td>2.2 2.8 1.5</td>
</tr>
</tbody>
</table>


Jacques Ellul (1973), in his work on propaganda systems emphasizes that unstructured "social propaganda" as expressed in films and journals has far more impact than the highly organized propaganda attempts of governments official political persuasion.
aimed at audiences in other countries. This cultural domination through social propaganda affects the psychological and social climate under which people live. It is in this realm that the quantitative imbalance (concentration of knowledge-information industry) becomes a qualitative one. This is a conditioning influence on the psyche, and leads to cultural dependence/domination (O'Brien, 1974). And this state of affairs is "a reflection of the world's dominant political and economic structures which tend to...reinforce the dependence of poorer countries on the richer." (MacBride, 1980:148)

Perhaps the main reason for continuation of importation of cultural commodities by LICs, despite their awareness of its negative consequences, is an economic one. For LICs to keep the imported technology (for example, cinema, radio, and television stations in use) it is economically more attractive to purchase films and television programs from MICs (in the cases of film and T.V. programs mostly from the United States and Western Europe) than to produce them. In the absence of adequate funds and technical expertise, it is almost impossible to produce all the materials domestically. For this reason, in some LICs, the majority of films and television programs are imported. But whatever the reason, the importation of cultural materials is, in Paulo Freire's word, "cultural invasion" which involves a parochial view of reality, a static perception of the world, and the domination of one world view by another.29 What the majority of people in LICs receive is distorted reality, illusion, models of life and values of the
dominant social classes in MICs, or at least, a set of values that contradict the values of indigenous culture. The imported values represent a threat to the quality of life under the indigenous culture, alienating people from their own way of life. The presented capitalist way of life is perceived by people of LICs as the ideal way (Smith, 1980). Therefore, it is admired and imitated as a status symbol. The process begins with LICs urban elites, including the majority of the former students returned from abroad. These elites are accustomed to the imported culture, and are in decision-making positions. Often they have a tendency to encourage more importation of not only cultural materials but also durable and consumer goods. The process then forces its way to masses of people through persuasive commercial advertising. The intrusion of commercial advertising into the LICs cultures promotes a consumer mentality contradicting the necessary saving and producing mentality. The introduced consumer mentality creates wants or artificial needs which in turn results in the people's demands for consumer goods, particularly the imported goods. The contradiction between such induced demands for consumer goods by people, and the necessity of saving for the capital accumulation, as a basic element of development, promoted by governments (assuming a nationalist, progressive and uncorrupt government) produces tension (Tehranian, 1979). In the long run, two factors intensify this tension, first, the introduction of more unhealthy, unproductive, and alien values, and second, the adoption of standardized, international patterns,
created by MICs in line with mass production in other industries, which inhibits the development of national culture. This situation, by widening the gulf between the elites and the masses, leads to an increase in the level of frustration and relative deprivation. The inability of LICs governments to enforce a policy of more equal distribution of wealth on one hand, and the inability of people to achieve the aspiration of a Western lifestyle, on the other, more likely leads to class conflict and a situation of political instability (Tehranian, 1979). The possible outcome is either a military coup with an authoritarian solution to the political situation, or the installation of some form of regime with alteration of the balance of class forces (Roxborough, 1979). In rare cases, the outcome is a revolutionary change with populism as its dominant feature. 30

Political Economy of Knowledge-Information

There is no consensus on the economic nature of knowledge-information. The dominant view is that there is free access to knowledge-information because knowledge-information is plentiful. According to this view, knowledge-information cannot be identified as a commodity because of two characteristics: it is by definition indivisible in its use, and very difficult to appropriate. This has significant implications in commercial and intergovernmental negotiations, since differential capacity in the acquisition and use of specialized knowledge-information directly affects the bargaining
capability of LICs. For these countries, therefore, knowledge-information is just another resource, power over which is ultimately converted into power over events. That is, MICs are able to make effective use of the resources under their control in order to bargain effectively, on one hand, and have oligopoly in selling knowledge-information as a commodity on the other. LICs are, thus, in a disadvantageous position due to the lack of knowledge-information on the knowledge-information system.

Although there are large multilateral information systems and data banks designed for the use of LICs (DEVIS, UNISIST, AGRIS, or the Development Information Network of the UNDP) by agencies of the United Nations, their under-utilization by LICs, and their research or project orientation in contrast to immediate negotiating requirements, have left LICs no alternative but to look for the private consultancy market. The problem here, is having basic information on where to look for information and how to enter and end an effective negotiation.

The implications of new knowledge-information and telecommunication technologies are so wide and deep in reshaping world trade, international finance, agricultural production and food security, detecting undersurface mineral resources, and enabling MICs to cope more effectively with natural crises, such as extreme weather conditions, crop failures, and epidemics, that it seems safe to say that scientific-technological advances in this area have altered in significant qualitative terms the nature of international
production, trade and finance (Schiller, 1984). The advancement in the area of knowledge-information and telecommunication, as a specific case of Western science-technology also has resulted in increasing concentration and centralization of power in MICs and the headquarters of transnational corporations based in these countries.

It is because of this unprecedented effect of knowledge-information and telecommunication at the global level, that LICs are increasingly concerned about their data dependence, the control of data across national boundaries, the allocation of space and the spectrum, and the enlarged potential of remote sensing satellites for increasing the advantages of MICs in international bargaining. The prime concern of LICs is the extent of information available to detect and evaluate the practices of transnational corporations, with which many negotiations are transacted. New trends in "the information economy do not stop at national boundaries, they are most importantly contained in the new information systems of these corporations." (O'Brien, 1983:xii).

The UNIDO Joint Study Group on International Industrial Cooperation recommended in 1979, a proposal to supplement expertise available only in the private market by the formation of a Consultancy Agency, financed on a downward sliding scale by the UN initially and later through voluntary contributions. The reason for this attempt is that, in order for LICs to improve their negotiating positions they have to seek information either through UN agencies or other forms of bilateral aid, or through purchases on the market,
consulting firms in particular. This is almost imperative because for these countries with high level manpower deficiencies, the capacity to organize information in terms which are appropriate in respect of speed and specificity may be most effectively achieved by buying-in outside expertise. Buying-in outside expertise requires considerable knowledge of the parameters and substance of negotiations. But the problem is that the knowledge of a consultant is "embodied information" in the sense that it is usually used in an on-off situation and not necessarily left to be used or built upon subsequently, unless local capability is developed (O'Brien, 1983).

The attempt by another UN agency has been geared toward improving the intelligence capability of LICs in helping to redress differential access to information. There are certain types of knowledge-information and skills which are best maintained at the local level in order to avoid the difficulties of obtaining market intelligence effectively using data banks. "An OECD Conference in 1980 introduced the concept of social intelligence for development and raised questions about the use of existing systems and creation of new ones, tailor-made for policy problems." (O'Brien, 1983:xvi)

In this regard, Wionczek (1983) argues that knowledge capability for national intelligence cannot be transferred, like discreet bits of data or packaged information; it is rather something which must be developed in the local context in relation to specific policy problems. The wholesale transfer of academic and professional structures from MICs to LICs has created work orientation,
priorities and institutions, which have not necessarily best served local needs. One of the aims, therefore, in the creation of a national intelligence capability is to overcome some of the more penetrating aspects of dependence, which formal educational and accreditation structures have helped to sustain in LICs. One important corollary of this improvement of the national intelligence capability is the creation of indigenous scientific-technological intelligence capability, as a means of reducing scientific-technological dependence.

All of these efforts are the reflections of realization of the fact that the efficient use of specialized knowledge-information and new technological capacity for its communication are the crucial elements of competition among MICs and of the widening gap between MICs and LICs. The reason is obvious, governments and firms in MICs are able to find out very readily about resources, weather, technology, market conditions, or about knowledge-information itself, because much of this knowledge-information is produced by universities and research institutions located in these countries. This provides MICs a considerable advantage in their capacity to profit from world market participation and to bargain internationally. Knowledge-information is not only a key intermediate input, which can be acquired at a cost, but also an important factor of power in the global scene. Since this differential access to knowledge-information is a major element in the determination of the distribution of the world's income, all
aspects of production, distribution, and utilization of knowledge-information including present stocks and flows, new technological capacity for its collection, storage, transmission and use are of urgent necessity for LICs. The necessity arises from the peculiar properties of information markets on "market information"31 or "commercial intelligence".

Properties of Knowledge-Information and its Market

Knowledge-information (regarded as a commodity) and its market, as a specific case of science-technology and science-technology markets, are subject to uncertainties. There are several means to reduce informational uncertainties, such as "customer relationships", brand loyalties, "reputation" and "good will". In conditions of great information uncertainty, certain elements come to play decisive roles, like the familiarity, in terms of existing relationships, language, geography, etc. (the colonial relationship between the colonizer and the colonized). The element of familiarity may be chosen even when the cost appears high (as was discussed in the case of former students abroad coming home to decision-making positions). Thus, the nature of information networks, that is, what has been called "information space", has considerable effect in the determination of the direction of both domestic and international flows of goods and services. With this background, we can now return to the properties of knowledge-information and its market as presented by O'Brien and Helleiner (1983)32.
1. Information is not an exhaustible product; that is, it is not "used up" through employment or expanded dissemination. Many can possess it at the same time. Its provision to others, even if transactions costs are zero, may nevertheless involve one in losses, and there may be advantages in not sharing it. On the other hand, substantial costs may also be sensibly incurred for the sake of gains which derive from the provision of information to others—through advertising. (Indeed, there may be advantages in passing on misinformation; and that fact necessitates a greater capacity to assess information acquired from "external" sources).

2. The cost of transmitting information which has already been produced (transaction cost) is not zero, and can be expected to vary greatly as between different types of information and different means of transmission. Transmission systems have their own factor-intensity and scale requirements, and it is likely that the lowest-cost systems require substantial capital inputs and scale. The latter create barriers to entry to certain transmission systems, and it follows that different actors will have differential access to low-cost media.

3. The returns from the production of information are generally not fully appropriable; that is, it is often possible for others to realize gains from the use of information which you "produced" without you being able to obtain a share of them. There are no laws or conventions, such as those governing patents and trade-marks, which protect intellectual property rights in this area. It follows that great quantities of information are transferred through low cost or even totally non-commercialized channels, sometimes quite informal ones. (Some kinds of information are nevertheless not easily transferred, such as those learned best by doing; and others are successfully kept secret.)

4. Information may be a product of extremely rapid obsolescence, an attribute which also impedes its effective transfer among unrelated decision-makers.

5. Like technology, its quality is impossible to judge accurately until one possesses it; many of those with the "best" supplies are themselves, consciously or
unconsciously, biased with respect to its content. "Opportunism" and conflict of interest must make one particularly careful about its reliability.

6. Information is frequently only available (at reasonable cost) in packages or indivisible lumps which, not being tailor-made, include goods and services other than those actually sought; these indivisibilities may relate to the size of the information package itself, to the packaging of the required information with goods or other purchases, to the minimum period of time over which it is to be offered, etc. It is often a by-product of some other activity.

7. On the supply side, the production of information seems likely to be characterized by economies of scale, economies of experience (learning by doing), and positive externalities; the cumulative effect of acquiring information over wider areas and over longer periods of time is to render one relatively better and better at acquiring more. "Since the cost of collection of information is (approximately) independent of its use (although the cost of dissemination is not) there is a strong tendency towards monopoly in the provision of information: in general, there will be a 'standard' source for trade information" (Stigler, 1961:171). Still on the supply side, the production, storage and processing of information is highly skill-intensive and capital intensive.

8. The longstanding legal precept, caveat emptor, places the responsibility for the acquisition of information firmly upon the buyer. Salesmen are not obliged to provide balanced assessments of the merits and demerits of what they offer. Once the sale has been concluded, moreover, there is no provision for renegotiation of terms on the basis of information subsequently acquired by the buyer; the sanctity of contract now takes over. (Nor are there markets on which one can purchase insurance against the possibility of having made a mistake; in larger organizations the law of large numbers offers some such protection but for smaller ones, the implications of mistakes can be devastating). In some areas, sellers attempt some self-discipline through the formation of "better business bureaus", "chambers of commerce" and the like; and in others the consumer movement has made some in-roads on both laws
and practices with respect to the prior provision of information, guarantees, and the improvement of original contracts. (O'Brien and Helleiner, 1983:6-9).

These characteristics of knowledge-information and its market reveals the basis for a new dimension of asymmetrical relationship between MICs and LICs. The party who has better access to knowledge-information has, regardless of situation (hostile, friendly, or negotiating), the greater ability to exercise power over the knowledge-information-poor party. One example of this inequality in access to knowledge-information in terms of manpower and expertise in international negotiations, is the number of experts on the professional teams backing MICs position. At the meeting of the General Agreements on Tariffs and Trade (GATT) in late 1982, the professional team backing the U.S. negotiations numbered about 160, and that preparing the U.S. position for the World Administrative Radio Conference (WARC) in 1979, was estimated at 930 (including only government employees). At that GATT meeting, the U.S. delegation argued for maintaining the free flow of data traffic. The move was expected because transborder data flow includes data on markets, technology and credit assessments, all of which are vital to the U.S. major transnational firms in services, plus the fact that the U.S. has a near monopoly of data bases and equipment. For this reason, some of the newly industrialized countries, such as Brazil and Mexico aware of the importance of data flows, have developed national policies on transborder data trade and have introduced restrictions on data traffic.
At the 1979 WARC meeting, which was held to reallocate the electromagnetic spectrum and geo-stationary orbit (at 22,000 miles above the earth), the resources used by broadcast, telephone and satellite communication, the deliberations postponed a number of important matters due to the limited capacity of LICs to negotiate with the representatives of MICs. Certain fundamental issues were left for discussion in the future with the hope that LICs would be able to achieve better briefing about technical details, to gain the capacity to assess their future needs and to develop a better understanding of the structure of negotiation (O'Brien and Helleiner, 1983).

For LICs, the capacity to mobilize, organize and apply knowledge-information, whether produced or transmitted by ordinary or electronic means, is the crucial factor in a negotiating advantage. However the capacity to synthesize knowledge-information is itself based on innovation, that is, the capacity to organize knowledge-information in terms which are appropriate in respect to speed and specificity. At present, LICs can use outside expertise (UN agencies, different forms of bilateral aid, or purchasing market-consulting firms) to improve their negotiation position. The services offered by UN agencies to LICs are: specialized courses and conferences by the Centre for Transnational Corporations, UNCTAD, the International Legal Centre, the Commonwealth Secretariat, and UNIDO; DEVSIS (International Development Research Centre, Canada) helps LICs design their development project; UNISIST (UNESCO)
The Effects of the Current Development of the Knowledge-Information Industry on the Relationships Between MICs and LICs

The essential issue in the light of the effects of the current developments in the knowledge-information industry such as telematics—the convergence of electronic information processing, data banks and telecommunication networks into a single system—is the potential consequences of such a change on the relationship between MICs and LICs or the equality of access to knowledge-information on a global level. The questions to be asked are (1) will the current developments in the knowledge-information industry increase the existent centralization and control of knowledge-information in MICs, thus enhancing their power and leverage; and (2) what are the options of LICs (individually or in regional or sectoral groups) for decreasing or terminating their present knowledge-information dependency and disadvantage?

To respond to these questions, we may look at the present situation of distribution in the knowledge-information industry. The industry is already over centralized in data-rich countries and firms. The commercial incentives, seem to have been the prime mover for transnational corporations to get ahead of the governments of MICs in the designing of new equipment and systems, and in
utilization of the most modern information systems. They have created multinational computer systems to increase their maneuverability in their relationships with governments, suppliers, and customers. They also have internalized their informational flows. That is, these firms not only have the capacity to utilize the new hardware of the data processing industry but also to develop or to encourage others to develop the even more important, and often industry—-or firm-specific "software"—the "automated filtering and screening mechanisms" for information relevant to them. (O'Brien and Hellenier, 1983:18)

Some scholars believe that modern telecommunication systems have evolved under U.S. leadership in response to the needs of transnational corporations especially (defense surveillance).

The main problems that most of the LICs are facing in the improvement of access to knowledge—information through electronic means are: (a) oligopoly of electronically produced software; and (b) absence of knowledge and institutional infrastructure required to make use of the information system. With the substantial reduction of hardware cost due to the development of new technologies and an expanding market, software is acquiring increasing weight in the total cost. The cost of software is usually divided into development of new systems, and maintenance and correction of errors. The projection is that if the present trend continues after the mid-1980s it could well come to represent over 90% of total costs. For LICs, the questions are: (1) are there enough commercial incentives for NICs and transnational corporations to loosen their oligopolic
control over the production and distribution of software in order to produce it commercially in forms which will be useful to meet their specific needs? (2) Can software be produced in such a way that can be suitably adapted for different purposes from other systems? and (3) Can software be obtained from non-commercial sources?

Pipe and Veenhuis (1976) suggest self-sufficiency in computer technology as a way of rapid accumulation of information systems in LICs, with adding informatics to the agenda for international discussion. This suggestion, however, is based on the erroneous assumption that rapid acquisition of foreign technology, in this case telematics systems, promote growth and development (Kaplinsky, 1980).

It is now widely acknowledged that:

The use of high technology in other sectors has frequently produced new forms of dependence rather than enlarging independent capacity. It has even generated new dimensions of inequality and poverty, when balanced against the opportunity cost of investing in other sectors. Developing countries cannot ignore changes in information production, but will they enter this field with the care that experience in other sectors would suggest is required? (O'Brien and Helleiner, 1983:19)

These points, thus, suggest that informatics, by itself, neither reverse the trend of increasing inequality of knowledge-information and expertise in a global level, or more specific, among MICs and LICs, nor aid the integration of technological change both at national and international levels. There are indications of changes in dimensions and trends but not in the pattern. For example, with the reduction of the cost of hardware production MICs and their transnational corporations are changing their focus on lucrative
software contracts. Because the profit has already been secured, it is much easier to unload low-cost information systems on LICs. In LICs, this may create a new form of economic dualism generated by various professionals and experts (professional engineers and systems analysts) who in pursuing their interests, try:

to define their own professional advancement in terms of new gadgetry and prestige expenditure. There is also a risk of producing, codifying, and storing false or dubious information if the quality of national statistics remains as poor as it still is in many countries. (O'Brien and Helleine, 1983:24).

The discussion of the knowledge-information economy in the context of the relationship between MICs and LICs is not complete without taking into account the types of knowledge-information LICs need and the types MICs are willing to transfer or sell.

Transfer of Knowledge-Information

In the discussion of the transfer of knowledge-information one should distinguish between recorded knowledge-information—for example, knowledge printed in books, journals, tapes, disks, or patent claims—and unrecorded knowledge-information—for example, personal knowledge of inventors, innovators, and imitators. The transfer of knowledge, including new scientific-technological knowledge, may occur at different levels, interpersonal, interfirm, interindustry, and international.

The distinction between recorded and unrecorded knowledge-information is important because:
It makes a difference for the ease of transfer whether the technological innovation can be described in words and pictures in detail sufficient to enable trained technicians to replicate the processes and produce the products in question. If some of the processes cannot be well described, and can be learned only by observing how they are done by those who know them, the transfer of the "know-how" is more costly, especially if the learners are in a distant part of the world. (Machlup, 1984:182)

This is the transfer of the "know-how", that LICs need and ask for, but either don't receive, or find so costly that they can't afford it (Dickson, 1980). The reason is that "much of the detailed knowledge...can more easily, and in part exclusively, be transferred by demonstration and training in actual operations" (Svennilson, 1964:408). This suggests that the transfer of the "know-how" part of technology is to a large extent "a person-to-person process". The education of LICs' students in MICs' higher education institutions, in most cases, is supposed to be concentrated in this process. However, the education these students receive is largely theoretical. In rare cases, if there is any demonstration and training in actual operation, more likely it is on highly advanced technology operating in the given MIC. This out of tone training creates more problems for the students and their countries. For, either as potential elites and decision-makers, they allocate their country's scarce resources to importation of the (highly advanced) technology they have been trained for (which is not necessary for the country's present situation), or since they cannot put their skill training in proper use (because the specific technology is not available in the
country), a more likely place to go is the more familiar one (the MIC). This is external brain drain.

LICs, besides education, may obtain "know-how" in patented techniques or products. The problem, however, is that despite the legal requirement of "full disclosure" in patents of invention, there are processes that cannot be described in words, and therefore cannot be included in the claims formulated in the patent. The reason is that in general, an inventor has the choice between relying on patent protection or on protection of his secret technological knowledge. But, in particular, there are patented inventions that cannot be put into practice without complementary know-how. That is, the inventor would enjoy both protections. The point is that the owners of both patents and know-how—MICs with about 85 percent of all patents granted and registered in LICs—share their inventions only for a high price or through ownership, or co-ownership, with the right to control the LICs firms in which their processes are used and their products produced.

The problem would be clear if we have an understanding of types of knowledge and knowing, the types necessary for socio-economic development of LICs, and the types available to them.

Meaning of Knowledge. There have been a great many attempts to clarify the double meaning of "knowledge": knowledge as a state of knowing, which is produced by activities such as talking-listening, writing-reading, and discovering, inventing, intuiting; and knowledge in the sense of "that which is known" which exists as soon as one
person has it. Or to put this double meaning of knowledge in a simpler way: knowledge is the sense of "knowing" and knowledge is the sense of what "is known". William James proposed to distinguish between "knowledge-of" and "knowledge-about" or knowledge by acquaintance and knowledge by systematic study and reflection (Machlup, 1980).

From the long history of discourse on the meaning of knowing, we find that there should be a distinction between knowing "that" (something is the case), so-called propositional knowing, and knowing "how" which has a directly pragmatic connotation. Of course, this does not mean that propositions of the knowing-that type are without pragmatic significance. Indeed, such knowledge, besides satisfying the knowers' curiosity, may have a strong influence on the knowers' actions. To clarify this point further we may add that knowledge of the know-how type, though often related to knowledge of the know-that type, is, or can be, immediately practical, since it is a skill or ability to do something, a capacity to perform (Machlup, 1980).

From the literature on know-how we also learn that four kinds of knowing are considered to be knowing how. First, descriptive knowledge, when we may know how something looks; second, historical knowledge, when we may know how something has happened (as a course of events); third, theoretical knowledge, when we may know how something (an antecedent, a cause) is generally or universally connected with something else (a subsequent, an effect) usually
regarded as knowing "why"; and fourth, procedural knowledge, when we may know how to perform a certain task (Machlup, 1980).

Machlup (1980), however, sees it necessary to add a third kind of knowing, namely, knowing "what", to the list of knowing "that" and knowing "how". He proposes two meanings for knowing "what". The first meaning is that knowing what means knowing an undetermined portion of all possible knowing-that claims about the subject. It relates to large complexes of propositional knowing, and knowing "what" can be broken down into large numbers of single knowing-"that" propositions. The second meaning of knowing "what" is feelings which can be known only by experience, not described in words. Feelings of pleasure and of pain, of love and of hate, of awe, sympathy....and many other personal experiences. They are included in the category of knowing "what", since they are nonpropositional contents or components of what is known.

For the purpose of this study, however, knowing why, who, whom, when, and where are as important as knowing that, how, and what, even if they do not need equal elaboration. Chapter IV deals with these issues in a relatively broad sense.

Summary

In this chapter, an attempt was made to delineate first, the characteristics of science-technology under study, and second the historical process of the evolution of LICs dependency on MICs.
The reason for the present condition of LICs dependency and the likelihood of the continuation of STD was thought to be the monopoly of knowledge-information, itself a consequence of concentration of forces of production of knowledge-information in the MICs and their rapid changes. The conflicting visions on the nature of knowledge-information were then presented as follows: in the political sphere, knowledge-information is viewed as a source of power through controlling the production and processing of knowledge-information. In the economic sphere, knowledge-information is viewed as a resource, either an asset for lease, or a commodity for sale. In the social sphere, knowledge-information is viewed as a social good to be freely shared by all. In the cultural sphere, knowledge-information is viewed as a cultural resource, the basis of belief and social reality. Finally, the effects of the current development of knowledge-information industry were discussed to give a sense of the probable future trend.

As Table 4 shows, production and distribution of media is concentrated in More Industrialized Countries.
Table 4

Media: Production and Distribution (1981-82)

<table>
<thead>
<tr>
<th>Type</th>
<th>More Industrialized Countries (MICs)</th>
<th>Less Industrialized Countries (LICs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (Percentage)</td>
<td>25.7</td>
<td>74.3</td>
</tr>
<tr>
<td>Book:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production (No. of Titles)</td>
<td>601,000</td>
<td>164,500</td>
</tr>
<tr>
<td>Production (Per million Inhabitants)</td>
<td>509</td>
<td>48</td>
</tr>
<tr>
<td>Distribution (Percentage of Production)</td>
<td>78.5</td>
<td>21.5</td>
</tr>
<tr>
<td>Newspaper (Daily):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of</td>
<td>4,560</td>
<td>3,600</td>
</tr>
<tr>
<td>Circulation (Per 1,000 Inhabitants)</td>
<td>322</td>
<td>40</td>
</tr>
<tr>
<td>Newsprint:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production ( Millions of Metric Tons)</td>
<td>23.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Consumption ( Millions of Metric Tons)</td>
<td>22.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Other Printing &amp; Writing Paper:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production ( Millions of Metric Tons)</td>
<td>36.8</td>
<td>5.9</td>
</tr>
<tr>
<td>Consumption ( Millions of Metric Tons)</td>
<td>35.4</td>
<td>6.0</td>
</tr>
<tr>
<td>Radio Broadcasting:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitters</td>
<td>22,000</td>
<td>7,700</td>
</tr>
<tr>
<td>Receivers (No. in Millions)</td>
<td>988</td>
<td>365</td>
</tr>
<tr>
<td>Receivers (Per 1,000 Inhabitants)</td>
<td>837</td>
<td>107</td>
</tr>
<tr>
<td>Television:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitters</td>
<td>38,800</td>
<td>2,300</td>
</tr>
<tr>
<td>Receivers (No. in Millions)</td>
<td>478</td>
<td>86</td>
</tr>
<tr>
<td>Receivers (Per 1,000 Inhabitants)</td>
<td>405</td>
<td>25</td>
</tr>
<tr>
<td>Long Films:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>1,770</td>
<td>1,930</td>
</tr>
<tr>
<td>Cinema:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Fixed Cinema (000)</td>
<td>211</td>
<td>27</td>
</tr>
<tr>
<td>Seating Capacity (No. in Millions)</td>
<td>51</td>
<td>19</td>
</tr>
<tr>
<td>Seating Capacity (Per 1,000 Inhabitants)</td>
<td>43</td>
<td>6</td>
</tr>
<tr>
<td>Annual Attendance (Millions)</td>
<td>7,400</td>
<td>6,100</td>
</tr>
</tbody>
</table>

Source: UNESCO Statistical Yearbook 1984, Passim
On the basis of analysis presented in this chapter, we can move to the next chapter, the effects of scientific-technological dependency on the social structure of LICs.
CHAPTER IV

THE EFFECTS OF SCIENTIFIC-TECHNOLOGICAL DEPENDENCY ON SOCIAL STRUCTURE OF LESS-INDUSTRIALIZED COUNTRIES

In the preceding chapter, it was suggested that through an historical analysis that (1) colonial and neo-colonial patterns of economic and educational systems have led to underdevelopment of science-technology of LICs; and through an analysis of the concentration of means of production in the knowledge-information industry in MICs and the speed of change in this industry that (2) these mechanisms lead to intensification of scientific-technological dependency of LICs. In this chapter the effects of scientific-technological dependency on social structure of LICs are examined to serve as a background for the next chapter. However, a full realization of the extent of scientific-technological effects entails an understanding of the nature and place of science-technology in social structure.

Nature of Science-Technology

In discussing the nature of science-technology, two positions are dominant: (a) the science-technology as social relations position, and (b) the use/abuse position popular in the 1960's. On the science-technology as social relations position, all aspects of present-day science-technology are to be understood basically as their being a part of modern capitalism (including its ideological
and political aspects as well as the organization of production itself). By contrast on the use/abuse position, it is only the use of science-technology that is capitalist, not the way it is produced.

From the science-technology as social relations position, two currents of thought can be distinguished, (1) the dialectical Western Marxism and (2) the Marxism in the USSR and Eastern Europe. In spite of using "science" and "technology" separately, the scholars emphasizing these two positions do not consider science and technology as separate entities. To review the perspectives of these scholars, here for analytical purpose, science and technology are considered separately. First science and then technology are presented as viewed by these scholars in the context of social structure.

A. Science: the three main schools of dialectical Western Marxism view science differently, such that:

1. In the Hegelian historicism of Lukacs, Korsch and Gramsci, science is seen as a source of mystification.

2. In the critical theory of Horkheimer, Adorno, Marcuse and Habermas, science is seen as an agent of domination.

3. In the humanism of Lefebvre, Sartre, Kosik, Petrovic et al., science is seen as hermeneutically (for inquiry into the purpose of human existence) inappropriate in the human world.

To elaborate further on the idea that science is a source of mystification and domination:

(1) Lukacs, remarks that "there is something highly problematic in the fact that capitalist society is predisposed to harmonize with scientific method" (1971:7). Science, breaking up wholes into fragmented (atomized)
facts, is essentially an expression of the reification endemic to capitalist society; and historical materialism is counterposed to science as being characterized by a totalizing method of its own. Similar themes prevail in Korsch and Gramsci.

(2) In the Frankfurt school tradition, science comes to be associated with an instrumental reason or interest, which is seen, at least in the social sphere, as a more or less directly repressive agency; counterposed to instrumental reason is an emancipatory, life-enhancing, or de-repressing reason or interest.

(3) Humanistic Marxism has been generally disposed to a more or less pronounced dualism, with the method of social inquiry regarded as distinctively interpretive or dialectical, etc., in contrast to that of the natural sciences. Common to all three schools is a positivistic misconception of science and an emphasis on human practice, in the transitive dimension, at the expense of transfactual efficacy, in the intransitive dimension, leading to epistemic idealism, judgmental relativism, practical voluntarism and/or historical pessimism. (Bhaskar, 1983:436).

The position of Soviet and Eastern European Marxism on science has shifted alternatively from science as a "direct productive force", a vital part of the "socioeconomic base" of society, to science as social relations, a part of the "superstructure" (Vucinich, 1984). A term which has come to be used, more specifically by social scientists in the USSR and Eastern Europe, is scientific and technological revolution, referring to a new phase of history. This scientific-technological revolution is seen as:

a drastic transformation of the entire technical basis, the technological mode of production, the forms in which production is organized and managed, and man's attitudes to the production process,...[as] a drastic qualitative transformation of the productive forces of society on the basis of the development of science into the leading factor of technical progress and the development of social production. It changes the entire face of social production, the conditions, character and content of work,
the structure of productive forces and social division of labor and, through the latter, affects the social structure of society. Thus, the scientific and technological revolution covers not only the sphere of science and technology, but also the sphere of production, which is why it has such a strong impact on all aspects of present day society, including every day life, culture, psychology and the interaction between nature and society. (Mikulinski, 1980:77)

According to Young (1983), for the scholar who employs the term scientific and technological revolution, it should be seen:

in the context of the "social relations specific to a given social system" (Richa, 1977), and "brought into correlation with the profound processes of social development underlying the mounting social revolution" (Fedoseyev, 1977), but in fact their approach gives primacy to the forces of production as the motor of history, while treating the relations of production as largely derivative. In this conception, moreover science is regarded as an unequivocally progressive force (once the distortions produced by capitalism have been eliminated) which will lead necessarily to communism.... On the other side, the scientific and technological revolution is seen as enhancing the contradictions in capitalist societies, and hence the possibility of revolutionary social change. Critics of this notion, however, regard it as only another form of technological determinism in Marxist thought,...which ignores the dynamics of class struggle and seeks to depict "the objective course of man's socio-historical progress (Arab-Ogly 1971:379). (Young, 1983:437)

In 1979, the Radical Science Journal Collective (RSJC) presented its basic tenets that: (a) scientific and technological knowledge is ideological; (b) all areas of science are equally determined by capitalism; but the determination operates in very different ways at different levels in particular disciplines; and (c) the realization of points (a) and (b) must affect political struggles in these areas, by pushing scientists out of scientific ghettos and integrating their politics of science with a much more sophisticated understanding of

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
class struggle in their own class faction based on Marxist theory and practice (because theory without practice is empty and practice without theory is blind). After presenting these tenets the RSJC called for an attempt:

to bring science and other kinds of production and reproduction into one interpretive framework. It is time to concentrate on how knowledge and technology are constituted, that is, where capital's values and needs enter into the constitution of science and technology, exposing that constitutive role. Above all, it is time to seek out the places where capital can be contested; the process by which the evaluative/ideological dimension enters into the production of science and technology is an excellent place for demystifying knowledge, but it may not be the locus most amenable to contestation. This will have to be discovered by close analysis of the labour process of scientific work, seeking out its vulnerabilities to transformation along the lines of socialist social relations—challenging hierarchies, authoritarianism, sexism, differentials, struggling for fully collective and open processes for setting tasks and goals. (Young, 1979:31)

The basis of this argument is that science is not just social relations, but a labour process. And being a labour process, it becomes subjected to ideology; ideology as fundamental—not a factor, not a contaminant, not intruding from the social context but constitutive. Ideology directs and frames our inquiry—what to think about and how to think about it. In other words, science is ideological, and implications of this thesis is that the social relations of production, the product and its uses are not separable; and that science is actually a labour process among others, and should not be treated as a privileged form of knowledge (Young, 1979:Passim).
B. Technology: Gramsci views machine [technology] as being:

a moment of the material forces of production, an object of property of particular social forces, that expresses a social relation which in turn corresponds to a particular historical period. (Gramsci, 1976:466)

This is in line with Lukac's idea that:

[the] attempt to find the underlying determinants of society and its development in a principle other than that of the social relations between men in the process of production...leads to fetishism. It is altogether incorrect and unMarxist to separate technique from the other ideological forms and to propose for it a self-sufficiency from the economic structure of society. (Lukacs, 1966:29).

Marcuse attacks the scientific-technological rationality, first on the basis of Taylorism (i.e., scientific management) as a "streamlined autocracy" in which the laws of physical science and technological reason are fused inextricably with the capitalist profit-motive (Marcuse, 1978). And later by developing this critique of scientific-technological rationality into his thesis of one-dimensionality, he writes:

Not only the application of technology but technology itself is domination (of nature and men)—methodical, scientific, calculated, calculating control. Specific purposes and interests of domination are not foisted upon technology "subsequently" and from the outside; they enter the very construction of the technical apparatus. (Marcuse, 1968:223)

However, it is Castoriadis, who by challenging the idea of "productive forces" as a point of departure, puts all those elements together and provides an historical account of the issue. He argues that "technological evolution", far from being an autonomous, homogeneous, teleological continuum, is determined "by the
development of the proletariat and by the class struggle waged in the womb of capitalism" (Cardan, 1971:8). Castoriadis reaches this point by acknowledging:

It is one thing to recognize the fundamental importance of Marx's insights on the connections that exist between production and other aspects of the life of a society...But it is another thing to reduce production, work, and human activities mediated by instruments and objects to the level of "productive forces", i.e. in the end to the level of technology. And it would be just as wrong to grant to technology an evolution which "in the last instance" would be autonomous. (Cardan, 1971:7)

Among those who take the use/abuse position, Gorz and Braverman are considered here.

Gorz (1976) contends that "organization, production technology, and division of labor, form the matrix that invariably reproduces through inertia hierarchical work relations, the capitalist relations of production." This is so because "the goal of capitalist production can only be the growth of capital itself" that is, "a unity of technique of production" and "technique of dominating those who are producing" (Gorz, 1976:viii). According to Reinfelder (1980) what this implies, is that Gorz takes a "technicist perspective of science and technology, being "incorporated" from outside, explicitly granting them a "degree of irreducible autonomy." Braverman, in Labor and Monopoly Capital (1976), argues that only with the development of machinery is capitalism's goal of the domination of dead labour over living labour established as a "physical fact", and that theories which view machine technology as "negative" in its objective structure are "constructed on every level to exonerate
capitalism". Braverman then concludes that "it is not the productive strength of machinery that weakens the human race, but the manner in which it is employed in capitalist social relations" (Braverman, 1976:228-9).

By considering two functions that technology fulfills, as a force of production, and as a relation of production, Dieter Ernst argues that "technologies are in a sense the crystallization of specific historical modes to organize social relations" (Ernst, 1980:49). He contends that technology is:

the specific way in which labour and means of production are combined, to use knowledge for the appropriation of and change in one's material and social environment. In a class society, for instance, technology will be used to perpetuate power and privileges. The ruling elite, besides controlling and appropriating the economic surplus, cannot but exercise the strictest control over science-based technology. (Ernst, 1980:49)

This conceptualization of science-technology makes the discussion of the real issue in scientific-technological dependence (STD) more meaningful. The real issue thus is the effects of STD, most of which are indirect and long term, on the overall dependency and structural deformation of the LICs. For the LICs, regardless of the differences in the ideology of struggle for autonomy, the strategy of transition towards a mode of economic and social development with emphasis on the needs of the underprivileged always ends with the importation of science-based technology on a significant scale. The realization of this fact necessitates the understanding of the effects of scientific-technological dependency on the social structure of the LICs.
The Effects of Scientific-Technological Dependency on the Social Structure of the LICs

In the past two decades, several theories have dealt with the role of science-technology in the international political economy with emphasis on the analysis of MICs-LICs relations. Among the recent attempts in this realm is the thesis of a "new international division of labor" with greater focus on the role of technology in the current reordering of the world economy. According to these theories, particularly the "new international division of labor", the current world economy is "centrally coordinated and hierarchically executed and employs technology as its spearhead." The argument is that center capital has been favoring a reorganization of the international division of labor. More importantly it favors stopping the opposition to industrialization efforts in LICs for the following reasons:

A. The increase of competition among MICs, notably among Japan, West Germany and the U.S.A. (despite close cooperation among Japan, Western Europe and the U.S.A. in a trilateral commission—recently quadrilateral, adding Canada as a fourth member—as a mechanism of coordination and orchestration of the policies of these countries on world affairs against the rest of the world);

B. The increase of R & D expenses by Japan and West Germany challenging the U.S.'s leading role—according to Annerstedt (1979) in the 1960s, the U.S.'s expenditures in R & D accounted for 70 percent of the capitalist world's R & D expenditures; Western Europe and Japan, 28 percent. In the mid-1970s the shares of these countries were estimated at 50 and 47 percent respectively—;

C. The growth of economies of scale, as a result of huge investments in innovation;
D. The increase of labor costs, necessitating a search for markets of cheap, skilled and semi-skilled labor; and

E. The increase of political opposition to direct investments or other forms of direct control over production in LICs by MICs.

These reasons are indicative of the dominant role of science-technology in the nature of relationships that MICs have sought to have with LICs. The prominent role of science-technology in relationships between MICs and LICs is suggested in this statement by T. A. Callaghan (1975):

Markets closed to products are invariably open to technology. Even extremely closed markets will open to Western technology, provided the West gives them the credits to make the purchase... as long as the United States is the predominant technological power in the world, closed product markets will always be open to American technology.10

This statement is affirmed by available data about some indicators of scientific-technological dependence of LICs on MICs. In 1970, the share of LICs capital goods production in the world was 3.18% slightly higher than the 2.9% in 1963.11 The share of the capitalist MICs was 61 percent, and of socialist countries 36 percent. A great part of LICs' share has been concentrated in a few NIC's (India, Brazil, Argentina, Mexico, South Korea, etc.). In 1970, only three countries (India, Brazil and Argentina) were more than 80% self-sufficient with regard to engineering products, and only four (those three and Mexico) had significant levels of machine tool production, which is an essential element of any capital goods production. The world market for machine tools, automated factories, is controlled by
the U.S., Japanese and West German firms. According to Callaghan, U.S. trade balance on technology-intensive products has not been negative since 1956. It reached 24 billion dollars in 1975 from 10.7 billion dollars in 1973 (Ernst, 1980).

By assuming R & D is the first stage of the scientific-technological development process, the share of LICs in the world's R & D expenditures remained two percent from 1963 to 1973 (Amerstedt, 1979). In terms of inventive and innovative capacity, the position of LICs is much worse than these figures show. The point of importance is that the great part of the R & D expenditure of LICs has little impact on their productive activities. Their R & D expenditures are either appropriated by international capital through subcontracting and other means, or are parts of consuming expenditure, or worst of all, in many LICs up to 50% of R & D expenditures are related to military and police purposes. And since most of the armaments are imported from MICs, LICs are marketing subsidies for armaments exporters. Of course, the distribution of R & D spending should be seen in conjunction with LICs growing debt payments and deteriorating terms of trade. These payments are closely linked to imports of technology (Hveem, 1983).

In terms of other indicators such as patents and trademarks it has been shown that about 85 percent of all patents granted and registered in LICs are owned by foreigners, most of them being owned by large corporations in the U.S., Western Europe, and Japan. From 90 to 95 percent of these patents are not used in production in LICs.
(UNCTAD, 1975). In the case of trademarks, 56 percent of all trademarks registered in LICs are controlled by foreigners (O’Brien, 1978).

It is in the light of such a wide scientific-technological gap and the dependence/domination relationship between MICs and LICs that a discussion of the effects of scientific-technological dependence on the social structure of LICs appears of prime importance in any study of LICs socio-economic development.14 However, before dealing with the effects of this dependence relationship on economic, socio-political, and educational dimensions of the social structure of LICs, a brief review of the technical and structural aspects of this kind of dependence relationship seems necessary for understanding the mechanisms that are used to perpetuate this dependence relationship.

**Technical Aspect**

The technology being transferred to LICs is in "embodied form" (machinery, turnkey factory, and various capital goods) and is also dependent on MICs for its maintenance and reproduction.15

The transfer of technology in "embodied form" has numerous impacts on LICs, among which the following categories are considered the more important (Ernst, 1980):

'A. Since the imported technologies are made according to the Transnational Corporations' global industrial standards, the possibilities of their adaptation to local conditions are restricted;
B. Almost all of the imported products, ranging from turnkey plants, subsystems, intermediates and spare parts are intentionally diversified and designed to be obsolete in a relatively short time;

C. The imported machineries are made in such a manner that their maintenance and repair is either impossible or extremely expensive if the manufacturer's maintenance and repair manuals or computerized maintenance information systems are not used;

D. Since transferred technologies are within packages, they can be divided into well functioning parts only at a very high cost. A package is a combination of mutually dependent innovations and improvements that is designed to be indivisible. The most controversial example of such packages is the Green Revolution, which consists of so-assumed miracle grains (main component) and fertilizers, insecticides, pesticides, irrigation systems, pumps, etc. (complementary inputs).16 Obviously without complementary inputs, the package cannot fulfill its purpose. As a result, the sellers of a package are assured that their market, for a long time, remains intact.

The technology-exporter firms put all their efforts in the process of production to assure their supremacy and control of the market for the future by using all mechanisms available to them. One of the major instruments of oligopolistic competition used by a handful of firms, to block the possibility for LICs to enter their newly developed technology into the world market, is the control of the life cycles of most of the technologically relevant industrial products and processes (Vheem, 1983). They do so by skillfully devising optimum time patterns of obsolescence. In such situations, even if LICs try to acquire operational capacity, to proceed to reproductive capacity, and finally reach improvement capacity, and develop their own new technology, they will soon find out that the
new technology has already been entered into the market by the original technology-exporter's firm.17

There are numerous reasons for MICs overwhelming S-T dominance. These countries have strict control of process engineering, equipment design, access to information systems and technical standards. The superiority and domination of given firms of MICs in certain areas is even acknowledged by other MICs. For instance, the French firm Technicatome, for the formulation of a feasibility study on the commercial export of nuclear power stations, has called for the assistance of the U.S. engineering firm Bechtel (Ernst, 1980).

It is not surprising, therefore, that these countries in almost all avantgarde technologies (alternative energy resources; public transport; oceanography; exploitation by low grade ores, etc.) have dominant positions. The unprecedented speed in advancement of information technology, and the unpredictable nature of space technologies, with increasing secrecy around them for military use, all are signs of even further intensification of S-T dominance/dependence.18

**Structural Aspect**

Transfer of technology basically takes one of these three forms: (1) "simple-direct" sales; (2) "process-packaged" sales; and (3) "project-packaged" sales. The dominant form of international transfer is "packaging".19 "Simple-direct" sales consist of
supplier-to-buyer sales of capital goods, consultancy services, and so on, according to "ordinary" market behavior. "Process-packaged":

normally provides part of a production line in such a way that the buyer is obliged to purchase the whole line. This form is particularly suited to suppliers who enjoy a monopoly position with regard to some elements of the production process, and who link other elements in which no monopoly is enjoyed in order to increase sales and profits. Technology packages in this form of deal may range from the supply of subsystems for production lines (such as electronic equipment) to large turnkey projects. (Hveem, 1983:284)

"Project-packaged" sales, or "vertical transfer" normally arises out of a concern on the side of suppliers to control the use of technology. The supplier's control may materialize in different ways: taking a share in the production venture; wholly owning the production through direct investment; and exercising control over production through a management contract, sales contract, or by licensing technology supplied on specific conditions that control future use. Such conditions include restricting exports and specification of product requirements. Among "packaging" forms, "project-packaged" sales seems to be the preferred one by international capital because, among other reasons, it gives the best opportunity for practicing transfer pricing (Hveem, 1983).

These patterns of controlling the sales of technology to LICs, as the mechanisms of LICs dependence on MICs are manifestations of a structurally deeper dependence of LICs on MICs innovative and reproductive capacity. In the development of science-technology there is a process of R & D, invention, innovation, application, and final production. This is a sequential chain, in which the majority
of LICs. have no part except receiving the final product (Cole and Miles, 1984).

Of course, international capital relocates some of the sequences to the LICs, but they are: first, one at a time and in different LICs; second, they are mostly in those technology sectors where monopolization is not a concern; third, if there are relocations, they are small parts of the total; and finally, they are either in the military sector or in the sector(s) meeting the needs of MICs consumers.21 And even in such situations, the relocations are not always long lived—one example is the electronics industry in some LICs, specifically in Southeast Asia. The same transnational corporations which brought South Korea, Singapore, Malaysia, the Philippines, and other Asian countries into the electronics industry through combining the new technology and low cost labor, until now a source of advantage and rapid growth, now have a newer technology which removes these countries' comparative advantage. The conclusion of a number of contributors to a recent series of articles in Institute of Development Studies Bulletin on the possible impact of micro-electronic technology on development, points to the likelihood of "trade reversal", the relocation of industries which are in LICs back to MICs.22 Indeed, a number of South-Asian producers of micro-electronics have recently been forced to set up production lines in the United States and Europe (Kaplinsky, 1982). The reason for such a trend is limitation of the diffusion of technology and competition by rival corporations through cross licensing, patent pooling, and

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
other forms of technology sharing among the leading transnational corporations as well as through intra-company technology flows in advanced sectors like heavy electronics or telecommunications equipment.

Now that technical and structural aspects of technology transferring from MICs to LICs have been briefly discussed, we return to the effects of scientific-technological dependency on the social structure of LICs. To avoid the shortcomings that some writers on "dependency" have been criticized for—not dealing with internal factors adequately—here the attempt is to elaborate first on both external and internal factors that play significant roles in the effects of scientific-technological dependency on the LICs, and then on the effects of STD on the social structure of LICs.

External Factors

The process of production and distribution of knowledge-information that is needed to develop, disseminate and make productive use of the new scientific-technological innovations and inventions have, for a long time, been concentrated within a few private and public R & D centers located in MICs (Annerstedt, 1980). This concentration has resulted in a very asymmetric distribution of control over the whole range of scientific-technological activities, such as inputs and outputs of research, development and engineering activities on a global scale. And scientific-technological domination by MICs, in turn, has resulted in the scientific-
technological dependence of LICs, demonstrating the dialectics of
S–T dominance and S–T dependence.

According to Ernst (1980) the major elements necessary to
produce, distribute and make productive use of technologies could be
summarized as follows:

Basic research and innovative capacities. Especially, in this
field, public "think tanks" such as the Rand Corporation, the
MIT, the Stanford Research Institute, the Denever Research
Institute, the Battelle Institute, or the
Frununhofergesellschaft play a major role. In this context, the
term "public" is rather misleading. One should talk of
institutions which are financed out of tax funds, but whose
results are available only to certain, specific segments of the
"public".

The avantgarde technologies. It is noteworthy that, especially
in this field, there is a clear predominance of firms which have
gained their technological lead mostly out of military oriented
R & D. For instance, the Lockheed Missiles and Space Co. is a
branch of the Lockheed Corporation in the field of new
technologies for seabed mining, especially with regard to
manganese nodules; and the Industrial Products Division of the
Hughes Aircraft Co. is involved in developing laser-directed
industrial automation systems; and, finally, the MBB Ottobrunn
of the Federal Republic of Germany is involved in new
technologies of public transport.

The so-called "technological building blocks", especially semi-
conductor-technology. Although, in terms of value and weight,
such technological building blocks are usually only a minor part
of the technology systems into which they are integrated, they
are in fact the really decisive elements. Consequently, there
can be no effective control of process and product technologies
as long as one does not control these technological building
blocks.

The information systems for worldwide screening and tapping of
scientific-technological developments and for feedback
concerning production experience. Besides the relevant
information systems of multinational corporations, banks, and
engineering consultancy firms (see, for instance, Control Data
Worldtech Inc., known as a "technology exchange service" of the
Control Data Corporation), it is again public information
systems and data banks which play an important role. A case in
Point would be the U.S. Air Force Systems Command, which, according to its own statements, maintains probably the most complete information system on innovations and innovative potentials in the field of electronics. Compared, for instance, with the contents of such an information system, it is hard to see how the Industrial Information System, presently prepared within UNIDO's Industrial Documentation Unit, will be able to play more than a marginal role.

Basic engineering activities, especially process engineering and equipment design. The rapidly expanding world market for these activities are increasingly under the tight control of a handful of private firms. U.S. firms are dominant, such as A. D. Little, J. Diebold Assoc., Bechtel, Austin, Kaiser, Flour Co., Stone and Webster, to name but the most important ones.

Finally, the manifold techniques to solve problems of worldwide logistics, maintenance, and marketing (Ernst, 1980, Passim).

Internal Factors

LICs have been increasingly channeling their resources to finance the purchasing of scientific knowledge and technology over the past two decades instead of devoting their resources to "reconstruction" of their own science-technology systems.

The ratio between resources invested in domestic S & T activities and those used on imports was 1:2.5 in 1968. There is reason to believe that it is on the order of 1:4 today, and considerably more in OPEC countries with vast currency surpluses, and in some of the highly externally oriented (newly industrializing) countries. (Hveem, 1983:284-85).

The severe problem associated with the import of science-technology (notice, we use "import" instead of "transfer" for the reasons given below) is that most LICs don't have the necessary, much less sufficient, conditions for active domestic adaptation and integration of the imported science-technology into their development process (Makange, 1980). If the necessary conditions were present,
the high level of importation for some time might have been a viable strategy as it was for Japan. The necessary conditions for S-T importation to be real transfer of S-T are first, the presence of an identifiable recipient in the LIC with the capacity to utilize the S-T according to self-defined goals; second, the presence of all other science-technologies necessary in order for the concerned science-technology to be put into stable productive use; and third, the existence of a clear net gain for the recipient (Baumgartner, 1980).

For some LICs, the problem is not so much the absence of indigenous S-T efforts, but rather lack of linkage between such efforts and local productive goals. The domestic manufacturing firms have shown the inclination to sign licensing agreements with exogenous suppliers for the same technologies that have been developed by local laboratories and workshops (see below for reasons). The lack of linkage could also be detected in the direction of S-T efforts. These efforts are mostly directed toward the "modern" sectors of the economy, to industry and high-productivity agriculture. There are negligible S-T efforts relevant to the development of agriculture and the countryside focusing on the needs of small peasants and poorer communities. 23

The researcher, from among the possible explanations for this situation—preference for foreign technology—would argue the following:

1. Local capitalists in LICs prefer MICs technology because, due to long experience, they believe it is better than the locally generated one. This is partly a result of the
"demonstration effect" of the international division of labor, whereby those successful economies which have accepted the rules of the game and dominant order represent the model for those which have not.

2. LICs' capitalists are tied to world capitalism and must buy its technology for reasons of ownership patterns and the like.

3. The vertical social mobility—moving to a higher social class—is much easier and faster through channels of affiliation with MICs economic sector. This is particularly so, for R & D employees who perceive working for firms intimately linked to the MICs economies as economically, socially and intellectually more rewarding. This process leads to what has been known as "internal brain drain".

4. The process of "self-colonialization" and the adoption of MICs dominant values and consumption patterns due to the long history of colonialism (including neo-colonialism) and reasons mentioned in 1 and 3.

To this investigator, this situation is an indication of disintegration of the forces of production, specifically disintegration of scientific, innovative and learning capacities to the overall process of the country's socio-economic development. For this reason, LICs are undergoing a process of progressive disintegration of the key elements of their capacity to improve their endogenous industrial sector, such as R & D capacities, engineering activities, educational systems and the capacity to produce capital goods (Senghaas, 1980). The importance of such improvement is apparent from Sagasti's description of LICs, namely, societies with an exogenous scientific and technological base (Sagosti, 1980). In other words, in LICs, knowledge-generating activity is not related in any significant way to productive activities. One notable example is India, a NIC whose consultancy services abroad (consultancy contracts
with other LICs) and the exports of engineering goods grew, over the last few years, annually by two hundred and thirty percent respectively (Lall, 1978). While India is capable of producing its own means of production, and has adequate capacity to innovate, for various reasons, outstanding among them external and internal brain drain, its S-T system is not of immediate relevance to, or used by, the domestic productive sectors (UNCTAD, 1978).

Among the more important elements in the linking of local R & D-potential to productive use in LICs are the absence of:

--- Well integrated and experienced laboratory teams;

--- Scientific and technical management cadres trained to apply social cost-benefit criteria;

--- An "appropriately" qualified labour force, i.e. workers who would be neither overskilled in the sense of being highly specialized watchdogs of "automated factories", nor deskilled in the sense of having been deprived of certain general-purpose skills, such as welding;

--- Clear priorities concerning the allocation of scarce skills (priority candidates would be capital goods for the production of capital goods, especially machine tools; machinery for producing agricultural implements and textile machinery; and capital goods used in the production of basic materials and intermediates);

--- And finally, the selective recovery and upgrading of "traditional" innovative capacities, if these have not already been destroyed by the penetration of foreign technology. (Ernst, 1980:54-55)

One of the reasons for the endurance of S-T dependency in LICs, in the context of their prevailing class structure and political system, is the almost complete lack of autonomy in making decisions concerning both the kind of technologies which will be needed for
national development, and the sources of supply. That is, the technological needs for development with regard to both the optimum use of local resources and fulfillment of basic needs is not defined within these societies (Edquist and Edquist, 1979).

One can see, on the bases of aforementioned points, how closely the internal and external factors have been related in the historical process of S-T dependency of LICs on MICs. These points also suggest that the dominant factor in the choices of alternative technologies is the social class. That is, we should expect different types of technology to have the support of different types of "social carriers",\(^{25}\) as it is the case for choices of alternative strategies and policies of development. The other factors of secondary importance that influence the choice of technology are: (1) the form in which the technology is presented for sale; (2) the capability (presence of a capable infrastructure) of the purchasing country to modify or control the form and content of the purchased technology; (3) the international and internal political-economic conditions within which the transaction takes place; and (4) the characteristics of the technology (Cole and Miles, 1984).

Having discussed the internal and external factors that affect the S-T dependency of LICs on MICs, we can now return to the effects of S-T dependency on the social structure of LICs, namely, the economy, the socio-polity, and educational-scientific capabilities.
Effect on Economy of LICs

Reverse Transfer. One example of the reverse transfer of technology is the brain drain. According to a study done for UNCTAD in 1979, in the period from 1961 to 1972, three MICs, the United States, Canada, and Britain received skilled S-T personnel from LICs that in value was almost equal to the total flow of Official Development Aid (ODA) from these same countries.26

Fragmentation. MICs and their Transnational Corporations (TNC) produce a kind of machinery for transfer (for sale to LICs) that is designed for specific production tasks only. Not surprisingly, these tasks fit into a worldwide organization of production involving a number of sites in different locations. Some of the reasons for selecting such a pattern of production are: (1) minimizing production costs; (2) providing enormous leverage for TNC over the individuated production sites; (3) allowing TNC to control the accumulation process more effectively through, for example, the mechanism of transfer pricing; (4) preserving the monopoly of specifying materials to be used, manufacturing design, handling and transportation for the headquarters of TNC. This centralization of activities has the effect on LICs of limiting the possibility for using local inputs other than labor (Rahman, 1980).

Disarticulation of Economy. One of the implications of fragmentation of production in LICs is that a growing share of production in LICs is located in "free zones" (Halliday, 1980).
That is, following the pattern designed by TNC, goods are imported, processed to a further stage utilizing LICs labor force, and then reexported. The effects of this kind of industrial production, which often has no link with the rest of the economy, on LICs are:

1. **Limited employment opportunities.** According to ILO's (1977) "World Employment Programme series only some 5 to 15 percent of the labor force is touched by foreign technology and production;

2. **Increased social inequality.** Those who are employed by industries connected to "transferred" technology have more income and as a result the income disparity between this group and the rest of the labor force skews domestic income distribution (Stewart, 1977);

3. **Concentration of resources.** This kind of enclave production has numerous effects on the resources of buyer country, including: (a) channelling of large part of resources to satisfy the required sophisticated infrastructure (transport, communication, etc.) which is often separated from the rest of the country; (b) allocating scarce resources for systems to secure and protect such industrial enclaves (police, military); (c) allocating resources for supply of cheap and suitable labor into technical schools and vocational training (Senghaas, 1980);

4. **Marginalization of the poor.** By providing more standardized and thus cheaper mass-consumer-oriented goods, in the domestic market as an extension of the international product cycle, the poor become marginalized not only as producers, but also as consumers. This is so because only the middle class, the skilled working class, and the better-off peasants could afford this cheaper mass-consumer-oriented goods, not the poor, unemployed, or underemployed (Amin, 1976; Sunkel, 1973).

**Capital Accumulation Capacity.** The severe negative effect of technological dependence on the capital accumulation capacity of LICs follows a peculiar circular path (Ernst, 1980). When a LIC has to import most of the means of producing goods, including whole

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
plants, it cannot substitute imports, especially capital goods and intermediates, because such policy leads to large-scale follow-on imports, that is, "negative import substitution." However, that is only the tip of the iceberg. There are more fundamental built-in mechanisms that drain off the country's scarce foreign exchange. These mechanisms, as were discussed elsewhere (technical aspects), are: (1) the complete dependence on basic engineering activities, particularly on design engineering and equipment design; (2) dependence on maintenance and repair of imported machinery and "turnkey" plants. This applies especially to "corrective maintenance"\(^2\) and "trouble shooting", i.e. the capacity to react quickly and at lowest cost to unforeseen disturbances in the production process; (3) the nearly complete dependence on access to information systems storing the bulk of new technological knowledge and feedback on production experience; (4) transfer pricing, i.e. a significant overpricing of technologies by suppliers. Thus, if a LIC expands its technology imports, which are essential for improving the economy to the point of competition in world market, the country must increase its exports, to expand its exports, the LIC must further increase its technology imports, and so on....\(^2\)

On the basis of the argument of the circular nature of the impact of technological dependence on accumulation capacity of LICs, one could conclude that technological dependence may not only be instrumental in reducing import capacity, and in worsening the LICs terms of trade, but, it also may lead to high monetary instability

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
and depreciation of local resources, as a result of the price inflation embodied in imported technology (Rahman, 1980). This does not imply overlooking or ignoring those countries with sufficient political stability and resources (including infrastructure, natural resources, and human factors) which may nowadays experience an over-supply of technologies. In a majority of cases, however, this is part of "demonstration effect", i.e., the presence of types of technologies are inaptly conceived as an indicator of countries' access to key technologies (Balassa, 1981). The essential point here is the control of the strategic elements of the overall economic circuit and especially of the industrial sector. This is true about the expansion of "localized" R & D-capacities, such as, testing, standardization, and engineering activities transferred over from TNC's in some LICs. But, the crucial problem in all these cases is that dependence on imports of machine tools, machinery to produce agricultural implements, equipment for the basic goods industry, and core engineering-activities means that decisions about investment allocation and the organization of the production processes will be subordinate to external control (Stewart and James, 1982). That is, even the most basic precondition for national control over capital accumulation will be absent as a result of S-T dependency. One example of such a situation is the policy that suppliers of machine tools have been pursuing for some time. The policy is worldwide proliferation of computerized manufacturing techniques, which they believe is functional because they would optimize their product life
cycles. However, for LICs this policy has disastrous consequences, for it intensifies the already extremely alarming levels of unemployment and "marginalization" prevailing in these countries (Ernst, 1980).

**Effect on Socio-Political Structure**

It follows from the earlier discussions on the characteristics of capitalist science-technology and their nature as reflections of existing social relations, that the imported science-technology, which have been designed to be compatible with and support the power relations of the system from which they originate, requires the same social relations in order to be economically effective. Under such social relations, production implies task specialization, which together with the related work organization, work rules and worker-management relations fragments the working class and undermines control of the work process by workers (Marglin, 1974; Braverman, 1975).

The effect of this specialization, work organization, and work rules is a hierarchical structure in which few persons have a monopoly of control over the organization, and others simply execute orders. That is, there exists an unequal acquisition of managerial and decision-making abilities. This situation is not confined to the economic sphere of production, but supports the unequal distribution of abilities and capabilities and the legitimation and acceptance of similar inequalities and hierarchies in the socio-political sphere.
The result is a reenforcing circle of mutually supporting centralization of power and control (Baumgartner, 1980).

Baumgartner (1980) reports, the existence of links between technology, enterprise organization and social and political structure which have been emphasized by several authors. Udy (1970) shows how the patterns of power and social relations in a factory affects the social and political structures of the society. Desai (1972) argues that both American and Soviet governments were aware of the link between the origin of a plant, and organizational patterns of a factory, as well as between internal social relations and power of a factory and wider social and political organization, when they were wavering about supporting the Bokaro Steel Plant in India. Dean (1972) believes such a link between organization of a factory and socio-political structures was one of the factors which turned the Chinese against the Soviet model of development and the importation of Soviet technology and plant. Tsurumi (1977) points to the fact that not only technology has multi-dimensional effects but also the mode of transferring it.29

The long-term effect of the imported science-technology, with the discussed characteristics, is a distorted socio-political structure, a heterogenous structure that leads to the coercive, authoritarian rule of the state in LICs (O'Donnell, 1973). Although the extent of structural heterogeneity is a function of the capitalist penetration of the economy—i.e., it changes in response to changes in penetration—the process of its development starts with
increasing inequality. Since the imported science-technology is capital intensive and hierarchical, and because metropolitan capital (that is industry and service, because these sectors are promising to generate profit) penetrates dynamic sectors of LICs economies, their economies' capacity to absorb labor diminishes. In addition, imported machinery producing capital goods eliminates jobs in handicraft industries. Workers thus displaced could scarcely be absorbed by the industrial sector. This proportional decrease of jobs in non-agricultural sectors, coupled with migrant peasants—the result of the industrial policy—leads to the phenomenon called the "overtertiарization" of urban employment and to a hypertrophy of the reserve army, creating so-called "marginal masses" or economic marginalization (Mueller, 1979). That is, while there is a "labor aristocracy", many members of the laboring class become "marginal" to the economy and hence unemployed or underemployed.

One of the consequences of marginalization is inequality, intra-class, class, regional or geographical inequality (Amin, 1976). The outcome of inequality is conflict. The expression of inequality, in all levels, is manifested by conflict over the societal distribution of economic goods. The conflict may occur either in the labor-management arena, or in more directly politically relevant forms as general strikes, riots, demonstrations, and terrorism. Since in LICs, the state has become more deeply involved in the economy, conflict is frequently stimulated over access to state power.
As the conflict over access to state power intensifies and becomes a threat to the bourgeois control of the state, a new class interest, a statist class interest develops which expresses itself in coercive authoritarian policy.\textsuperscript{31} These class interests remain closely tied to those of the bourgeoisie but have their own basis in the apparatus of the state, i.e., in the control of the means of coercion. These statist class interests, in some LICs, are centered in the new military establishments.\textsuperscript{32} In some other LICs, as the military emerges as a politically dominant force and loses its class ties to the aristocracy and the bourgeoisie, it creates a new coercive "state bourgeoisie" which is centralized in urban areas. These regimes mostly exhibit the characteristics of populism, with the lumpen proletariat as their backbones (Germani, 1978).

**Effect on Educational and Scientific-Technological Capabilities**

One aspect of the consequences of colonization and neocolonization that has disrupted the economy and social structures of LICs, through exploitation of their resources and markets by the imperial powers, is distortion of education and scientific-technological capabilities. Over the years since attaining independence, many of the LICs have made major efforts to build up their scientific-technological infrastructure by importing science-technology in order to create an industrial base, but found themselves becoming more and more dependent on the science-technology of the former colonizers.
The importation of science-technology by LICs has had numerous negative effects on education and scientific-technological capabilities of LICs (Rahman, 1980):

A. Dilemma of S-T aid. As a part of general trend in increasing politicization of aid, scientific-technical assistance programs provided by MICs to LICs have become part of the foreign policy and global strategy of the former. As a component of that policy, MICs impose their views on LICs regarding the organization of their educational and scientific-technological infrastructure, the nature of training to be imparted, the technologies to be imported, and even the pattern of development to be followed. For nationalist progressive leaders of LICs, this is a dilemma. If they accept implementation of the policies and programs suggested, they lose their political autonomy and become more and more dependent, a regression to colonial past. If they reject the package—i.e., fail to implement the policies and programs suggested, they face not only the aid cut off but pressures from various sources which make their countries fall back into line (Miles, 1983).

B. Scientist alienation. One of the critical conditions for science-technology to be effectively utilized by LICs is the presence of a cadre of scientists who have an interdisciplinary approach to solving social problems, are strongly committed to serving the needs of the underprivileged and are willing to act as a team. However, because education of LICs has been patterned on the model of MICs, and in some countries even use the MICs language,
particularly at the university level, the educated are generally alienated from their own people, are competitive instead of cooperative, and have elitist and specialization orientation toward solving social problems. For research workers and students who are sent to MICs for training, the situation is not different. These persons are trained in areas of research primarily relevant to MICs. On return to their own countries, they tend to replicate these areas of work, leading to investment in research which is irrelevant to the needs of LICs and which cannot be sustained. The consequences of this situation for such scientists is either to leave the country in frustration (since they cannot put their expertise in proper and full use), or attempt to develop close links between the scientific infrastructure of LICs and scientific centers in MICs. The result for LICs is the isolation of their scientific institutions from the social environment and needs of the country, reducing these institutions to serving as outposts of MICs science without any major local interaction (Chu and Morehouse, 1982).

C. Concentration of R & D. Some authors have over-valued the contribution of the importation of science-technology in the increase of R & D activities in LICs. The emphasis is on the contribution of TNC's to build up an S-T infrastructure in LICs. But according to statistics the contribution of TNC's is negligible.

For example, U.S. TNC's spend one percent of their total R & D expenditure in Third World countries. Foreign expenditure accounted for eight percent of total R & D in LDC's in 1975. The Third World countries' share of TNC's expenditure abroad was up from three percent in 1966 to nine percent in 1975. These R & D efforts are, however,
extremely concentrated: Brazil and Mexico alone account for close to 2/3 of TNC-generated R & D in the periphery. (Hveem, 1983:280)

The importation of S-T also leads to concentration of scientific-technological activities in the areas closely related to the imported science-technology (Sandoval, 1973). At the optimum, the modification of the imported S-T with regard to the needs of the given country, produces spare parts (in case of the machinery), and maintenance and services. The concentration of R & D activities in areas related to the imported S-T leads to the unequal distribution of scarce financial resources in favor of these areas. The allocation of a high percentage of the research budget to certain areas leads to unequal distribution of scientists, technicians, students, and publications (Annerstedt, 1980).

The concentration of higher education and scientific activities, mainly R & D, are not isolated parts. They should be seen as parts of a general distorted educational structure, resulting from the adaptation of the educational structure to the needs of the imported science-technology, or the creation of a new technocracy to serve the interests of foreign investors. It has served as a mechanism for ensuring the stability of the system by educating the "right" persons or groups, or areas, capable of satisfying the needs of world dominant class and their local collaborators. The results have been the deprivation of the majority of the population of opportunities to attend school and the allocation of a relatively high percentage of the national budget to the expansion of
universities and urban secondary school systems (Sandoval, 1973). A consequence of this is the formation of the new middle class or technocracy which plays a double role as an ideological supporter of the dominant class and as a functional mainspring to independency, a phenomenon fostered by the dominant class.

Education, under dependency conditions, does not function as a change agent. It only plays a stabilizing role, affecting class structure. It serves as a mechanism for stabilizing the positions of the different classes by offering certain possibilities of social vertical mobility to those groups who will enhance the position of the dominant power, and depriving others of the chance to attain a meaningful degree of formal education. It is this contradiction in the educational system that gives importance to the analysis of the educational structure as a means of understanding its role in shaping the political structure and the distribution of power and its role in inducing or maintaining contradictions essential to the maintenance of dependency.

The form of the contradiction in education was changed with the emergence of the era of new dependency that replaced the colonial period. The new dependency, characterized by the shift of foreign investment towards industry, and an accelerated process of urbanization, brought about a new form of conflict between social classes. The conflict rose between the dominant class (i.e., the owners of the means of production, both the old landed aristocracy and the new capitalist-industrialists) and new groups in the middle

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
classes. In LICs, the new situation—the new dependency and accelerated urbanization—created a demand for a native bureaucracy and technocracy. The industrialists demanded an educational system geared to training rank and file workers in industry and services, particularly in urban areas. Here, a division between landowners and industrialists became apparent. At the same time, the middle classes were looking for a channel of mobility, and the most accessible one was education (Sandoval, 1973). But, since the state in most of LICs did not put enough effort to meet the needs of interest groups (now, four groups, the "old" dominant class or landed aristocracy, the "new" dominant class or the bourgeoisie, the middle classes, and foreign interests in industry and services) for educational facilities, the middle classes and the industrialized segment of the dominant class funded higher education institutions to provide trained personnel for industry and to meet the growing demand of the middle classes for mobility. This situation led both sides to overlook the underlying clash between the dominant class and the middle classes, for the sake of their interests. The dominant class viewed the middle classes as necessary allies to accomplish the "modernization" process, while the middle classes took part in "modernization" with hope of gaining mobility. This is the proper condition for continuation of dependency (Sandoval, 1973). If creating educated and semi-educated urban groups for urban industrial and service demands, while retaining the traditional structure in the rural areas was necessary to meet the need of dependency in the past,
the problem of education was divided between urban and rural areas. At present, however, with the urbanization and new dependency, the unplanned rural-urban migration has brought the rural educational problem to the peripheries of the cities, shanty towns, and slums. This migrated people, who are either seasonally employed, unemployed, or underemployed, make up "urban masses" and "lumpen proletariat" facilitates the growth of populist governments.88

Summary

What has been discussed in this chapter about the effects of scientific-technological dependency on social structure of LICs so far, could be presented in a simple model as Figure 1 shows. It can be concluded, therefore, that scientific-technological dependency can be seen as cause and effect of the general dependency relationship, the cause of LICs' underdevelopment (or uneven and blocked development), as discussed in Chapter II. It is caused, in so far as the need to import science-technology is concerned, by the absence of an indigenous scientific-technological base which leads to foreign investment, loss of control, and the introduction of the MICs patterns of production and consumption. As a result of the import of foreign science-technology an enclave economy dependent on the MICs for inputs, markets, management, finance, and science-technology then develops. Such distorted economy is characterized by disintegration of economy, sectoral heterogeneity, and uneven and blocked development. It leads, on one hand, to a distorted socio-
Scientific-Technological Dependency

Internal Structural Distortion

Economic Distortion

- Uneven Economic Development
- Disintegration of Economy
- Sectoral Heterogeneity
- Export Enclave

Socio-political Distortion

- Increasing Inequality
- Increasing Unemployment
- Increasing Class Conflict
- Imposition of Coercive, Authoritarian Rule of the State

Educational-Scientific Distortion

- Concentration of Higher Education
- Concentration of Scientific Activities and Research and Development (R&D)

Figure 2. A model of the effects of scientific-technological dependency on social structure of less industrialized countries.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
political structure characterized by inequality, unemployment, class conflict, and imposition of coercive, authoritarian rule of the state, and to a distorted educational-scientific institution characterized by concentration of higher education, and concentration of scientific activities, and research and development (R & D) (Sandoval, 1973).

This internal structural distortion is self-reinforcing because once MICs science-technology has been introduced it creates a society in its own image, requiring further import of science-technology to feed the markets which have been created, and to enable the industries to survive and expand. Given a productive structure based on the production of MICs products, using MICs techniques, the consequence is that the local science-technology systems are small and irrelevant, adept at assimilating (unadapted) foreign science-technology, but lacking independent innovating force. Yet the weakness of the local scientific-technological base is not only an outcome but also a prime cause of scientific-technological dependency, specifically, and of dependency generally, because it means that there is no real alternative to the import of foreign science-technology. There is a vicious circle in which weak science-technology reinforces dependency, and dependency creates weakness, and the result is underdevelopment or uneven, or distorted growth (Stewart, 1977). The attitudes and interests developed as a result of the dependent relationship are among the main forces behind the continuation of the system.
In this chapter negative effects of scientific-technological dependency on the social structure of LICs, in general, were discussed. On the basis of the discussions presented in this and the last two chapters, the case of Iran's dependency in general, and its scientific-technological dependency in particular, are subjects of the next three chapters.
CHAPTER V

THE CASE OF IRAN
1800 - 1941

In Chapter IV the negative effects of scientific-technological dependency on various aspects of the social structure of less industrialized countries were shown. This chapter and Chapter VI provide a qualitative analysis of the case of Iran from 1800 to 1977.

This chapter covers the period between 1800 and 1941. It starts with the assertion that Iran has never been a feudalistic society and therefore its transformation into capitalism did not require the emergence of a national bourgeoisie, as is the case according to Marxian theory of social development. It then presents an historical analysis of Iranian society from the nineteenth century, the beginning of the expansion of Iran's contact with Western countries, to 1941, the time of occupation of Iran by the same Western powers (the Allied). The goal is to analyze and explain the channels and mechanisms used by Western countries to penetrate Iran and the factors responsible for Iran's dependency.

Is Iran a Specific Case?

A review of the literature on the history of socio-economic development of Iran reveals that there are at least four interpretations of the history of this society, therefore some
familiarity with these seems necessary for understanding the history of Iran's scientific-technological dependency.

The first interpretation is that of Soviet historians of Iran who have divided its historical development into four stages: primitive communes, slavery, feudalism, and bourgeoisie. According to these historians, from the Median to the Sassanid, the society was in the stage of slavery. The stage of feudalism, beginning in the Sassanid time, has been subdivided into "underdeveloped feudalism" in the times of the Caliphs which brought about the state lands; "nomadic feudalism" the Mongol invasion period; "centralized feudalism" for the period of the Safavids, with the creation of a highly centralized state system, until the nineteenth century when the feudalism was supposed to have been disintegrated by the penetration of colonial powers; and the final stage "national and dependent bourgeoisie" beginning in the twentieth century (Ashraf, 1970; Ivanov, 1952).

The approach of the Soviet historians has been criticized for distorting the course of the historical development of Iran due to preconceived theoretical commitments and lack of evidence to verify their unilinear theory of history of Iran (Ashraf, 1970).

The second interpretation has been presented by those using Marx's concept of "Asiatic mode of production" whose characteristic, among others, is its resistance to change of any kind and the absence of internal contradictions to undermine it. Marx claimed that the absence of private property, particularly private ownership of land
in Asiatic society was the basic cause of social stagnation. Periodic changes in the political organization of Asiatic society from dynastic struggles to military conquest had not brought about radical changes in economic organization, because ownership of the land and organization of agricultural activities remained with the state as the real landlord. The static nature of Asiatic society also depended on the coherence of the ancient village community which, by combining agriculture and handicrafts, was economically self-sufficient. These communities were, for geographical and climatic reasons, dependent on a kind of irrigation system which required a centralized administrative apparatus to coordinate and develop large scale hydraulic works (Bailey and Llobera, 1981; Krader, 1975; Hindes and Hirst, 1975).

One of the off-shoots of this interpretation is that of Wittfogel (1957), who on the basis of the Asiatic mode, and Max Weber's ideal type of Oriental patrimonialism, developed a theory of Oriental despotism, focusing on the vital role of the water supply in the arid region of the Orient. His basic concept was that of the existence of a centralized and extensive functional bureaucracy which he generalized from Chinese history. Wittfogel emphasized the totality of state power and analyzed the major characteristics of the Asiatic society as a major historical societal type.4

Wittfogel's explanation of the emergence of this societal type (hydraulic society) in terms of geographical factors (aridity) has been criticized as being weak, especially in terms of the charge of

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
geographic determinism, which is considered as being too simple, too mechanistic, and too exclusive to be accepted in its entirety (Bailey and Llobera, 1981).

The third interpretation, which is close to the views of Soviet historians, claims that the socio-economic system of the East, more or less, resembles that of the feudal west (Herzfeld, 1976).

The fourth interpretation, in contrast to the third one, stresses the differences between the feudal system and Iranian socio-economic institutions. This interpretation considers the differences between the urban structures of Iran and the West, the expansion of trade and the growth of a money economy, the Western bureaucracy and the bureaucratic nature of land tenure in Iranian society, or a combination of these. This view is close to the analyses of Marx, Weber and Wittfogel.

Some writers have preferred a synthesis of the Marx-Engles' concept of the Asiatic mode of production, Weber's ideal type of Oriental patrimonialism, and Wittfogel's concept of Oriental despotism to show the historical specificity of Iranian society. For these writers the major characteristics of Iranian society had been a trichotomous structure of urban, rural and tribal communities, whose interactions had important consequences for each individual community and for the society as a whole. The relationship among these three elements has been a conflict between the urban and tribal communities, with continuous subordination of one by the other, and a
subordination and exploitation of the rural communities by the urban and/or tribal communities.

The establishment of centralized patrimonialism in the cities have always been followed by the rise of capital cities, the expansion of trade and industry, security of commercial routes, huge public works such as construction of roads and irrigation networks, the development of patrimonial bureaucratic capitalism and the expansion of state lands, and above all by the superimposition of the patrimonial bureaucratic machinery over the real economic structure of urban, rural and tribal communities from the towns, the princely camps of the patrimonial chiefs and his staff. The ideology of centralized patrimonialism has always been expounded by the strong shahs and their patrimonial staff who constituted an important stratus in the machinery of patrimonial domination and who had an idealized view of the central authority. These well established bureaucratic elements have been instrumental for continuity, stability and order of the traditional political system of Iran for centuries. (Ashraf, 1971:10)

The insecurity and precariousness of the landholdings in Islamic Iran, constant redistribution of land, changes in the proportion of different types of landholding, due to the short life of various dynasties, the absence of the landholders on the land, the concentration of the landlords, money economy, and commercial activities, in the cities, on the one hand prevented the emergence of a stable land aristocracy, and on the other, strengthened the position of patrimonial authority vis-a-vis the landholders.

Others have attempted to systematically compare the main features of Iranian society with the basic characteristics of a feudal system to show whether or not Iran has had a feudal system over her long history. One of those who convincingly argues against the existence of feudal system in the history of Iran is Katouzian (1981). Here is a brief presentation of his argument:
1. There has not been a slave economy which, because of internal and/or external forces, gave way to a feudal society.

2. What has been accounted for proof of the presence of feudal relations of production, that is, the obligation of Iranian peasants to pass on the surplus of production, in the form of dues, taxes and so forth, to some agent of exploitation: the state, the overlord, and the tax-former, is not evidence for the existence of any form of serfdom or bondage in Iranian history.

3. There existed no memorial system, and the overlord was characteristically based in the urban centers.

4. The class structure was not so rigid to prohibit social mobility. Because the laws of inheritance, both before and after Islam, the concentration of private wealth, and the perpetuation of social station, were inhibited. Besides, people's fortunes, of whatever form, could be easily confiscated or usurped by public authorities or "private" persons.

5. There was no relationship of lasting (i.e. constitutional) contractual rights and obligations between the various classes, and between the state and the people. Clearly, there were functions which, if the state systematically failed to perform them, would eventually lead to its downfall. Yet, precisely for this reason, these functions were not fulfilled in accordance with any contractual (or constitutional) obligations: they were carried out in order to maintain the state itself in power. It is one thing to pay a person for his services, and quite another to pay him off for his support or complicity.

The important point, here, is that the lives and possessions of people, regardless of their positions in the hierarchy of class structure, were vulnerable to the will of one single arbiter at the top. This situation has been manifested as conflict and antagonism between the people as a whole and the state, corresponding to European class conflict. And since the king had always resided in cities, economic and political power was concentrated in the urban sector, contrary to the European feudal system.

As a result, domestic, and (especially) international trade was quite extensive, and "towns" and "cities"
(although these terms have certain socio-historical connotations which make them imperfect equivalents for their Persian counterparts) were comparatively numerous and populated. There was a large merchant community in each "town", communally organized and concentrated around the main "bazaar"...

6. Religious organization before or after Islam neither had a hierarchy as rigid as the Roman Catholic Church in feudal Europe, nor a comparable role and significance.

7. The nature of property ownership is perhaps the most salient difference between the system of Persian despotism and feudalism in Europe. The following features characterize the nature of property ownership in Iran:

a. The direct state ownership of land was always quite extensive;

b. Unarable and uncultivated land were all state property, at least in principle;

c. Some arable land was assigned by the state to individuals, mostly members of the royal household and state functionaries. There were neither contractual security of title to ownership, nor automatic right of bequest;

d. There were scattered smallholdings held by local cultivators; but even in their case there was no security ownership;

e. There were both public and private endowments in land. The former enjoying greater security—were a source of income and scholarship grants for religious dignitaries and colleges; the latter were a source of income for the descendants of the rich—landlords as well as merchants. Neither was nearly as inviolable as private ownership in Europe, let alone European endowments. (Katouzian, 1981:Passim)

These characteristics of the history of Iranian society lead us to conclude that Iran has not been a feudal society. What follows is that the "main" force behind Iran's socio-economic transformations
(at least until the nineteenth century) has not been the Iranian bourgeoisie, but other factors, both external and internal.

**External Factors**

A. In her course of history, Iran has always been an open society and either has been conquered and subjected to aliens or has conquered other territories;

B. Since trade with China through the "silk-road", Iran has been actively involved in international trading.

There are numerous examples of the impact of such violent and peaceful contact with foreign people on basic structural changes, both technological and institutional, in Iranian history (these issues will be discussed in greater detail later).

**Internal Factors**

A. Up to the first renaissance of the seventeenth century, Iran had witnessed the rise and fall of science-technology (in some periods the most prestigious teaching/learning centers in the world were in Iran), the growth of urbanization and public welfare at all levels;

B. Despite the absence of favorable circumstances for the accumulation of capital, financial capital was accumulated, although there was no private accumulation of physical capital. Among the elements of this unfavorable circumstance are: (1) absence of right to title or security income of the Iranian "landlord", either land assignee, tax-farmer, or endowment beneficiary, and merchant (there was, of course, differences between landlord capital and merchant capital, for the latter it was earned, rather than granted by privilege, and it could be more easily realized in monetary form); (2) absence of considerable saving due to lack of security and certainty concerning future, and immediate consumption or distribution of wealth in response to inheritance laws which under both pre-Islamic and post-Islamic urban practice of polygamy would result in a small amount of capital in a number of hands.
Overall, under such condition of the absence of a legal code of conduct, that is, as mentioned before, the arbitrary nature of power at all levels, obviously there were no security and predictability in any sector or level of society (personal, political, financial or economic) to allow saving, investment and the growth of physical capital.

On the basis of our comparison between the features of Iranian society and characteristics of societies that have been delineated in the analytical models described in the beginning of this section, we could argue that the system of Iranian society corresponds more thoroughly with the Asiatic mode of production, or Oriental despotism. "The distinctive characteristics of the Iranian case is that the state monopolized not just power, but arbitrary power, the power of exercising lawlessness....Iranian society has been run by functional despotism for two and a half millennia."  

This brief discussion of the formation of Iranian society through history provides a necessary background for understanding the pace of socio-economic transformations in the later period, that is, the nineteenth century. This is the time of a number of changes in almost all aspects of social life, including: increasing population, increasing contact with European countries, trade expansion and the resulting unanticipated consequences such as price inflation and a decline in the domestic and external values of the national currency, the trade deficit, the changes in the patterns of consumption, values, norms, ideas and social institutions, and more importantly
the internal power structure. And, above all this, are several military defeats leading to the loss of a number of cities, trade concessions to foreign countries and people, ultimately culminating in the Persian Revolution (1905–1909).

Iran in the Nineteenth Century

The concern in this section is not a detail account of changes, but rather a general overview with particular attention to penetration of MIC which resulted in the scientific-technological dependency of Iran and its consequent negative effects on the social structure of that country.

There are two conflicting views on the situation of Iran in the nineteenth century. One regards this period as a clear example of backwardness in contrast to European progress, while the other contends there were dynamic forces at work which led to the breakdown of the old system, the emergence of a dependent "bourgeois" class, and relative economic progress. No doubt some changes were occurring in different spheres of Iran's socio-economic arena, but these were far from those occurring in Europe, namely, the accumulation of capital, the invention or adoption of new techniques, the growth of productivity, the expansion of productive industry, the greater integration of the productive sectors of the economy, the emergence of a proletariat, considerable improvement in health and educational systems, political reform and so on.
In what follows, an overview of general conditions of Iran in the nineteenth century is presented to give a clear picture of the internal factors that were involved in stagnation and transformation of the society.

**General Overview**

**1800-1900**

**Economy.** The economy was centrally controlled, with a relatively small bureaucratic apparatus radiating from the center to the provinces, taking as much as 20 percent of the government's revenues. The main sources of the government's revenues consisted mainly of the land tax, the poll tax, the tax on the profit of master craftsmen, and customs duties. The largest share was that of land tax. Other sources were somewhat irregular such as sales of trade concessions to foreigners, direct foreign loans and sales of public offices.

The rate of land tax was not the same for all parts of the country. It ranged from 5 to 20 percent depending on the productivity of land and the quality of the agricultural produce. The effect of such a practice was the reduction of positive incentives towards greater regional productivity. Putting regular taxes and irregular extortions together, according to Curzon (1892) the tax rate around the 1880s was about 25 percent, increasing to around 35 to 40 percent for the rest of the century. In addition to these direct taxes and extortions, people were subject to invisible
taxes.\textsuperscript{23} One of the methods for such taxes was debasement, a standard method, in pre-industrial economies, for an arbitrary expansion of the money supply.\textsuperscript{24} This method would enable governments to spend more and this tended to push up the price of domestic goods (assuming a situation with a given aggregate supply of goods and services, and a stable velocity of circulation).\textsuperscript{25}

The balance-of-trade deficit, the debasement and other external factors such as the fall in international price of silver after 1870 (itself being influenced by the appreciation of silver in terms of gold following the discovery of gold in North America and Australia between 1848 and 1867) resulted in the fall of the external value of Iranian currency by 410 percent, an average annual rate of 3.6 percent, which was a fairly high rate for a backward economy.\textsuperscript{26} This situation was partially responsible for substantial growth of Iran's foreign trade. The other factor responsible for such high growth of foreign trade throughout the century, a twelvefold increase according to Issawi, was mainly the growth of European demand for primary products, and the pressure of European powers (both directly and through imposition of preferential tariff rates) to sell their manufactured products, as it has been the case for the majority of LICs.\textsuperscript{27} This altered both the volume and composition of Iran's exports and imports with negative consequences for the national economy.
Curzon (1892) writes that in Yazd:

Silk weaving was formerly the chief local industry, the mulberry being cultivated in great abundance in the neighborhood; and as many as 1,800 factories, employing some 9,000 hands, were in the middle of the present century engaged in the business. This has, however, declined, and its place has been taken...by the cultivation of the poppy, 2,000 chests of opium extracted from which are now said to leave Yazd annually. (Curzon, 1892:211-212)

He also writes that Isfahan, which was famous in manufactured materials, became the consumer of "manufactured cotton goods, almost wholly from Manchester and Glasgow." And "of the exports whose value and bulk are both greatly inferior to the imports, the principals are: opium, tobacco, cotton, almonds and rice" (Curzon, 1892:41).

Table 5 shows the imports, exports and the balance of trade for different periods of the nineteenth century. It is clear that by the end of that century the gap between imports and exports had been widening.

Table 5

<table>
<thead>
<tr>
<th></th>
<th>1830-57</th>
<th>1857-68</th>
<th>1868-85</th>
<th>1885-1900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imports Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Per Annum</td>
<td>1.8</td>
<td>-1.5</td>
<td>5.2</td>
<td>0.47</td>
</tr>
<tr>
<td>Exports Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Per Annum</td>
<td></td>
<td></td>
<td>3.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Deficit Total</td>
<td></td>
<td></td>
<td>-134.0</td>
<td>-14.5</td>
</tr>
<tr>
<td>Average Per Annum</td>
<td></td>
<td></td>
<td>-7.9</td>
<td>-0.96</td>
</tr>
</tbody>
</table>

The changes in the composition of foreign trade were even more substantial. Not only did the production and export of cash crops rise at the expense of other products, but there was also a noticeable shift between the export of processed and primary products. Table 6 is a representation of the composition of foreign trade.

Table 6
The Composition of Foreign Trade: Percentage Distribution by Various Categories

<table>
<thead>
<tr>
<th></th>
<th>1850s</th>
<th>1880s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton Cloth</td>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td>Woolen and Silk Cloth</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Total Cloth Imports</td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>Tea</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Sugar</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Metal Goods</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Paraffin</td>
<td>--</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Exports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silk and Products</td>
<td>38</td>
<td>18</td>
</tr>
<tr>
<td>Cotton and Woolen Cotton</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>Total Cloth Exports</td>
<td>61</td>
<td>19</td>
</tr>
<tr>
<td>Cereals</td>
<td>10</td>
<td>16b</td>
</tr>
<tr>
<td>Fruits</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Tobacco</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Raw Cotton</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Opium</td>
<td>--</td>
<td>26</td>
</tr>
<tr>
<td>Total Primary Exports</td>
<td>19</td>
<td>60</td>
</tr>
<tr>
<td>Carpets</td>
<td>--</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

* This should include raw silk.

Mainly rice.

In his interpretation of Table 6, Katouzian (1981) writes:

It can hardly be a coincidence that the contribution of this sector [cotton and woolen products] to total exports should have declined from 23 to a mere 1 percent, while at the same time the share of raw cotton in the same total had increased from 1 to 7 percent....this change in the pattern of exports took place over a period for the best part of which the international terms of trade were turning against primary and in favour of finished products. (Katouzian, 1981:40)

And on the impact of these changes in the composition of foreign trade on overall economic condition of the country he argues that:

To pay, so far as possible, for this substitution of foreign for domestic goods, there had to be a very substantial increase in the production of cash crops, chiefly opium but also rice: (which is even now locally regarded as a luxury food product), cotton, tobacco, and so on. This, in a period of doubtful productivity growth, institutional rigidity, and lack of technical progress, should have meant a decline—and very probably an absolute decline—in the production of staple food for domestic consumption. And, given that the population was increasing...we have another clue to high inflation rates, perennial food shortages, and the growth of abject poverty. No wonder that by the end of the century Iran had become dependent on the importation of sizable quantities of food products in the hope of maintaining internal equilibrium. (Katouzian, 1981:40-41)

What all this meant for the state of technology in the country was that for several reasons mentioned before--loss of territory, and with it loss of resources (both physical and human) that diminished both productive capacity and internal market, and reduced political power of the country, which in turn resulted in the preferential tariff treaties, itself leading to a weak economy--the native industry could not compete with cheap machine-made products. The practice of dumping which was possible for large foreign traders,
because of local tax immunities and low customs duties, led to a loss of manufactured exports,\textsuperscript{29} and gradually to the loss of a self-developed know-how that had been developed over the centuries.

This trend was not confined to the destruction of the traditional manufactories, the various attempts of a few merchants to establish new factories failed mainly because of the marketing intervention of the colonial powers to maintain their own market. There are numerous examples of such failed attempts. According to Jamalzadeh (1951) 30 major factories which were installed in the later nineteenth century were closed due partially to the intervention and competition of the foreign companies. For instance, he cites a modern sugar-cane factory which was installed in 1899 by a merchant (Amin al-Dawle), whose products were of better quality than Russian sugar, finally went bankrupt as a result of Russian dumping practices.\textsuperscript{30}

As a result of these failed attempts, the decay of national manufactories, and the growth of trade, a great number of native merchants became middlemen for foreign firms. These firms opened up their offices, or appointed representatives, in the major commercial cities. Curzon (1892) reports that six large British firms were active in the British zone of influence.

Also a good deal of trade is done by native merchants; but the bulk of mercantile transactions passed through the hands of what may indisputably be described as English firms, whose activity here is in pleasing contrast with the apathy that has been displayed in other parts of Central Asia. (Curzon, 1892:41)
The social consequences of such economic conditions were profound. In the following section these consequences and the general condition of society are presented.

**Society.** As a consequence of such economic conditions, the majority of the merchants became agents of Russian and British commercial firms and thus dependent on them. The close cooperation of these merchants with foreign firms provided a fertile situation for introduction and flow of European-made products which weakened the social and economic positions of the traditional merchants and artisans, and lowered the quality of their products. These events also affected the peasantry, although to a lesser degree.31 This class was affected in at least three ways: (1) becoming accustomed to a few items of imported manufacture; (2) the cottage industries in some rural communities, particularly carpet weaving became exposed to the international market and capitalist relationships; therefore the peasants in those communities became wage laborers. The foreign firms benefited greatly by putting their offices under the management of the native agents; (3) lastly, the highly profitable business of the production and export of poppy and cotton by the British and Russian capitalists also introduced capitalist relationships in several rural regions of the country.32

The major overall effect that created an apparently long-lasting vicious circle (or loop of dependency) was the dependency of different social classes, in one way or another, upon European
commodities. The expansion of trade affected their consumption behavior and lifestyle of these people and created new demands.33

The disintegration of the economy, the social class differences, the weakness of government and the arbitrary power of despot reached its climax at the end of the century, when the government went into bankruptcy due to the Shah's trips to Europe and other abuses of the treasury by people around him or his relatives.34 Consequently, foreign loans increased and almost all the customs houses of the country went under the control of the colonial powers.35

Among the reforms which were implemented in the mid-nineteenth century and relevant to the theme of this study are: (1) the establishment of fifteen factories to supply the newly revived army and to cut foreign imports, such as, factories for the production of cannons, light arms, uniforms, epaulets and insignias, woolens, cloths, calicoes, carriages, samovars, paper, cast iron, lead, copper, and sugar; (2) the establishment of the country's first secular high school, the Dar al-Fonun (House of Knowledge). The Dar al-Fonun offered its students, who were mostly sons of the aristocracy, classes in foreign languages, political science, engineering, agriculture, mineralogy, medicine, veterinary medicine, military sciences, and band music; and (3) the establishment of the country's first official newspaper, the Ruznameh-i Vaqa-yi Ittifaqiye (Newspaper of Current Affairs).

Among reforms in the last quarter of the nineteenth century few are noteworthy: (1) Catholic and Protestant missionaries were
allowed to open schools, medical clinics, and printing presses in a few northwestern cities and Tehran, (2) forty of the first graduates of the Dar al-Fonun were sent to France for further study, and (3) the establishment of two military colleges, two official journals— one for military matters and one for scientific subjects—a translation school, and a new government printing office. This printing office, together with the Dar al-Fonun and the older printing office, published only 160 titles. They included 88 military textbooks, language manuals and medical handbooks; 4 biographies of famous Muslim leaders; 10 travelogues of the West; 10 translations of European classics; 10 histories of Iran— thus Iranians began to see their own past through the eyes of contemporary Europeans— and finally over 20 translations of European works on Western history. The Shah commissioned many of these translations to glorify the monarchy; but the same translations, by inadvertently drawing contrasts for Iranian readers between their Shahs and the most famous kings of Europe, between the poverty of Iran and the prosperity of Europe, tended to weaken the Qajar monarchy (Abrahamian, 1982:passim).

In 1891, the last scene of a century of tragic crises began with a public rebellion against a concession granting a monopoly of the tobacco trade to a foreign company (Tobacco-Regie) under the leadership of religious leaders. It was this revolt that, for the first time, compelled the Shah to bow to popular opinion and withdraw the concession, marking a momentous achievement. In 1896, the Shah
(Nasir-al-Din) was assassinated by a devout Muslim. This act, which was the climax of a widespread urban rebellion, ended the tragic drama of that century. When the curtain dropped, the country was in a climate of agony of hope and waiting for the resources to convert these crises into opportunities.

Iran in the Twentieth Century

In this section we continue our attempt to give a general overview of the socio-economic and political conditions in Iran that were conducive to the greater penetration of MICs. Briefly the magnitude of the impact of international events (the First and Second World War), and the changes of the policies of imperialism (colonialism to neo-colonialism) on Iranian society are delineated. This will be accompanied by emphasis on the effects of such happenings on the scientific-technological dependency of Iran.

The Mashruteh Revolution, 1905-1909

The preceding arguments reflect the presence of an objective/subjective condition, necessary and sufficient, for a revolutionary upheaval. The increase in the volume of foreign trade led to greater concentration and centralization of commercial capital. The big Iranian merchants benefited from the growth of foreign trade, and increased their fortunes, a factor that directly increased their potential political power. There were other factors involved in strengthening the political position of merchants.
and weakening state, these include: (a) the foreign imposition of commercial treaties which were perceived by people, particularly merchants, as the relative weakness of the state in relation to the colonial powers. (b) Some of the necessary arrangements in proposing and concluding such treaties—like illicit payments to the Shah and high officials, intensification of bureaucratic rivalries, nepotism and favorism, and so forth—tended to dismantle the despotic structure and its bureaucratic apparatus from within. (c) Finally, the greater specialization in the production and export of raw materials, the relative decline of traditional manufacturing, the use of modern means of communication, such as the telegraph, the high rate of inflation (which, in the case of food products, was almost invariably blamed on speculation by merchants), the crippling deficit in foreign payments and the resulting accumulation of foreign debts. It is safe to argue that the Anglo-Russian rivalry weakened the Iranian state without replacing it by direct colonial rule, as colonial powers has done in other countries.38

With the expansion of contacts between Iranians and Europeans, Iranians became familiar with the European standard of living, and its economic, political, educational and judicial systems. They learned that in an alternative system, private property could be safe and powerful, political power could be shared, official posts could be less insecure, and life and property could be better protected against arbitrary decisions. Some intelligentsia thought all of
these elements of a better way of life as being exclusively the result of constitutional forms of government.\(^{39}\)

The main objective of the Mashruṭeh revolution was, thus, the establishment of a constrained or qualified monarchy.\(^{40}\) It meant the abolition of "the rule of force" and its replacement with a government legitimized by popular consent. And this was possible through a system of government in which the widespread absolute and arbitrary exercise of power would be impossible. The executives would be appointed, and their activities checked and balanced by elected representatives of the people. The judiciary would be an independent body guided by civil and criminal codes of justice.

The revolution was triggered by, not so unusually, an incident in 1905, and was followed by a series of street demonstrations, mosque meetings, political leaflets and proclamations, and "sit-ins" in sanctuaries.\(^{41}\) These were met with the resistance of the ruling bureaucrats and led to some violence and bloodshed. By the spread of the movement to provinces, attitudes hardened, and revolutionary demands were extended to no less than a constitutional government. The revolution achieved its goal, when a constitution was hastily drafted and received royal assent shortly before the Shah's death. The relative ease of the initial success of the revolution was partly due to the personal weakness of the Shah, and partly due to the British government's active support for the revolution through their diplomatic legation in Tehran and other cities.\(^{42}\)
The attempts of the newly established Shah (the son of dead Shah) as the new (constitutional) monarch, to undo the achievements of the revolution, although bloody and serious, did not succeed. In 1907, a secret agreement between Britain and Russia set up two (British and Russian) spheres of influence, divided by an Iranian buffer zone. Because of this, Britain withdrew her support for the revolution, and Russia her backing for the Shah. Although the Shah led a military coup against the constitutional government and bombarded the National Assembly, arrested, murdered, or forced the revolutionary leaders into hiding, in the end the Shah was also forced to abdicate and go into exile. His young son was put in his place under the supervision of a regent.

If it is true that the nature and purpose of a revolution is identified both by its aims and its agents, then the social classes which were represented among the leadership, rank and file, and sympathizers of the revolution should be identified. The participants came from all walks of urban life except for the military-bureaucratic establishment. The peasantry were neither specifically represented in the objectives of the revolution nor autonomously took part in it. On the occasions when a peasant group took part in the struggles they were almost always mobilized and led by their own landlords. Merchants, landlords, lower administrative ranks, intellectuals, and theological scholars all took part in the revolution, with the single unifying aim of destroying despotism and replacing it by a constitutional government. It was a revolution
that was fought against traditional despotism for political, social and economic reasons, by all the classes and individuals who hoped to gain from its results.47

After the Revolution, 1909-1919

This was a period of unsystematic and chaotic upheavals brought about by domestic conflict and foreign interference.48 The population grew slowly from about 9 to 11 million with an almost unchanging distribution—of about 85 and 15 percent, respectively—between rural and urban communities. The balance of payments remained in chronic deficit throughout, and foreign debts went on accumulating. Iran exported oil and industrial raw materials (mainly to Britain), and traditional manufactured products, notably carpets (primarily to Russia).49 She imported between 80 and 90 percent of her imports from Russia and Britain.50 There were no significant changes in the economic structure. About 90 percent of the country's labour force was involved in agricultural production and rural handicrafts; the remaining 10 percent in commerce, state and other services, and urban manufacturing.51 Accumulation of physical capital was very limited, and most of the investment in new plant and equipment was in domestic (as opposed to imported) capital goods, using traditional techniques of production. Expansion in roads, communications, health and other infrastructural facilities was insignificant. Investment in modern secondary education advanced, somewhat more rapidly than did investment in the other basic
Although the government was unable to meet its financial obligations and redeem its debts, about 50 percent of government expenditures was allocated to the army and other security forces.\footnote{53}

The discovery, production and export of petroleum, in the period 1900-18 has become a dominating factor in the political economy of the country ever since. In 1900, a concession was granted to a British citizen (William D'Arcy) for £200,000 (paid in 1903) for the exploration and subsequent production of oil—covering the whole of Iran except the Russian zone of influence—until 1960.\footnote{54} The resulting activities began to bear full fruit in 1903, when the Anglo-Persian Oil Company was set up, 51 percent of whose shares were quickly acquired by the British government.\footnote{55} All major decisions concerning the rate of output, pricing, marketing, refining, and so on were left to the discretion of the company, against which it agreed to pay the Iranian government 16 percent of its annual net profits. Between 1912 and 1919, on average, Iran's share amounted to £250,000 per year.\footnote{56} Although a small amount, it provided the government a source for domestic expenditure and foreign exchange.

Foreign intervention and lack of effective leadership had created a state of social, economic, and psychological insecurity and political disorder. One example of such disorderly situation, which also shows how foreigners became involved in laying down the foundation of a dependent society, is the appointment of an American financial adviser (Morgan Shuster) in 1910 to modernize (Westernize, or Americanize) Iranian public finance.\footnote{57} Shuster's mission was
abruptly terminated in 1911, when a Russian ultimatum for his dismissal obliged the government to comply, in spite of an unyielding resistance by the National Assembly.

Neo-Colonialism: Pahlavi Dynasty Begins

When the First World War ended (1918), Iran was in a situation of national disunity, political conflict, economic disruption, poverty, social insecurity, hopelessness and was saddled with a corrupted and incompetent bureaucracy. The tribal and regional forces had established their own order—with the support of imperial powers—fighting for more territory and power. The British troops were present in different parts of the country, a sign of lost sovereignty and independence for Iran. Accompanying this situation was the radical transformation of the geopolitics of the Middle East, as a result of the October Revolution.58

To safeguard its regional interests in the wake of the new regime in Russia, the British government was anxious to stabilize the Iranian political economy. In 1919 the British government initiated a bilateral treaty of technical assistance and economic cooperation. The result was the 1919 agreement.59

The main points of the agreement were the provision of a loan by Britain to Iran, and the employment, by the Iranian government, of British military and civil technical advisers to help reorganize Iran's army and state administration. The agreement was rejected overwhelmingly by the Iranian political public with emotional (and,
occasionally, physical) violence, for the suspected 1919 agreement would be used by the British as a vehicle for colonizing Iran directly, or at least, for increasing their hold over it.  

The 1921 Coup d' Elat

The period 1921-26 was a period of intense struggle for political power between competing political visions. It began with the coup d'etat of February 1921, when a professional "Cossack" brigade led by Reza Khan, who, later founded the Pahlavi dynasty, occupied the capital almost without bloodshed, declared martial law, and appointed a journalist to the office of Prime Minister. In retrospect, it is clear that the coup was intended as the alternative route to the achievement of the spirit of the 1919 Agreement—that is, a political stabilization in Iran which would not pose a threat to the main local regional interests of the British Empire. It is equally clear that Britain was somehow involved in the conception of the Coup, although it is improbable that the British Foreign Office itself conceived the idea. However, within a month the new prime minister declared the 1919 Agreement—which he himself had previously supported in his journal—as canceled. Three months after the coup this prime minister "inexplicably" resigned from his position.

By the end of 1923, five more cabinets, led by elite politicians of varying tendencies, had come to power and gone. At this time Reza Khan, the de facto permanent Minister of War, became prime minister. In this period he rapidly consolidated his position in various
fields. He tightened his command over the expanding professional army and gained popularity among both officers and the others. He personally commanded the troops which finally routed an upheaval in the northern part of the country. He began to put down tribal and regional rebellions, highway robbery and brigandage. He established non-committal contacts with the political elite, posing as an honest broker who was above conventional political intrigue and petty rivalry. He gathered around himself younger men of the civil service and the professions—many of them with modern, Western-style, educational backgrounds—who made up the emerging techno-bureaucratic elite of the country. And finally, he managed to win over the majority of the deputies of the parliament. Overall, in a short and decisive period he dug in deep roots, while the political elite—contemptuous of "the illiterate former private soldier"—were engaged in their conventional competition.

How Reza Khan Became Reza Shah

The illegal activities of the police and the gendarmerie, both of which the War Office had quietly brought under its own command, were increasing daily; and it was becoming less and less possible to indulge in free (and sometimes licentious) political activity and journalism, which had been generally—but not always—possible since the First World War. Besides the annual budgetary increases in the allocation for the army, there were illicit financial appropriations by the Ministry of War. Some parliamentary deputies complained
against this situation. Nevertheless, the parliament elected Reza Khan to the premiership in October, 1923. Soon, he overthrew and arrested a number of tribal chiefs—who had been enjoying British protection—hence enhancing his stature, among his supporters and bystanders, and throwing his opposition into confusion or silent admiration; he bought off a number of politicians and journalists from the opposite camps, frightened some into inaction, and won over many others.65

Early in 1924, the parliament received telegrams from all over the country for the establishment of a republic.66 Demonstrations and meetings were held, leaflets distributed, and speeches were delivered proclaiming the virtues of a republican system. A protracted and bloody battle was fought around the parliament. Reza Khan came under attack for his order to the Assembly guards to use force in dispersing the crowds. Reza Khan resigned his office. The provincial army commanders began to send threatening letters to the parliament. A delegation of deputies brought Reza Khan back to Tehran.67

In mid-October 1925, a simple motion—signed by a number of deputies, including some who until recently had been in opposition—demanding the abolition of the last dynasty (Qajar) and the temporary transfer of the royal title to the prime minister was tabled in the parliament.68
The Economy

After the war the devastated Iranian economy gradually began to recover and, to some extent, reintegrate. The growing extension of effective central authority, from 1921, at least made the roads and tracks more passable and less exposed to brigandage; thus reducing costs of transport and risks to trade. The growth and stabilization of oil revenues provided a boost to the economy by increasing home demand and by relieving the balance of payments. The greater sense of economic security and expectations of better prospects were encouraging to traders and small investors. The state expenditure on some infrastructural and industrial (mainly mining) projects was helpful both to immediate recovery and greater expectations. The budgetary and fiscal reorganization helped reduce public debt and, more significantly, put the government accounts in much better order. None of this, however, implies a glaring economic improvement, much less economic development. It merely indicated gradual recovery from the previous state of total economic and financial, as well as socio-political chaos.

The Role of Petroleum

It is from this period onward that petroleum production and revenues become a key factor in the Iranian history. By maintaining Iran as a country of vital interest to transnational oil companies as well as to Western governments, it had been provoking their systematic intervention in the domestic affairs of the country.
It has tied the home demand, the level of state expenditure, and the balance of payments to the variations in the price and quantity of oil exports, which, until the early 1970s, have been out of the control of the domestic political arena. It has increased (and sometimes decreased) the economic and political power of the state, which has been responsible for the receipt and the disbursement of oil revenues. Petroleum production created an autonomous economic sector, alienated from the rest of the political economy, by combining minimal employment opportunities with a highly disproportionate financial return. It has provided an invisible (and, productively, unearned) source of imports, consumption and general welfare—mainly for the privileged urban population, hence creating a gulf between real effort and actual earnings that gave rise to further expectations on the part of both the already privileged and the aspiring classes of the urban population. Oil production made it technically easier to achieve economic "progress", "industrialization" or "modernization", but socio-politically oil production and its progress made it more difficult and even detrimental to the Iranian economy—its productivity, cohesion, stability, integrity and survival—as a whole. It took over fifty years, including many years of interruptions, reversal and euphoria, for the full effects of the ahistorical and asocial agencies of oil production and revenues to shed their skins. It created an export enclave par excellence. All the activities—from discovery to
export—were run by foreigners and foreign science-technology, and thus it grew faster than any other economic category.

Table 7 shows that the Iranians were paid between a minimum of 5.05 percent and a maximum of 10.42 percent of the value of the exports of their own oil, from 1919 to 1926 (Column 4). The story of oil and foreign intervention does not end here. When in 1921, and 1922, the Iranian government decided to grant concessions for oil exploration and exploitation in northwest of Iran to two American companies—Standard Oil Company, and Sinclair Consolidated Oil Corporation—the Soviet Union strongly protested against the decision, on the grounds that according to the Iran-Soviet agreement of February 1921, the Soviet Union had canceled all concessions granted to Tarist Russia and Russians on the condition that these concessions would not be transferred to the government or citizens of another country. These included the North Iranian Oil Concession, which had previously been granted to a Russian; therefore, the "transfer" of this concession to an American company would violate the terms of the Iran-Soviet Agreement. Both decisions were canceled; one because the Soviet Union's threat that it would deny transit facilities for export, and the other because the southern Anglo-Persian Oil Company quickly had entered into an agreement with the Standard Oil Company for joint exploitation and the British government had acquired a majority shareholding, and this was unacceptable to the Iranian government, parliament, who would never grant such a concession to a British company.
Table 7

Oil Revenues, Oil Export

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil Revenues (h m.)</th>
<th>Value of Oil Exports (h m.)</th>
<th>Oil Revenues as % of Oil-Exports Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>0.47</td>
<td>7.24</td>
<td>6.49</td>
</tr>
<tr>
<td>1920</td>
<td>0.59*</td>
<td>6.88</td>
<td>5.57</td>
</tr>
<tr>
<td>1921</td>
<td>0.59</td>
<td>6.54</td>
<td>9.02</td>
</tr>
<tr>
<td>1922</td>
<td>0.53</td>
<td>7.73</td>
<td>6.85</td>
</tr>
<tr>
<td>1923</td>
<td>0.41</td>
<td>8.11</td>
<td>5.05</td>
</tr>
<tr>
<td>1924</td>
<td>0.83</td>
<td>12.30</td>
<td>6.75</td>
</tr>
<tr>
<td>1925</td>
<td>1.05</td>
<td>12.53</td>
<td>8.10</td>
</tr>
<tr>
<td>1926</td>
<td>1.40</td>
<td>13.43</td>
<td>10.42</td>
</tr>
</tbody>
</table>

* Excludes the lump-sum payment of L 1 million in lieu of outstanding accounts.


The Situation of Non-Oil-Economic Sectors

Based on indirect evidence, agricultural production was still largely divided between cash crops (cotton, opium, tobacco and dried fruits), which were mainly exported; and food crops (wheat, barley, rice, fruits, etc.) for domestic consumption. The main items of agricultural imports were tea and sugar, otherwise the country was generally self-sufficient in food. Table 8 shows that in the period of 1918-26 non-oil export began to recover in volume and value, an
indication of the moderate increase in agricultural output. It follows that agricultural recovery and growing oil receipts have improved the balance of trade and have turned the years of deficit into a surplus.

Table 8

Non-Oil Exports and the Balance of Trade, 1918–26

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Non-Oil Exports (million rials)</th>
<th>Balance of Trade, Including Oil Exports (million rials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918</td>
<td>115</td>
<td>-205</td>
</tr>
<tr>
<td>1919</td>
<td>187</td>
<td>-262</td>
</tr>
<tr>
<td>1920</td>
<td>137</td>
<td>-111</td>
</tr>
<tr>
<td>1921</td>
<td>179</td>
<td>-108</td>
</tr>
<tr>
<td>1922</td>
<td>305</td>
<td>115</td>
</tr>
<tr>
<td>1923</td>
<td>385</td>
<td>87</td>
</tr>
<tr>
<td>1924</td>
<td>485</td>
<td>207</td>
</tr>
<tr>
<td>1925</td>
<td>515</td>
<td>178</td>
</tr>
<tr>
<td>1976</td>
<td>450</td>
<td>324</td>
</tr>
</tbody>
</table>


The developments in manufacturing and non-oil mining took place in the "private" sector, and was, therefore, oriented towards local consumer demand. It consisted of small traditional plants and workshops employing unskilled and artisan labour in the production of such goods as soap, glass, textiles, and cements which were the government's monopoly in the 1920s and 1930s. Those larger plants in the production of sugar, matches, textiles and similar products that had been set up by foreign investors and sometimes the state, based on foreign experts' advice and technologies, had mainly failed.
Carpets, still a village-based industry, were the major part of manufacturing exports. The wage-labour production, that is, production by labour employed on monetary wage-contract (one element of modern factory production) began when some rural industries such as soap manufacture and some textile and footwear production moved to towns. Non-oil mining was limited to salt and coal and entirely financed by the state.79

Demonstration Effects: Further Dependency

It was argued, in Chapter II, that one of the most common symptoms of emulative modernization (Westernization, industrialization) is the demonstration effects. This is the main characteristic of the relative economic reforms—if they are looked upon from the surface—in the Pahlavi dynasty which created further dependency. What follows is a very brief account of the situation.80

With a rapid increase in the state's power, the military and administrative apparatus grew and became more centralized. That is, the Pahlavi state began by extending, modernizing and centralizing the army and the bureaucracy. To complement such a policy, major investments were concurrently made in roads, railway, telecommunications, higher education, and so forth.81 To revive the glory of the ancient imperial Persia—a dominant aspirational idea of the time—a similar military—bureaucratic network was created. The country was divided into a number of provinces, and a system of dual military and civil governorship for each province established, in
order to both divide labour and to provide a check on the activities of each governor by the other. Some measures were taken to modernize the civil, financial and judicial services through enactment of certain significant bills.\(^82\) The Ministry of Justice was reorganized by a group of French legal and judicial experts who had been employed for this purpose, and an office for the registration of urban and rural property was established. Although a good idea in itself, the formal property registration soon became a powerful means whereby some state property, especially uncultivated and semi-urban land, and a lot of rural small holdings were usurped and registered by the powerful.\(^83\)

The promotion of higher education received the greatest attention, among the important items of social legislation, in this period. In 1925, the first group of sixty students was sent to Europe—especially France, Belgium and Germany—to study a variety of subjects. In 1928, the Parliament appropriated funds for sending one hundred students every year.\(^84\) Later many other students were financed by their parents and by private companies, and sent to other places such as Beirut (American University) and Istanbul (Robert College). An interesting point to note is that no one was sent to Britain by the state (perhaps as part of a trend with some political significance, since in the whole of the Reza Sha period no British expert or company was employed to assist in the realization of state projects).\(^85\)
Sending students abroad continued as part of a teacher training program to satisfy the demands of the rapidly increasing state and private secondary schools, and later the newly (1934) established University of Tehran.86 Between the years 1928–1933 more than 6,400 went to Europe. By the beginning of WWII, 400 of the state supported students had returned to Iran. Some estimates put the total number (public and private) at more than 1,500. As a whole, these students seemed to have formed the nucleus of an elite group with enormous power and influence in the affairs of the country. This is certainly a good example of demonstration effect, that is, the establishment of a university in a country where over 90 percent of the population were illiterate, in order to take pride in the growing number of modern Iranian doctors, engineers, and so on. No doubt, Western science-technology was thought of as a panacea, and was adopted uncritically.

Banking and Financing

Another step in emulative modernization, in this period, was the establishment of a national Iranian bank—a national-revivalist dream—with the help of a German “expert” who was later to stand trial on charges of corruption87 The monopoly of issuing notes, hitherto enjoyed by the British-owned Imperial Bank of Persia, was transferred to the new bank, the National Bank of Iran. Later, a few other banks were established to replace an old and well developed Iranian institution, Sarafan (the Iranian counterparts to the old
European goldsmiths) to grant credit to Iranian merchants. In contrast to the traditional institution in which there existed mutual trust and security in transactions between the two sides, the new state bank had little expertise in banking affairs and was alien to both the bureaucrats who had seen it necessary and the people whom they were supposed to serve.88

The main source of state revenue was oil receipts, making up about one-third of total government expenditure.89 The other sources of income for the Treasury were customs revenues, other indirect taxes and income tax. The indirect taxes, which were invisible to the masses of the people made up a large part of the revenue.90

As Table 9 shows, the pattern of state expenditure was consistent with its policies of extension, centralization and modernization of the military-bureaucratic network. This network—Departments of War, Finance and the Interior—received over 70 percent of the allocations, with the Ministry of War alone spending over 40 percent of the total budget. There were other sources of income, such as state property, that illicitly financed military expenditure.91 Among all departments industry and agriculture were at the bottom of the priorities, with posts and telecommunications, education, and justice, in between. Among possible reasons for such uneven allocation is the fact that investment in industry and agriculture not only requires the existence of an extensive administrative apparatus and planning, but also it takes a longer time for the results of investment in these areas to appear and more
difficult to be demonstrated than those investments in education, posts and telecommunication.

Table 9
Budgetary Allocations, 1928-1933
(Percentage Share of the Total)

<table>
<thead>
<tr>
<th>Department</th>
<th>1928</th>
<th>1929</th>
<th>1930</th>
<th>1931</th>
<th>1932</th>
<th>1933</th>
<th>Average 1928-33</th>
</tr>
</thead>
<tbody>
<tr>
<td>War</td>
<td>40.4</td>
<td>40.3</td>
<td>41.6</td>
<td>47.9</td>
<td>38.6</td>
<td>42.2</td>
<td>41.8</td>
</tr>
<tr>
<td>Finance</td>
<td>22.0</td>
<td>23.1</td>
<td>23.2</td>
<td>20.6</td>
<td>25.7</td>
<td>18.5</td>
<td>22.2</td>
</tr>
<tr>
<td>Interior</td>
<td>9.0</td>
<td>10.3</td>
<td>10.8</td>
<td>9.6</td>
<td>8.5</td>
<td>9.6</td>
<td>9.7</td>
</tr>
<tr>
<td>Posts and Telecommunications</td>
<td>8.0</td>
<td>8.0</td>
<td>5.7</td>
<td>5.1</td>
<td>5.0</td>
<td>5.1</td>
<td>6.2</td>
</tr>
<tr>
<td>Education</td>
<td>6.5</td>
<td>6.0</td>
<td>6.2</td>
<td>6.4</td>
<td>7.4</td>
<td>8.3</td>
<td>6.8</td>
</tr>
<tr>
<td>Justice</td>
<td>5.4</td>
<td>4.6</td>
<td>5.1</td>
<td>4.2</td>
<td>3.9</td>
<td>4.5</td>
<td>4.6</td>
</tr>
<tr>
<td>Imperial Court</td>
<td>4.3</td>
<td>3.7</td>
<td>3.4</td>
<td>3.2</td>
<td>2.7</td>
<td>2.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Foreign Affairs</td>
<td>3.3</td>
<td>3.1</td>
<td>3.4</td>
<td>2.4</td>
<td>3.7</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Industry, Trade and Transport</td>
<td>1.1</td>
<td>0.9</td>
<td>0.3</td>
<td>0.3</td>
<td>4.1</td>
<td>5.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Agriculture</td>
<td>—</td>
<td>—</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>


The Trans-Iranian Railway

One of the major infrastructural investments of this period was the construction of the Trans-Iranian Railway, running from a port in
the Caspian Sea, through Tehran, the west and the southwest, to a city near the Persian Gulf (Ahvaz)—a distance of about 1,400 kilometers. Construction began in 1927, and ended in 1934. It was constructed by American, Swedish and German firms in different stages (again no British firm was involved) and financed mainly by a special tax on the consumption of tea and sugar—two indispensable and complementary items in the daily diet of the poor—and bank loans and state grants. It came to be called the "Victory Bridge" when the allied forces used it to supply support to the Soviet front during WWII. A cement mill was erected by the government in the southern part of Tehran to supply a good portion of the cement required for the construction of the railway system. The project has been criticized for ignoring the more suitable alternative route at that time, a route across the northcentral regions (it would have been cheaper to construct and maintain, for geophysical reasons, it would have reduced domestic and international transport costs across the country; and the higher freight and passenger demand would have led to greater capacity utilization). In addition to this project, the state made relatively considerable investment in building, extending or renovating roads; around 13,000 kilometers of new roads were constructed, connecting cities and towns.

Other Reforms

A coordinating center was formed to integrate investment decisions in different areas. However, it appears that there was a
lack of communication among responsible authorities. For example, in the middle of the 1930s the government's Department of Industries was concluding an agreement with the German firms of Dema-Krupp for a steel mill installation in the northwest of Tehran. The Department of Finance, which was to underwrite the venture had no prior knowledge of this agreement (Ebtehaj, n.d.).

One of the reforms with a broad social impact, during this period, was electrification.\textsuperscript{96} The introduction of electricity gained a meager reception in its inception, but its popularity gradually increased. It was followed by a massive migration from rural areas to the urban centers, more specifically by a concentration of population in the capital city, Tehran. Residency in Tehran was sought as a measure of status by itself. Living in the cities for the majority of migrated people was an indicator of higher social status, and usage of electricity was part of the higher status. Paying for the electricity was an extra burden on the budget of these migrated households. For those who did not have sufficient income to pay for electricity, usage of electricity meant search for more income. The demand for employment, therefore was increased. This increase in demand for employment in turn exacerbated the problem of unemployment.

Another notable reform in the Reza Shah's period was the educational reform. Between 1925 and 1941, the annual allocations for education increased in real terms by as much as twelvefold. In 1925, there had been no more than 55,960 students enrolled in 648
modern primary schools administered by state officials, private boards, religious communities, or foreign missionaries. By 1941, there were more than 287,245 students in 2,336 modern primary schools, almost all administered by the Ministry of Education. The number of students in 74 modern secondary schools in 1925 was 14,488. By 1941, 28,194 studied in 110 private and 241 state secondary schools modeled after the French lycée system. During the same period, the number of theology students in the traditional schools declined from 5,984 to 785. The number of students in the country's six institutions of higher secular learning, in 1925, was fewer than 600. They were enrolled in the colleges of Medicine, Agriculture, Teachers' Training, Law, Literature, and Political Science. In 1934, these six were consolidated to form Tehran University. In the late 1930s, five new colleges were added: of Dentistry, Pharmacology, Veterinary Medicine, Fine Arts, and Science and Technology. By 1941, there were over 3,300 students enrolled in the eleven colleges of Tehran University. Moreover, by 1941, ministries were training almost 3,200 employees in technical schools, and the Education Ministry was teaching 173,907 adults in evening literacy classes (Abrahamian, 1982:146-7).

The Role of Petroleum

As the state's expenditure on "modernizing" projects increased, the Iranian imports also increased, and oil revenues had to be increasingly relied upon to finance the consequent rise in foreign-
currency requirements. At the same time, there were inexplicable variations in the annual oil revenues paid by the Anglo-Persian Oil Company. Reza Shah was unhappy about the level and the volatility of the oil revenues, believing that Iran was receiving a raw deal, both by the terms of the original D'Arcy Concession, and within those terms, by arbitrary decisions of the Anglo-Persian Oil Company. Eventually, after the failure of the negotiations with the company:

Shah lost control of his nerves, stormed into the cabinet room, while the cabinet was in session, threw the oil file into the heater, and ordered his ministers "not to leave" until they had prepared the draft of the (unilateral) abrogation of the D'Arcy Concession. This was the typically rash behavior of a despot who was getting more and more used to imposing his own will in all situations. This time, however, he had overreached himself: in this case, the Shah's will could not be imposed absolutely, by his usual methods, if he still wanted to survive on his throne. The D'Arcy Concession was duly abrogated, but the Shah realized—and/or was made to realize—that he had to enter into a new agreement. The Iranians lost the initiative, and the 1933 Agreement [a new agreement] was concluded. This was inevitably hailed as a great triumph; but it was an abysmal failure. (Katouzian, 1981:118)

The new agreement was, indeed, a failure for the following reasons: (a) it included all the areas under exploitation, and most of the proven reserves; (b) it extended the concessionary period from twenty-seven to sixty years; and (c) it changed the basis of revenue payment from the previous 16 percent of the company's annual net profits to 4 shillings per barrel produced without assurance that this would be Iran's share over the concession period, although it ensured that changes in the market price, and/or the company's tax obligations to the British government could be used as reason for decline in the revenues paid to the Iranian government. 98

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
It is worth noting that two of the high officials involved in the negotiations of this agreement—the Finance Minister and the Minister of the Imperial Court—became the victims of the Shah's suspicious mentality of conspiracy. The former had to go into voluntary exile, and the latter was tried, convicted, imprisoned and subsequently murdered in prison. This is an indication of the fact that the Shah had gradually become the undisputed arbiter over the lives, freedoms, rights and properties of the Iranian people.

**Police State**

To maintain his power, the Shah organized and promoted his own police state. He first started by controlling parliament, through jailing and murdering a few of the outspoken, critical deputies, and by frightening into inaction the few remaining. Then, he destroyed anyone who, for real or imagined reasons, he regarded as a potential threat. He used various means to silence his opponents, ranging from baseless accusations to sending organized gangs of police assassins to raid his victim's house. Followers of different ideological persuasions were persecuted, imprisoned or driven into exile. In this process, the judiciary, one of the most important achievements of the revolution, was weakened and finally became part of the Shah's police state. His brutal treatments of friends and foes led the people around him, to tell him what he wanted to hear. And since he did not have independent access to data and information, he had no choice but to believe what he heard.
This state of affairs led to the disappointment of many students whom the new regime had proudly sent to European countries for higher education. They compared the material prosperity, openness, and political freedom of European societies with the poverty, closedness and the police state in Iran. Some of these students sympathized with European socialist movements, asking for modern science-technology and industry as well as freedom from repression and poverty. They managed to set up a few "party cells" to discuss theoretical issues, and publish a periodical. Early in 1937, fifty-three of them were arrested and tried for "rising against the system of constitutional monarchy, and adhering to the collectivist doctrine". They were subject of indignity, violence and torture, before and after their trial, and their senior member, Dr. Taqi Arani, a chemist with exceptional command of a few languages and with broad interdisciplinary knowledge, was killed in prison (Alavi, 1944).

More Roads, More Factories, Less Freedom, Less Equality

Under the described suffocating socio-political atmosphere, a number of modern mechanized factories, mainly in the production of sugar, cotton and silk products, building materials, glassworks, matches, leather products, and so on were established. All the machines were imported from Western countries, Germany having the higher share, and were, therefore, capital intensive. As a result, the increase in the industrial labour force was not as significant as
the general increase in the manufacturing capacity. While in 1941, the budgetary allocation to industry was nearly fifty times what it had been in 1934—with the result that the percentage share of industry and trade rose from 3.5 (in 1934) to 24.1 percent of the total budgetary allocations—the industrial work force, excluding the oil sector, was nearly three times what it had been ten years earlier.105 Although the initial expansion was in the "light" consumer industries, there was a tendency towards larger plants and heavy industry using imported technology. An agreement with Germany for the construction of a modern steel plant had already gone into effect. However, the deliveries were postponed, by intrusion of the war into Iran.106

Another railway project, aimed at linking the northwest to the northeast region of the country, through Tehran, was started, but it was not completed until the 1950s. Road building projects were continued. Education, by receiving an average percentage share of nearly 5 percent of the budget for the period of 1934–41, was given almost the same priority as before.107

These elements of "economic achievements" or "accomplishments" could be seen as signs of economic progress. But considering the fact that these "economic achievements" were not accompanied with greater socio-political freedom, and did not result in more equal distribution of their fruits among all social classes and strata, one could conclude that the attempts have not been successful, in other
words, there have been some problems with the policies. A small number of those problems could be summarized as follows.

1. In building roads, factories, schools and banks, national resources were wasted by being invested in projects which involved high costs and low returns. In an appropriate investment strategy, what matters is what the national economy gets from its investment in building a factory, not building for everyone to see, as a demonstration of modernization. This is what is called "demonstration effect".

2. Investment in education was concentrated in capital-intensive education which was socially unjust, economically wasteful, and technologically irrelevant.

3. The chief beneficiaries of such investments were the urban populations, more specifically, the more privileged people of Tehran, and a few other major cities, and among them merchants and traders (with persistent and comprehensive discrimination against the rural population). Not only was agriculture given very little assistance, but by acting as sole buyer and distributor for the main agricultural products, including wheat and barley—the main staple food of the poor—the state kept agricultural prices as low as possible, which turned the domestic terms of trade against the rural population.

4. Almost all welfare services, and especially health services, education, and public utilities were concentrated in Tehran and a few major cities, as it is the case, even today, although to a somewhat lesser extent.

The arbitrary and despotic power of the Shah was not confined to the public policy, but also extended to private lives of the people. The notable example of such violation of people's right is the mandatory change of clothing for both men and women. The order was for the sudden changes of traditional dress with European style. In 1936, the use of the Iranian "Chadur"—a long overdress covering the woman's head and body—and any form of headscarf or headdress, except for a European hat was forbidden. That day was marked as the
day of "liberation" or "emancipation" of Iranian women, to be celebrated in the years to come.\textsuperscript{112}

Those who dared to defy the order were victims of physical assault by policemen, who would pull the "Chadur" or the scarf, off their heads in public, and with loud abuse tear it into shreds.\textsuperscript{113} Whether as a part of passive resistance or the fear of the shameful ridicule in public, many aged women became "voluntary" prisoners in their own homes. The situation of men was not much different. They were forced to wear a newly designed hat (closely resembled the French military cap) called Pahlavi.\textsuperscript{114} A few years later, men were ordered to wear the currently fashionable hat in Europe and America. Likewise, the use of European three piece suits, already common in the higher social circles, was made compulsory for government employees. This later served as a status symbol and therefore its use spread among other social strata. Not surprisingly, any critical voices against such lawlessness were silenced. As a matter of fact, a public protest against the latest order led to a massacre, and hundreds of arrests in a major city northeast of Iran (Mashhad), and the provincial governor was publicly hanged for the alleged involvement in the uprising.\textsuperscript{115} It should be clear, now, how both external and internal factors have been actively involved in the process of evolution of distorted economic growth of Iran and what conditions led to Iran's scientific-technological dependency.
Summary

After a brief review of literature on the issue of specificity of Iranian society, it was argued that Iran has never been a feudalistic society. By comparing the characteristics of European feudalism with that of Iranian society, it was shown that among the relevant theories, the theory of "Asiatic mode of production" more clearly explains the conditions of Iranian society. Thus, in explaining the condition of the society in this chapter, emphasis was put on the arbitrariness of the despotic power rather than on the struggle of social classes.

A general overview of different aspects of Iranian society in the nineteenth century was presented to show what circumstances allowed an uneducated soldier (Reza Shah) to establish the Pahlavi dynasty with the instruction and help of foreign powers. With a relatively detailed account of the economy, polity, and general condition of society, it was demonstrated that the measures taken by the Reza Shah's government, under his direct order and arbitrary power, were not genuine efforts to improve general conditions of living, as had been claimed, but rather some sort of unplanned reform based on fragmentary and uncritical emulations of other countries' activities and other people's ideas. The imitated, limited reforms for construction of the infrastructure of society were not accompanied with more equal distribution of income and freedom for all. The major part of efforts of Reza Shah's period, which ended
with his forced abdication and exile by Britain in 1941, was a
typical "demonstration effect" which made Iran more dependent on
foreign countries.

Although educational reforms were the most impressive of the
civilian reforms, in terms of number of students and number of newly
established schools, the vast majority of graduates entered
government service to form a modern bureaucracy. However, by 1941,
over 90 percent of the rural population was illiterate. In the
economic arena, the railway projects were carried out with
insufficient study and planning and thus were too expensive. Modern
factories destroyed many handicraft workshops. In politics, by
transferring the agricultural tax from the landowners to peasants and
by abolishing the right of local communities to appoint village
guardians (kadkhudas) the main safeguard of the rural communities was
destroyed.

This chapter attempted to show how and why both external and
internal factors were involved in making a country dependent on other
countries (even though in some cases the internal factors are the
historical results of external factors). This effort to illustrate
the interaction between external and internal factors and to analyze
and explain the scientific-technological dependency of Iran will
continue in the next chapter while covers the reign of the second and
last Shah of the Pahlavi dynasty, from 1941 to 1977, the peak of the
social movement which led to the 1979 revolution.
CHAPTER VI

"VICTORY BRIDGE" LEADS TO MORE DEPENDENCY

A socio-historical analysis of the general conditions of Iran in the context of the international political economic system from the nineteenth century to 1941 (the time of the fall of the founder of the Pahlavi dynasty) was presented in Chapter V to explain why and how Iran became dependent on more industrialized countries.

This chapter covers the period between 1941 and 1977, a period of unique historical importance for Iranian people. Nineteen forty-one was the beginning of the occupation of Iran by allied powers, whose alliance later became an unholy one for Iran. This occupation provided an opportunity for allied powers to extend their influences in Iranian society for years to come. The presence of allied powers, however, was not always visible but was rather disguised under various masks. Nineteen seventy-seven was the beginning of the end of a revolutionary movement which was full of hope for ending the negative effects of dependency that had been intensifying since 1941.

In 1941, Reza Shah—who has been given such titles as the "Redeemer of Persia", and the "Architect of Modern Iran" by both foreign commentators and local supporters—abdicated and was taken aboard a British vessel to Mauritius, and later to Johannesburg (South Africa) where he died in 1944. The reason for his abdication was his support of Nazi-Germany, in the 1930s, when he relied more

252
and more on German technical advisers for his military and civilian projects, as Germany was becoming the most important exporter to Iran. In July 1940, Germany attacked the Soviet Union, and threatened to cut through the Caucasus oil fields on the northwestern border of Iran. The Allies warned Iran to curtail the activities of the German agents or they would make the necessary decision to stop the activities of those agents. The Allied forces entered Iran on 25 August 1941, and the crown prince, Muhammed Reza, became Shah.4

Reza Shah's departure was greeted by the public with euphoria.5 Political prisoners were freed; social meetings could be held openly; women could wear their traditional dress (Chadur); newspapers and books could be published without political censorship; those landlords and farmers whose properties had been usurped by the Shah, or people close to him, could file petitions to the courts and recover their assets; and those whose relatives had been murdered in prison could sue the official agents of injustice. However, the impact of the occupation was devastating. The details of this impact goes beyond the scope of this study. What follows is a brief account of the occupation on Iran.

The Allies needed food, tobacco, raw materials, and so forth. They forced the Iranian government to put the country's resources at their disposal.6 The monetary policy became the major means for the purpose. The Iranian currency was devalued by more than 100 percent, the money supply was expanded, and the credit to Russia and Britain

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
was extended. These policies, combined with trade speculation and a decline of the marketed agricultural surplus of peasants and landlords alike, led to a great scarcity of goods and to hunger and famine in towns.

In this period one witnesses a number of irregularities in both the political and economic system of Iran. In the political arena the following irregularities are noticeable. First, the rise and fall of political parties, more important of all (in terms of organization, ideological cohesiveness, and highly educated membership) the Tudeh party, which held three seats in the cabinet in 1946. Second, frequent changes of government. Third, the weakening of the state apparatus and power. Fourth, internal instability. In the economic system the following irregularities are noteworthy. First, the high inflation rates due to supply shortage (a direct result of the occupation). Second, speculative trading and official corruption. Third, the fall of state investment expenditure to negligible proportions. Fourth, high unemployment. Fifth, widespread poverty. Sixth, loss of confidence in paper money. Seventh, a great deal of hoarding and investment in unproductive durable assets, such as urban property. What kept the Iranian government from total collapse was the oil revenue, which made it possible for the state to meet many of its current obligations and pay for a large proportion of the country's imports.

The oil itself was the center of tension. First it was the issue of the North Iranian Oil Concession (see Chapter V) which
faced fierce opposition in parliament. However, the controversy over this issue brought up the question of the 1933 oil agreement, which the majority of the political public regarded as an unjust imposition. This and many social and psychological grievances of the workers in the southern oil fields (stemming from the comprehensive discrimination against them, in comparison with British workers in the fields) led to a great deal of industrial unrest. In the biggest of these unrests—the oil strike of 1946—the government ordered the troops to shoot at the rioting strikers. The workers in the oil industry were the most skilled and prosperous members of the industrial labour force and, after the departure of Reza Shah, had been able to organize and participate in industrial and political activities.

One of the most important events in this period which provided the Shah an occasion to show his determination in reacting to any challenge to his monarchy by force, was that of the uprising of the Democratic Party of Azarbijan (a province in the northwest of Iran and border with the Soviet Union) for autonomy. In December 1945, the party, in a short and bloodless move, managed to disarm the army division stationed in the province. The party was dependent on Soviet support, and Soviet troops were still occupying both the province and the access areas (for this reason the central government was not able to send troops to that province). But, when the agreement of March, 1946, granted the Soviet Union a fifty-year concession for north Iranian oil, involving the establishment of a
joint-stock company, with 51 percent Soviet and 49 percent Iranian shares (becoming 50-50 after the first twenty-five years), they guaranteed the immediate withdrawal of their troops. The central government troops, under the command of Muhammad Reza Shah, reoccupied the provincial cities, by indiscriminate killings, burnings, lootings and rapes. Since then, December 10th has been a public holiday known as "the day of the Iranian army" or "the day of the liberation of Azarbajan". To firm up his power, the Shah in 1949, succeeded in having a bill passed through the parliament which transferred his father's unlawfully acquired properties to himself, in the guise of a foundation under his own guardianship. However, the real challenge to the Shah's power came two years later, 1951, when the bill to nationalize oil was passed by the Iranian parliament.

Nationalization of Oil

After the assassination of the Prime Minister in 1951 (General Razmara, the army chief was appointed to this position in 1950) the nationalization of Iranian oil followed immediately amid public joy and euphoria. The Nationalization Bill was passed through both houses of the Iranian Parliament under the leadership of Musaddiq—the leader of the opposition and the chairman of the National Assembly's Oil Committee. Musaddiq, later, drafted a new bill for the implementation of the Nationalization Act, which would replace Anglo-Iranian Oil Company by a National Iranian Oil Company. The
dispute between the care-taker government of the time and Musaddiq over Anglo-American formula resulted in resignation of the former and the premiership of Musaddiq (the Musaddiq's government has been known as the first national government of Iran). Britain reacted to the Iranian government's move to implement the Nationalization Act—conditioning the export of oil on the submission of receipt to the Iranian authorities by the tankers for their loads—by withdrawing the oil tankers and replacing them with a battleship. That is, Britain blocked the export of Iranian oil.

In July 1951, Britain took her case to the International Court. The court decided in favour of the AIOC. The Iranian government rejected the decision. After weeks of discussion and U.S. government mediation, the Iranian government signed an agreement (a) to sell any amount of oil to Britain; (b) to enter a twenty-five year contract to guarantee such sales; (c) to let the British provide the means of transport for themselves and other customers; (d) to re-employ the British technical and managerial staff, other than directors and chief administrators; and (e) to pay full compensation for nationalized British property.

In September, 1951, the Iranian army occupied the Abadan Oil Refinery, and the British were asked to leave. Britain took the case to the UN Security Council. The Council resolved that the question of the International Court's jurisdiction in the case must be determined by the court itself. Musaddiq, who was leading the Iranian delegation, extended his trip in order to explain the Iranian
position to the U.S. government. It was almost a year after these attempts that a U.S. backed coup d'etat toppled Musaddiq's government and made the U.S. the dominant imperial power in Iran until the fall of the Shah in 1979. By looking at the combination of a series of events that happened in that year, one may wonder how decisive and determinant some historical moments are in the history of a nation, and how the international political-economic system influences the direction of the evolution of socio-economic and political situation of a small and dependent country. As we see in the following paragraphs, these events are both internal and external.

The U.S. government turned down an Iranian application for financial aid, because the Iranian government had rejected the World Bank's proposal. The World Bank, playing the role of an intermediary, had suggested that Iran should agree to resume oil operations and exports, on the condition that the bulk of the output were disposed of by the Bank, which would hold the proceeds until a final settlement was reached between Iran and Britain. When discussion revolved around borrowing of funds from foreign sources, the public became apprehensive. Iranians had had a bitter experience with foreign loans which in the past had been a powerful instrument for undermining the independence and sovereignty of the country. The U.S. refusal to grant financial aid to Iran was announced at the time when Iran was in a desperate economic situation. The export of oil was blocked by British vessels, and the Iranian government's attempt at issuing $25 million worth of special bonds, described as "Popular
Debt was failed. The Soviet government refused to repay its wartime debts to Iran. At the same time Musaddiq had to postpone part of the parliamentary election (the Seventeenth Majlis) indefinitely because of illegalities of the opposition—the alliance between the Shah's supporters and the conservatives. The British Embassy was asked to close down their consulates in major provincial capitals for its role in becoming centers of anti-government campaigns. The British Charge d'affaires was recalled to London, after his compliance with Iranian demand.

In May, 1952, Musaddiq led a delegation to the Hague (Netherland) to defend the Iranian case before the International Court. Early in July, the new parliament reinstated him as prime minister, but ten days later he resigned because the Shah had refused to give up his conventional, but unconstitutional, active command of the armed forces. In response to the new prime minister's threat of arrest and execution of leaders of opposition groups, pro-Musaddiq deputies (who had staged a sit-in in the parliament) together with other supportive parties, called a general strike. A few hours after the strike, in which many lives were lost, the prime minister resigned. The news of Iran's success in the International Court—the Court had accepted Iran's argument that the Court had no jurisdiction in the Anglo-Iranian oil dispute—and the return of Musaddiq to office were received by the people almost simultaneously. In August, Iran broke her diplomatic relations with Britain, to be resumed in March, 1953.
In February, 1953, Musaddiq escaped a plot against him.\textsuperscript{32} The plot was put into operation, in a conspiracy involving the Shah, a group of conservative politicians and some religious leaders. The failure of the plot, however, had another desirable consequence for people. It forced the Shah to agree to return to the government the extensive rural property that had been usurped by his father, and put under the Shah's guardianship.\textsuperscript{33} In August, Musaddiq held a referendum to close the parliament and hold a fresh election, in order to neutralize the threat of a censure motion against the government for its unauthorized expansions of the paper money supply.\textsuperscript{34} By this move Musaddiq lost the support of the parliament, the only organ of the state that still backed him. This move also provided the conspirators—the Shah, the CIA, the Retired Officers' Association, and the conservative opposition—with a situation that was ripe for a coup d'etat.\textsuperscript{35}

The first attempt of the "coup d'etat", which began on the evening of the 15th of August 1953 by kidnapping a number of leading politicians, including the Foreign Minister, and holding them at the royal palace, failed.\textsuperscript{36} The Shah flew to Baghdad and later to Rome. In the midst of uncontrolled euphoria, chaos, confusion, and sense of insecurity, the fall-back plan, which the conspirators had designed in case of the failure of their first attempt, was put into operation. By the evening of that day, Musaddiq had been carried to safety by a few close friends (his home had been captured and
looted), and the new government had declared martial law, and imposed a public curfew starting from 8 p.m. that night.37

An extensive analysis of these events, the role of political parties, social classes, the errors of the leaders of the movement, and direct foreign intervention is beyond the purpose of this study. Here, the intention was to show how the various events interacted with each other in a short period of two years to change the direction of a democratic movement. This was a period of great historical importance for Iranian people. By this coup, the road of total submission and dependency of Iran on the U.S. (replacing Britain and Russia) was paved.37 Was there, in these crises any space/time for the development of the Iranian indigenous science-technology?

**After the Coup**

**Concentration of Power**

There are different views on the nature of the regime after the coup, from 1953 to 1960, when it faced an economic and political crisis. The view that the Shah, being assured of the continuation of the U.S. support, gradually increased his power, specifically when in 1955, he dismissed the coup's prime minister—an army general who was instrumental in the success of the coup—and established a conservative-authoritarian regime, is more convincing.38 The power began, through the years, to become concentrated in the hands of the Shah, who later appeared as a dictator. The concentration of the
power evolved from extensive political persecutions, arrests, and jailing of the prominent members of the opposition groups following the coup.

The Shah did not tolerate opposition, even peaceful demonstrations. In December, 1953, a peaceful demonstration by a few hundred participants on the campus of the Tehran University, which was under army occupation, was met by indiscriminate firing. Three students were shot dead. Since then, the day has been unofficially observed as University day. Later, the Tudeh party's powerful military network—consisting of 600 well educated and able officers—was accidentally discovered. All were arrested and put on trial. Some were executed, others were given long prison terms, and a few defected to the regime, and became members of the Savak, the brutal secret police, when it was formally instituted in 1955, by CIA advisers.

The consequent relative stability of the Shah's regime, could be attributed to the politics of the Cold War—the U.S. strategy to encircle the Soviet Union, the usefulness of the Shah to both superpowers, and the success of the Savak in brutally and systematically suffocating any critical voice. There were, of course, numerous significant events in the neighboring countries, such as the 1958 coup d'état in Iraq, and so-called "white coup" in Pakistan. The importance of these happenings was reflected in the death of the Baghdad Pact—founded in 1955, with the membership of Turkey, Iraq, Iran, Britain and the U.S. to prevent the changes of the current
friendly governments of the region--and its reincarnation in the Central Treaty Organization (or CENTO).45

**Economy**

It was indicated, in the previous sections, that during the war, the economy of Iran was dislocated by the needs and requirements of the Allies. The crises that followed left no room either for public investment or for economic normality. The only measures taken were the creation of an ad hoc "planning board" to produce a program of national priorities and objectives in response to the popular idea of systematic planning which had gained some momentum at the time.46 The "planning board", in 1946, was transformed to a position of high economic council. The first economic council had been initiated in 1937. In 1946, Iran approached the newly created International Bank for Reconstruction and Development with a request for a loan of $250 million.47 Upon the recommendation of the World Bank, the government of Iran invited a consulting firm, Morrison Knudsen, from the U.S., to work with the "planning board". Morrison Knudsen provided the government with three plans, each of different magnitude and each requiring different amounts of investment funds depending on financial availability.48 In 1948, final plans received final revisions and were presented to the parliament for approval. Then, a new consulting firm, Overseas Consultants Inc., which was composed of many technical and management firms in the U.S. was created and commissioned to take care of the technical and managerial problems.49
The plan, known as the First Plan, or the Seven Year Plan, allocated a quarter of the expenditure to agriculture, 32 percent to social welfare and postal and communications, and 24 percent to industrial and mining projects. The plan, however, remained on the paper, because 69 percent of the required funds were expected to come from oil revenues and World Bank loans, and 21 percent from domestic credit creation, none of which was materialized due to the Anglo-Iranian Oil dispute. It was only after the coup that the U.S. aid—coming at unprecedented levels and increasing rate—and the oil revenue were generally spent on consumption which brought the economy out of its acute depression.

Along with the U.S. aid, the influence of the U.S. was increasing rapidly. For Iranians, the "Americans were coming". Through "Four Points" and other U.S. technical assistance programs, a number of U.S. consulting engineer companies were invited (as part of the conditions of aid, as has been the case in other countries) to supervise construction activities. The engineering company Justin and Courtney of Philadelphia was invited as the consultant firm for construction of a dam in Golpaygan, and the Harza Consulting Engineering Company was brought in for planning assistance and Morrison Knudsen for construction of a dam on the Karadj River which ever since has been the main water source of Tehran.

In 1955, the ad hoc "planning board" was transformed into the "Plan Organization", responsible for the preparation and execution of the second plan. The second plan (1955-62) was formulized on the
basis of the prescription for "the economic development of the 'traditional' or 'backward' societies," recommended by the "modernization" theorists; that is, the dominant Western approach to economic development in the period (see Chapter II). Table 10, which summarizes the projected and actual expenditures of the plan, reflects the presence of the recommendations of that "perspective", namely, the priority to be given first, to the infrastructure, second agriculture, and then industry.

Table 10
The Second Plan (1955-62): Percentage of the Projected and Actual Expenditures

<table>
<thead>
<tr>
<th></th>
<th>Projected Expenditures</th>
<th>Actual Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>59.0</td>
<td>48.0</td>
</tr>
<tr>
<td>(Transport and  Telecommunications)</td>
<td>(33.0)</td>
<td>(35.0)</td>
</tr>
<tr>
<td>(Public Utilities and  Other Services)</td>
<td>(26.0)</td>
<td>(13.0)</td>
</tr>
<tr>
<td>Agriculture (including  dam construction)</td>
<td>26.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Industries and Mines</td>
<td>15.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Regional Programmes</td>
<td>--</td>
<td>14.0</td>
</tr>
<tr>
<td>Unanticipated Cost</td>
<td>--</td>
<td>8.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Sources: Review of the Second Seven Year Plan Program of Iran (Tehran: Plan Organization, 1960)
Table 10 shows only the proportion of expenditures. More important, however, is whether the investments were economical and wisely invested. Numerous studies show that "much of the investment in 'agriculture' was wasted in the construction of hydroelectric dams, none of which were completed in the plan period, or brought any benefit to agriculture when they were finished" (Katouzian, 1981:204). The poor planning and feasibility study were, perhaps the main reasons for the failure of these projects. The collection of sediment in some of these dams and soil erosion in others made them useless. The wasteful investment is evidenced in the other areas as well, and one more example will suffice to reveal another face of the demonstration effect. "...expenditures on transport and communications, apart from camouflaging expenditure on military logistics, included the extension of The Tehran-...-Mashad railway, which was a wasteful project intended mainly for travel services" (Katouzian, 1981:204).

It was argued earlier (Chapter II) that one avenue for the penetration of MICs into LICs and dependency of LICs on MICs is aid and investment. It is interesting to see the sources that financed the second plan's projected expenditures. Table 11 shows these sources. Tarshis (1976:389) writes, "foreign capital pumps vast natural wealth out of Iran, totaling in 1969-70 nearly one-fifth of the country's gross domestic product."
Table 11


<table>
<thead>
<tr>
<th></th>
<th>$million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Revenues</td>
<td>2129</td>
<td>62.5</td>
</tr>
<tr>
<td>Foreign Aid and Investment</td>
<td>1278</td>
<td>37.5</td>
</tr>
<tr>
<td>American Non-Military Grants &amp; Loan</td>
<td>681</td>
<td>20.0</td>
</tr>
<tr>
<td>American Military Grants (non-repayable)</td>
<td>469</td>
<td>13.8</td>
</tr>
<tr>
<td>British Aid</td>
<td>28</td>
<td>0.8</td>
</tr>
<tr>
<td>Foreign Investment (Until 1961)</td>
<td>100</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td>3407</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The picture of the economic situation of this period cannot be completed without some information about the balance of trade for the period. Table 12 provides such information. It reveals that Iran's traditional (non-oil) exports has declined, and the Iranian markets have been invaded by foreign goods (the formal policy in foreign trade in this period was "the open-door policy"). It was argued (Chapter II) that one avenue for the penetration of MICs into LICs and dependency of LICs on MICs is import of goods and services.
<table>
<thead>
<tr>
<th>Year</th>
<th>Oil Revenues</th>
<th>Non-Oil Exports</th>
<th>Imports of Goods</th>
<th>Balance Excluding Oil Revenues</th>
<th>Balance Including Oil Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>10</td>
<td>135</td>
<td>106</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>1955</td>
<td>88</td>
<td>106</td>
<td>143</td>
<td>-37</td>
<td>11</td>
</tr>
<tr>
<td>1956</td>
<td>146</td>
<td>104</td>
<td>346</td>
<td>-241</td>
<td>-95</td>
</tr>
<tr>
<td>1957</td>
<td>167</td>
<td>109</td>
<td>429</td>
<td>-320</td>
<td>-153</td>
</tr>
<tr>
<td>1958</td>
<td>291</td>
<td>104</td>
<td>610</td>
<td>-506</td>
<td>-215</td>
</tr>
<tr>
<td>1959</td>
<td>323</td>
<td>101</td>
<td>656</td>
<td>-555</td>
<td>-232</td>
</tr>
<tr>
<td>1960</td>
<td>364</td>
<td>110</td>
<td>693</td>
<td>-583</td>
<td>-219</td>
</tr>
<tr>
<td>1961</td>
<td>395</td>
<td>126</td>
<td>620</td>
<td>-494</td>
<td>-99</td>
</tr>
<tr>
<td>1962</td>
<td>443</td>
<td>113</td>
<td>551</td>
<td>-438</td>
<td>-5</td>
</tr>
</tbody>
</table>


Table 12 shows, that in the period of 1954-62, imports of goods grew very rapidly, export of non-oil goods declined and a growing balance-of-trade deficit developed. The table also shows the importance of oil in Iranian economy. The growth of balance-of-trade deficit means the need for foreign aid or loan (See Table 11).
Society

According to the "Modernization" perspective for a "traditional society to modernize, parallel to the investment in infrastructure, agriculture and industry, some social changes are necessary. The social changes should consist of the creation of an urban "middle class" as agents both of economic development and of liberal democracy. To this researcher the real intention, which would differ in different countries, was that these social changes serve some political purposes. The purpose was to create an educated and semi-educated urban community content enough to forestall serious political opposition. In the case of Iran the purpose was to generate an alternative power base to the landlords, who were economically independent and politically powerful (despite the fact that they were the Shah's ally); and both to encourage the U.S. government to continue her financial and military support, and to assure the U.S. that her financial and military aid-grant would go back to the U.S. for importing various consumer goods, necessary to satisfy the artificially created needs and wants of that urban "middle class" Western-style consumption pattern. To be consistent with the "demonstration effect", the creation and maintenance of this pattern of consumption necessitates the importation of durable consumer goods, such as refrigerators, motor-cars, ranges and so on. For the Shah, this was the way to show to the world how a "tradiotional", "backward" society could be transformed into a "modern", "developed" society.
According to the 1956 census, the population of Iran was 18.5 million. It had been growing since World War II, at an average annual rate of 2 percent. Seventy percent of the population was rural, and one-third of the remaining 30 percent was residing in Tehran. Tehran was (and still is) the political and economic capital of the country with modern attractions. The urban "middle class" enjoyed a significant rise in income and consumption at the expense of the peasantry. Speculation in land, particularly in urban land (and being commercial representatives of foreign firms) became the most lucrative method of making fast money, at the expense of ordinary home-buyers, tenants, and consumers.

By the spread of the Western lifestyle (regarded as a status symbol) from bourgeois compradors to the other social classes, another facet of the Western urban life, namely urban dualism and Western architecture, appeared in Iranian cities (first in Tehran and then major cities). The rich moved towards the northern part of cities, into new houses with Western (non-traditional) architecture, and the poor remained in the south. With the development of urban dualism, the sense of communal life which had always been present in Iranian cities, in spite of class differentiation, disappeared. As a result of this change, not only the ensured social contact between different classes (which had become possible in the old residential quarter that included families of all walks of life) was lost but also many old houses with large shaded gardens were leveled by property speculators, who built new little hovels in their place.
The impact of this loss of the sense of community on the future upheavals might be very difficult to measure, however, it should not be ignored.

Another point of importance, in this period, is the rise of unemployment and underemployment. As a consequence of the unplanned expansion of secondary (and in a smaller extent, in some areas of higher) education—part of "demonstration effect" strategy—a large number of school dropouts and graduates who (because of the inappropriate state strategy of investment could not be accommodated in productive activities) were jobless. The only avenue open to the state for alleviating this social headache, was the expansion of the military-bureaucratic network, which would serve two purposes: to increase both employment and state power. The size of this network was 200,000 in the army, and 260,000 in the state bureaucracy, a great number of whom were underemployed.

The cumulative effects of the aforementioned inappropriate strategies and tactics, that is, emulative modernization, in 1960, led to two years (1960-62) of economic depression, political instability, and a power struggle, out of which a new era of dependency started, to be ended by the toppling of the Shah's dictatorship. The new era of dependency began with the declaration of some intended reforms as principles of the "White Revolution". It was a hasty reaction to the crisis of the day. The next section is intended to show the circumstances that led to this revolution from the above and its consequences for the Shah and for Iran.
From White to Red: Shah's Revolution vs. People's Revolution

Politics

In the early 1960s, the inappropriate policies of government led to political and economic crises that reinforced people's demands for some drastic changes. The political crisis was a result of the government's intervention in the parliamentary election, which compelled the government to cancel the election before its completion in the summer of 1960. The economic crisis, namely, deficit in balance of payments, increasing unemployment, and a high rate of inflation, which was due to the failure of the "open door" policy, forced the Prime Minister, responsible for the policy, to resign. The political opposition groups saw the situation favorable for raising their concerns. One of the opposition groups (The National Front) had a popular power base, and the backing of the merchants, while the other—a group of politicians gathered around a veteran politician—had the support of the U.S. government. The opposition group called for a demonstration against governments policies. When the second round of parliamentary elections was being carried out, while 5000 students had staged a sit-in at the Tehran University under the leadership of one of the opposition groups (The National Front). These students were protesting the conduct of the election, which, in contrast to the Shah's earlier promise of a free election in a public speech, had the same old problems of favoritism,
government interference, and forgery. A day after, when the protest was called off by the opposition group, nearly all the leaders of the group were effectively imprisoned in the Senate building. Later the Teacher Union staged a strike over pay. The strike ended with the violent death of a teacher and a postgraduate student when a police colonel shot into the crowd of demonstrators outside the parliament.

The combination of these events, plus the victory of John Kennedy--whose administration had a general formula of reform, including a relative liberalization (giving some freedom of speech, freedom of press and freedom of association), land reform and industrialization, for friendly governments in LICs—compelled the Shah to choose one of the opposition groups. In April, 1961, the Shah chose the one with the U.S. support to replace the last seven-month-old cabinet. After reaching some agreements with the Shah, according to which he would dismiss the parliament in order to clear the way for the new prime minister's proposed land reform, the Shah would agree to a relative freedom of the press and other freedoms, including some restraints in the Savak activities, and would immediately leave the country for a visit to Europe. The new prime minister formed a cabinet of ministers coming from various opposition groups, plus some of the Shah's henchmen.

The new cabinet faced a chaotic situation because of the changes in the political atmosphere. The prime minister had proposed a comprehensive reform of the land-tenure system involving distribution.
of land among peasants in an election manifesto a year earlier, which had to be carried on. The economy was sliding further into depression, and the merchant community was in financial difficulty. A number of notorious financial racketeers and some publicly despised individuals were arrested. And most important of all, the parliament was dismissed, the Shah departed, and Tehran Airport was temporarily closed.\(^{73}\) There was a general sense of uncertainty about the future and dissatisfaction about the current affairs. There was a need for some fundamental changes to solve the country's problems because the people were impatient.

Within a few months the situation began to change, the prime minister resigned his office after fourteen months, and was put under surveillance by the Savak. This was followed by the Shah's attempt to respond to the prevalent sense of the need for the fundamental changes and also to secure the U.S. support for himself.\(^{74}\)

The Shah's remedy came on his prescription, "the White Revolution" or "the Revolution of the Shah and the People".\(^{75}\) The Shah had perceived himself as the spokesman of the people, and as the father of the family (viewing the country as a family, in a lesson in a text book in the elementary school).\(^{76}\)

**The "White Revolution" of the Shah**

The Revolution of the Shah\(^{77}\) (it was called the revolution of the Shah and the people by the Shah and his propaganda machine) was presented to the people in a program containing six principles:
1. distribution of arable land to the farmers;

2. nationalization of woods and forests;

3. electoral reform, including the granting to women of the right to vote, and to be elected to the parliament;

4. de-nationalization of state monopolies in order to finance the land-reform programme;

5. company profit-sharing for industrial workers;

6. creation of a "literacy corps" by sending high school graduated conscripts to "campaign against illiteracy in rural areas".78

These principles which were presented to the people, with no details, in January 1963, was put to a plebiscite entitled "The National Approval." According to the Shah's media, 90 percent of the entire electorate voted for it.79

The Shah's gain in presenting this program was manifold: It discredited the leadership of the opposition groups (which had previously pronounced the similar points of principle in their programs, more specifically land reform, and who presented him as a progressive leader to the outside world), in order both to nullify their propaganda against him (especially those of students abroad) and to pave the way for further assistance. The Shah eliminated the landlords, as a powerful social class, which resulted in the apolitical Iranian peasantry's rallying to his side. It seems, the Shah was satisfied with the aftermath of his program as a powerful manipulative tool, since over the next fifteen years he added a number of other "principles" to his list, such as the establishment of health corps, and the nationalization of pastures.80
The different social classes and groups saw the situation differently. The landlords realized that if they lost their lands and their dependents, they have lost their power; they knew the Shah did not like to share his power. The religious community started a massive campaign against the program, especially land reform, "women's rights" and the further concentration of the power in the Shah's hand. The opposition groups were accused by the Shah as being the puppets of foreign powers and called their movement a coalition of "red-black reaction" or "feudal conspiracy". On the 6th of June 1963, massive riots erupted all over the country under the leadership of religious leaders. It was an uprising whose participants were coming from all walks of life. The Shah ordered his troops to "shoot to kill". A three day massacre ended with a couple of thousand casualties (the official estimates were below ninety, as against unofficial estimates of 5,000 to 6,000).

After the Massacre of 1963

After the massacre, the opposition groups went underground. The parliamentary election took place under total state control. The deputies were hand-picked individuals, some of whom did not even have the minimum constitutionally required qualification to be elected. Others did not have any background in social or political activities and thus were unknown to the electorate, with the exception of a few well-known wrestlers, weight-lifters, comic actors and the like. They were selected by the state, regardless of their social class,
profession, political affiliation, and their ideology, only for their common characteristic, total support for the state. In fooling people, inside and outside the country, the Shah's propaganda machine presented this election as evidence for the "abolition of landlords" and the emergence of "political democracy". To strengthen this evidence, suddenly there came the news of the establishment of a new party called Modern Iran. It was also a time for finding a scapegoat and blaming others for the massacre and its aftermath crack-down of opposition. The best target was the widely-hated Savak, whose chief was driven out of the country and which was purged of all who had had any relation or connection with the chief.

A number of political events, between 1964 and 1966, provided the Shah with excuses to get rid of the opposition. The Savak was very powerful and active in tracing anyone suspected of having and/or propagating anti-regime ideology. All those political opposition leaders who were not ready to withdraw silently, were arrested, tried in military tribunal and imprisoned. There were many others who were crowded in prisons—with or without trial—including the rank and file of the parties, student activists, and the like.

Another event which led to the persecution of the opposition, was an unsuccessful attempt on the Shah's life by a young conscript in the Imperial Guard, who was killed during the attempt. Early in 1965, several oppositionist young men were arrested and charged with conspiracy to assassinate the Shah. No evidence was presented on the connection between the assassin and the arrested ones, who were
sentenced to serve from three years to life imprisonment. And yet another incident had greater political significance because of its impact on further revealing the nature (and intensity) of the Shah's total dependency on the U.S. In April 1965, the prime minister (who had been in office for only one year) was assassinated in front of the parliament. The act reflected the depth of the anger and frustration of the people against the submission of their sovereignty and national pride to an imperialist power. The parliament, under extreme pressure, had passed a bill (submitted by the prime minister under the Shah's order) to give American technical advisers immunity from trial by Iranian courts. The U.S. government had made the capitulation of Iranian jurisdiction in cases involving American nationals a condition for the further supply of technical advisers—because of a number of previous incidents involving American servicemen and other personnel in Iran.

The people's restlessness surfaced in mosques (the only place for social gatherings immune from the open invasion of the police), where leaflets were circulated, and denunciations were delivered from the pulpit. One of the speeches against the bill that later posed an enduring impact, was that of Ayatullah Khominei—who since the 1963 uprising had been confined and, later, put under close surveillance—He was immediately arrested and exiled to Turkey; and then was allowed to go to Iraq, to an Islamic holy city. Shortly after, the religious endowments began to be "administered" by the new prime minister, who remained in office for the next thirteen years. The
conventional opposition disappeared from the surface, and in 1966 opened the way to unconventional views and methods. There was less censorship and restriction in publication and circulation of some books like the classic Marxian texts, in foreign languages. Social gatherings for discussion and reading of well-known Iranian writers and poets was allowed, and was even shown on the state television. The criticism of the situation, and high officials, as far as they did not point to the Royal Family, from politically inactive intelligentsia were tolerated. Under this calm surface, however, there were groups of young opponents, some of whom were former supporters of the old opposition parties, spreading along a wide ideological spectrum from Marxism to the revolutionary interpretation of Shiism, and struggling against Shah's dictatorship. In their fighting, being independent or along other ideologically different groups, they were also refining their ideologies, sometimes by division, and other times by integration. Hence, the opposition was still active and had the support of the majority of the educated. Those opposing the Shah also had contact with the revolutionary and liberation movements of the other countries. Encouraged by the struggles of Vietnamese and Palestinians, some of the members of these groups joined the Palestine Liberation Organization, and while fighting side by side with them, learned to be urban guerillas. The Shah's terrifying and inhumanly brutal Savak with the help of CIA and Musad (Israel Secret Police) were active to arrest, torture, imprison, and put to death any opposition it could trace. It was...
widely known that the Shah had been chosen by his Western allies for policing the Persian Gulf area after the British withdrawal in 1968, and therefore had the support of the governments of those countries.\textsuperscript{103} With Nixon's agreement to sell the Shah as many weapons as he requested in 1972, with the Shah's support of the Oman government and his sending troops to crash the Oman liberation movement (Dafar), and with American's description of the Shah as the loyal ally and of Iran as the "island of stability", there had remained little doubt in the people's mind about the influence of foreign powers in the Shah's regime.\textsuperscript{104} Besides the dependency of Iran on the Western countries was apparent in all aspects of Iranian's life.\textsuperscript{105}

In the oil crisis of 1973, the Western press started to criticize the OPEC for increasing the price of oil.\textsuperscript{106} The Shah perceived and presented himself as the architect of OPEC's decision against the unjust trade between the OPEC countries and the Western oil companies and governments. He began to react to their criticisms by attacking Western civilization in general and pointing to the decadence of their democracy in particular. Shortly after, he invented the National Resurgence Party, and declared that the one-party state was the sign of integration and unity of all Iranians.\textsuperscript{107} Therefore, he told all those who held an Iranian birth certificate to join "the all-embracing party" and those who do not join would either remain silent, but "expect nothing from us", or get their passports and leave the country, for the country was not in need of

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
"traitors". There were books in the state offices for the employees to go in groups to sign. There were rumors that a stamp in the signer's birth certificate would make the signer eligible for travel abroad and some other activities. While some people signed the book and went on cursing the Shah and his invention, some did not sign, but put up with various degrees of harassment. The rumors on the fate of those who did not sign the assigned books were so frightening and harsh that the prime minister had to call them false on television. However, the party became another channel of nepotism, favorism and useless employment, bureaucratic self-advancement, corruption and waste.

At the time of the overnight invention of the National Resurgence Party, the Shah was very happy of his role in OPEC (which provided him with an opportunity to challenge the heads of the Western states) and his success in making peace with the Iraqis in March 1974, through the intervention of the Algiers president in an "Islamic" summit. By this peace he actually "plunged his knife into the back of the Iraqi kurdish guerrillas whom he was committed to support." He betrayed the kurdish guerrillas and their movement for autonomy as he had previously smashed the Iranian kurdish guerrillas.

As this brief historical analysis of the internal political events suggests, the Shah had made enough enemies in different social classes to precipitate his downfall. However, the main factor in the fall of the monarch was not internal political conflict and power.
struggle, it was rather a complex situation consisting of internal political condition and conditions of political economy of world system and its reflection on Iran's economic condition, specifically on oil. The reflection of the conditions of global political economy on Iran's social structure and the consequences of the dominant role of the oil industry on Iran's economy will be further explored in the next section. It should be emphasized that oil in Iran has become an export enclave as a result of dependency on Western science-technology. And this export enclave has a determining impact on the pattern of development, integrity, and homogeneity of Iran's economy, and the rest of the social structure, as was shown in Chapter V.

From the Rise of Oil to the Fall of the Shah

Economy: General Overview

1960-1963

During the political conflict and power struggles of 1960-1963, the economy of Iran was depressed. The dominant atmosphere of political uncertainty and poor economic prospects reduced domestic saving and investment. It was only as a result of the increase of oil revenues, due to the increase of exports, the U.S. aid, and the state monetary policies, that short-term relief became possible.112 Because of inflation and the balance-of-payments deficit the state had to impose import surcharges, tighten credit and reduce public
expenditure. These policies brought a number of bankruptcies and bank failures.\textsuperscript{113}

In the period of 1960-1962, the percentage annual average rate of growth of agriculture was 1.6, while of manufacturing and construction was 5.6.\textsuperscript{114} The reason for the poor performance of agriculture was that almost all the oil revenues and foreign loans were spent in the urban sector, and also because of the campaign for land reform. Iran had an economy based on agriculture, before it became export-enclave. The percentage annual average rate of growth of oil revenues was 10.0.\textsuperscript{115} However, the rate of growth of GNP per capita was 1.6, and of services was 0.8, partly due to the effect of the reduction of military-bureaucratic expenditures. The point of importance in this period is the attempt of a team of foreign consultants in drafting a comprehensive plan for the second seven-year plan covering the period 1962-67.\textsuperscript{116} The idea of seven-year and later five-year planning was a Western idea and therefore was meaningful only on the basis of particular assumptions that had little resemblance to the reality of a country such as Iran.\textsuperscript{117} A country in which the arbitrary power of one person (the Shah) is above any law or plan. For example, in that plan there was no reference to an imminent land reform. To this researcher it is more likely that the state was not serious about it and had it only as part of the "demonstration effect". At that time such comprehensive planning had become part of the package of "modernization."\textsuperscript{118} Stincomb (1983), in this regard, believes that five-year planning is
not suitable or appropriate for LICs because activities in these countries are not accomplished with the same speed as in the MICs, where the idea of five-year planning was originated. The validity of this assertion is apparent in the case of Iran, where the time-frame in the planning has almost always remained on paper.

1964-1978

From 1964, the oil revenues began to increase continuously, until late 1973 when it quadrupled. Since that time, the oil has become the fundamental axis of change, around which not only the economy of Iran, but the whole society has been rotating. As a matter of fact, the oil has become the most, or perhaps the only, viable source of energy for the rapid economic growth in Iran—a quantitative growth with disastrous quality. The devastating effects of the increase in oil revenues on the quality of social life in Iran is discussed later.

Table 13 provides a view of the changes in the contribution of various sectors of the economy to the gross national product over the three five-year plan periods.

The oil revenues figures show the importance of oil revenues in GNP (that is, the level of the national income). In 1963, they were a little more than 12 percent of GNP, but it increased at a high rate, rising to over a quarter of GNP in 1971-72, and suddenly exploded to over 50 percent in 1973. This may be taken as evidence of what we referred to earlier as uneven development.
## Table 13

**Sectoral Distribution of Gross National Product 1963-1978**  
**Selected Years (\textsuperscript{000} m.rial, Constant Prices)**

<table>
<thead>
<tr>
<th></th>
<th>1962-63</th>
<th>% of GNP</th>
<th>1967-68</th>
<th>% of GNP</th>
<th>1972-73</th>
<th>% of GNP</th>
<th>1977-78</th>
<th>% of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>% of GNP</td>
<td>Amount</td>
<td>% of GNP</td>
<td>Amount</td>
<td>% of GNP</td>
<td>Amount</td>
<td>% of GNP</td>
</tr>
<tr>
<td>1. Agriculture</td>
<td>88.8</td>
<td>27.4</td>
<td>111.1</td>
<td>21.6</td>
<td>271.0</td>
<td>10.3</td>
<td>339.0</td>
<td>9.2</td>
</tr>
<tr>
<td>2. Industry</td>
<td>57.8</td>
<td>17.8</td>
<td>106.3</td>
<td>20.7</td>
<td>333.0</td>
<td>12.6</td>
<td>684.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Manufacturing and Mines</td>
<td>(41.5) (12.8)</td>
<td></td>
<td>(72.5) (14.2)</td>
<td></td>
<td>(224.4) (8.5)</td>
<td></td>
<td>(468.2) (12.6)</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>(14.1) (4.3)</td>
<td></td>
<td>(24.9) (4.8)</td>
<td></td>
<td>(91.4) (3.5)</td>
<td></td>
<td>(179.5) (4.8)</td>
<td></td>
</tr>
<tr>
<td>Water and Power</td>
<td>(2.2) (0.7)</td>
<td></td>
<td>(8.9) (1.7)</td>
<td></td>
<td>(17.2) (0.6)</td>
<td></td>
<td>(36.6) (1.1)</td>
<td></td>
</tr>
<tr>
<td>3. Services</td>
<td>119.8</td>
<td>40.0</td>
<td>187.0</td>
<td>36.4</td>
<td>629.4</td>
<td>23.9</td>
<td>1281.3</td>
<td>39.6</td>
</tr>
<tr>
<td>State Services</td>
<td>(24.7) (7.6)</td>
<td></td>
<td>(48.6) (9.4)</td>
<td></td>
<td>(207.8) (7.9)</td>
<td></td>
<td>(402.3) (10.9)</td>
<td></td>
</tr>
<tr>
<td>4. Oil</td>
<td>40.0</td>
<td>12.3</td>
<td>92.4</td>
<td>18.0</td>
<td>1333.3</td>
<td>50.6</td>
<td>1284.9</td>
<td>34.7</td>
</tr>
<tr>
<td>5. GNP at Market Prices(^a)</td>
<td>324.2</td>
<td>—</td>
<td>513.8</td>
<td>—</td>
<td>2635.7</td>
<td>—</td>
<td>3702.4</td>
<td>—</td>
</tr>
</tbody>
</table>

\(^a\) This is not the exact sum of rows 1-4, because it includes indirect taxes, and non-oil net factor income from abroad.

However, the share of oil revenues in GNP fell to over 34 percent in 1978, still a noticeable percentage, over one-third.

The services sector has made up the largest proportion of GNP. This sector includes a number of heterogeneous activities, such as education, housing, banking and insurance. The major proportion of the banking, insurance and similar activities were related to the distribution of oil revenues over other sectors. However, the point is that there were a lot of wasteful and unnecessarily expensive projects in education and housing, which grew fast in the period. This is also the case for the high share of "state services." It grew from less than one-fifth of total service expenditure in 1963 to almost one-third of total service expenditure in 1978, that is, its total value was almost equal to the entire manufacturing output of the country in this period. If these expenditures had been made in activities that all social classes could have benefited, there would not have been any objection. But a large proportion of the expenditures were put in expensive luxury services such as hotels, holidays, ski resorts, modern educational medical services from which only a very small percentage of population benefited.

The share of "industry" has suddenly fallen to close to 13 percent in 1973, from 20.7 percent in the previous period (1967-68), and this was due to the sharp decrease in manufacturing and mining expenditures. The importance of this decrease in the figure for manufacturing and mining output becomes more clear if we consider the components of this figure before and after 1973. Before 1973, the
figure for manufacturing and mining output included outputs of motor-
car, steel production, non-oil minerals, and traditional handicrafts.

while after 1973, this figure also included the growing revenues from
the sale of gas to the Soviet Union. It is notable that the total
contribution of manufacturing and mining output to GNP in 1977-78 was
only slightly more than that of state services.

Agriculture's contribution to GNP has dropped from 27.4 percent
in 1962-63, to 9.2 percent in 1977-78, that is, from over one-fourth
to less than one-tenth. This was when the peasant population made up
53 percent of the total population, and the share of agriculture of
the total labour force was 32.2 percent, decreasing from 65 percent
and 55.1 percent respectively in 1962-63. Although these figures
show the decline of the central role of agriculture in the economy of
the country, they say nothing about the reasons and mechanisms of the
decline. The reasons and mechanisms are discussed later. For now it
suffices to compare the changes of labour force across the sectors.

It is interesting that the oil sector, while responsible for up to
one-third of the national income, employed only a negligible
proportion of (0.6 percent) the total labour force. 125

The formation of export enclave and the impact of it on the rest
of the social structure of a LIC was discussed in Chapter II and V.

It was argued that TNCs are more inclined to invest in the area of
mining and extracting because to them, politically it is a forceful
leverage in the international power struggle and economically it is
more profitable. It was also explained that TNCs more likely deploy
capital-intensive technology than labour-intensive one because, to
them it is more efficient and less troublesome (dispute with
labourers over wage), and because it would perpetuate the dependency
of the host country on their science-technology on the impact of
export enclave on the rest of the social structure. It was argued
that deployment of capital-intensive technology in export enclave
means greater rate of unemployment for the host country. The greater
rate of unemployment, on the other hand, means greater income
disparity between the employed and the unemployed. Greater income
disparity means greater inequality in access to goods and services.
And greater inequality in access to goods and services more likely
leads to class conflict over control of state power.

Here statistics indicate that the share of the oil sector, the
technologically most-advanced sector of economy, of the total labour
force is only 0.6 percent. Considering what has been said so far on
the history of development of the oil industry in Iran, and its
beneficiaries, the impact of the oil industry (an export enclave) on
the rest of the social structure of Iran becomes clear in the
following sections.
Table 14

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>3672</td>
<td>55.1</td>
<td>3861</td>
<td>49.0</td>
<td>3600</td>
<td>40.9</td>
<td>3200</td>
<td>32.2</td>
</tr>
<tr>
<td>Industry</td>
<td>1372</td>
<td>20.6</td>
<td>1947</td>
<td>24.7</td>
<td>2550</td>
<td>29.0</td>
<td>3300</td>
<td>33.2</td>
</tr>
<tr>
<td>Services</td>
<td>1584</td>
<td>23.8</td>
<td>2020</td>
<td>25.7</td>
<td>2600</td>
<td>29.5</td>
<td>3379</td>
<td>34.0</td>
</tr>
<tr>
<td>Oil</td>
<td>36</td>
<td>0.5</td>
<td>46</td>
<td>0.6</td>
<td>50</td>
<td>0.6</td>
<td>60</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>6664</td>
<td>100.0</td>
<td>7874</td>
<td>100.0</td>
<td>8800</td>
<td>100.0</td>
<td>9939</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Foreign Trade

The structure of foreign trade is an explanatory indicator of the politico-economic position of a country, and of the patterns of foreign relations and dependency.

In Table 15 we find that 33 percent of total imported non-military goods is composed of basic machinery and tools, 29 percent consists of such products as steel, chemicals, paper and so on, and 12 percent is food. The importance of such a pattern of distribution, however, would not be appreciated without a comparison between the imported and exported goods. Table 16 provides dollar value of the exported goods and percentage of composed articles. For example, the comparison of these two tables shows that Iran has spent
more than four times of her non-oil exports on food imports alone. The situation in service transactions was even worse. Iran's import of services was about five times her total non-oil exports (Table 17). The important point in these transactions is the composition of the trade partners. From which countries were the capital goods and services purchased? From the Western more industrialized countries, whose restricted conditions for delivery of goods and services were discussed in Chapter II, or the other newly industrialized countries such as India, which delivers necessary goods and services more cheaply and in more lenient terms? Table 18 summarizes the distribution of Iran's imports of non-military goods by countries of origin.

Table 15
Imported Goods by Type of Product, 1977-1978

<table>
<thead>
<tr>
<th></th>
<th>$million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Military</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery, vehicles, locomotives, etc.</td>
<td>14,100</td>
<td>76</td>
</tr>
<tr>
<td>Steel, chemicals, paper and pulp, fibres, etc.</td>
<td>(6,100)</td>
<td>(33)</td>
</tr>
<tr>
<td>Food</td>
<td>(5,300)</td>
<td>(29)</td>
</tr>
<tr>
<td>All Other</td>
<td>(2,200)</td>
<td>(12)</td>
</tr>
<tr>
<td></td>
<td>(500)</td>
<td>(2)</td>
</tr>
<tr>
<td>Military and Related</td>
<td>4,300</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>18,400</td>
<td>100</td>
</tr>
</tbody>
</table>


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Table 16
Exported Goods by Sectors (Excluding Oil and Gas)
1977-1978

<table>
<thead>
<tr>
<th>Sector</th>
<th>$million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>264</td>
<td>51.0</td>
</tr>
<tr>
<td>Cotton</td>
<td>93</td>
<td>18.0</td>
</tr>
<tr>
<td>Dried Fruits</td>
<td>90</td>
<td>27.5</td>
</tr>
<tr>
<td>All Others</td>
<td>81</td>
<td>15.5</td>
</tr>
<tr>
<td>Traditional Industry</td>
<td>148</td>
<td>28.0</td>
</tr>
<tr>
<td>Carpets</td>
<td>115</td>
<td>21.8</td>
</tr>
<tr>
<td>Textiles</td>
<td>24</td>
<td>4.5</td>
</tr>
<tr>
<td>Shoes</td>
<td>8</td>
<td>1.5</td>
</tr>
<tr>
<td>All Others</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Modern Industry</td>
<td>111</td>
<td>21.0</td>
</tr>
<tr>
<td>Detergents and Soap</td>
<td>16</td>
<td>3.0</td>
</tr>
<tr>
<td>Other Chemicals</td>
<td>12</td>
<td>2.3</td>
</tr>
<tr>
<td>Sweets and Biscuits</td>
<td>11</td>
<td>2.1</td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>10</td>
<td>1.9</td>
</tr>
<tr>
<td>All Others</td>
<td>62</td>
<td>11.7</td>
</tr>
<tr>
<td>Total</td>
<td>523</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Table 17
Service Transactions (Exports Minus Imports)
1977-1978

<table>
<thead>
<tr>
<th>Sector</th>
<th>$million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel and Tourism</td>
<td>-1316</td>
<td>-48.4</td>
</tr>
<tr>
<td>&quot;Government and Other Services&quot;</td>
<td>-816</td>
<td>-30.0</td>
</tr>
<tr>
<td>Freight and Insurance</td>
<td>-375</td>
<td>-13.7</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>-125</td>
<td>-4.6</td>
</tr>
<tr>
<td>Income From Abroad</td>
<td>89</td>
<td>3.3</td>
</tr>
<tr>
<td>Total Deficit</td>
<td>-2632</td>
<td>-96.7</td>
</tr>
</tbody>
</table>

### Table 18

**Distribution of Imports (Non-Military) by Countries of Origin, 1977-1978**

<table>
<thead>
<tr>
<th></th>
<th>$million</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>European Economic Community</strong></td>
<td>5,968</td>
<td>42.3</td>
</tr>
<tr>
<td><strong>West Germany</strong></td>
<td>(2,747)</td>
<td>(19.5)</td>
</tr>
<tr>
<td><strong>Other EEC Countries</strong></td>
<td>(3,221)</td>
<td>(22.8)</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>2,215</td>
<td>15.7</td>
</tr>
<tr>
<td><strong>U.S.A.</strong></td>
<td>2,205</td>
<td>15.6</td>
</tr>
<tr>
<td><strong>Other West European Countries</strong></td>
<td>1,025</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>All Other Countries</strong></td>
<td>2,687</td>
<td>19.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14,100</td>
<td>100.0</td>
</tr>
</tbody>
</table>


**Manufacturing**

Despite the fact that Construction sector, among such activities as manufacturing and non-oil mining, water and electrical power—which form the industrial sector in the Iranian statistical conventions—consistently had a high share in total fixed investment, even higher than "machinery and equipment" in state investment, for the purpose of this study the focus is only upon the manufacturing industry. The concern is to establish what are the characteristics of the major manufacturing projects. According to the Western scholars' prescription—"modernization"—in the state strategy of
industrialization, the priority should be given to "heavy industry." 126

**Steel Plants.** It was indicated earlier, that the German ship carrying parts of a steel plant's machinery to Iran was sunk by the Allied forces during the Second World War. 127 For the Iranian public, the steel plant had symbolized "economic progress", and implicitly independence. 128 Finally after decades of suspension, the issue of a steel plant appeared on the Soviet Union-Iran negotiation agenda in 1963. 129 The deal was that the Soviet Union would supply a steel plant and a small machine-tool plant in exchange for Iranian natural gas, which had been uselessly burning in the air for years. 130 As part of the deal, Iran agreed to construct a gas pipeline from the source in the southwest of the country to the Soviet border in the north, and the Soviet Union agreed to finance the project.

The total cost of the gas-pipeline construction was estimated at 300 million dollars, to be financed by a Soviet loan of 286 million dollars at an interest rate of 2.5 percent. However, the final cost of the project was 700 million dollars. 131 The steel plant was constructed by the Soviets. The first phase of operation began with 600,000 tons capacity, and was expected to earn 600 million dollars worth of exports by 1969-70. It earned only 4 million dollars in that year. 132 The second phase increased the plant's capacity to 1,200,000 tons, with a number of major incidents due to lack of expertise of Iranian workers along the line such as explosion of long
furnace. The distribution of the plant's product soon became part of the already existing network of nepotism. The credit of delivery of the product would be sold in advance to some specific people with different types of connections with the royal family and high officials, who in turn would sell the credit to the steel merchants. Then the merchants would sell the steel in the black market which had been created by the merchants and officials in the climax of the construction boom, the result of the explosion of oil revenues and land speculations.

**Petrochemical Plants.** In 1965, the National Iranian Oil Company was charged to set up a petrochemical subsidiary company as a joint venture with foreign capital, to be called the National Iranian Petrochemical Company. This company managed to establish five plants in different parts of the country in thirteen years, three of which were joint ventures with American oil and petrochemical firms. The company had also reached an agreement with Japanese firms for another plant which was scheduled for construction in 1978-79. This last plant, in which Japanese firms have invested more than three billion dollars, has been a frequent target of Iraqui's shells during the on-going and devastating four-and-a-half-year war (starting September, 1980).

Up to now the emphasis has been on the extent of the dependency of the manufacturing activities in the public sector upon foreign science-technology, where the government has been the recipient of
technology and presumably has been very concerned and articulate about the potential benefits that the country derives from the transferred technology. The reasons for this presumption are that (a) the government purchases the desired technology directly from the suppliers, (b) the government has relatively more information about the market, i.e., price, quality, and competitive suppliers and their terms of trade, and (c) finally the government has more power (legal and financial) and thus more room for maneuvering in the negotiation on terms of trade.

The nature of the transfer of technology in the private sector is, however, different. This transfer of technology is usually "indirect", that is, through various intermediaries, in which, more often than not, the beneficiaries are the foreign suppliers and their local recipient enterprises (whether they be wholly-owned foreign subsidiaries, joint ventures, or locally-owned enterprises operating under foreign licenses). According to Charles Cooper (1971:54-55):

...indirect transfers are essentially mechanisms whereby the supplier, so to say, shares his monopoly power with the recipient company. In exchange, the supplier is able to demand commercially restrictive terms. These terms may be acceptable to the recipient, but they are not necessarily to the advantage of the country as a whole. For example, where the terms of transfer increase the costs of production, the recipient company may be able to pass on the burden to the consumer, in the form of higher prices. The monopolistic advantage inherent in the technology which is transferred helps, of course, to make this possible. In other words, there is the possibility that private returns to the companies involved in the transfer are greater than social returns in the developing country. High-priced consumer goods are examples of such a distortion.
In the absence of information on the nature of various restrictive business practices by transnational corporations which have supplied technology to the Iranian firms, one can only make some preliminary generalizations about the entire Iranian technology transactions on the basis of findings of a study (or perhaps the only one in this subject) in the transfer of technology to a few Iranian firms. According to this study (Salehkhow, 1974), there was no legal or administrative requirement concerning regulation of foreign contracts and licenses.

In response to the Iranian government's occasional inquiries concerning details of agreements between suppliers and the recipient enterprises, some companies never submitted copies of their contracts, confining themselves instead to providing information (verbally or in writing) with reference to specific information demanded by the government. Other companies which did submit their contracts had them returned to their own files after review by government officials....[yet] not all these contracts for which copies were submitted to the government were filed with a single government agency. Some were filed with various ministries; others with establishments and governmental agencies... (Salehkhow, 1974:92)

Thus there was not enough centralized control over the type of technology imported into the private sector. Nor was there adequate evaluation of the imported goods, particularly evaluation of the pharmaceutical products with potential health hazard.

That study analyzes 24 Iranian technology transfer contracts in five areas, with different frequencies: (1) pharmaceuticals 12, (2) chemicals 7, (3) synthetic fibers 3, (4) petrochemical 1, and (5) tire and rubber 1. It finds that "restrictive clauses" in these contracts are numerous, varying from one area to another, and are of

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
different significance. That is, licensee's limitations resulting from the variety of such clauses may differ in the extent, degree, and effectiveness according to the types of restrictive clauses inserted in the agreement. The following summary of these "restrictive clauses" provides an example of the mechanisms used by the suppliers of technology to maintain their superiority in the market.

1. Export restriction clause, restricting export to all countries or specified countries or regions.

2. "Tie-in" clauses such as (a) purchase clause on machinery and equipment, raw and/or intermediary materials, and licensor's approval of the licensee's purchases; (b) "tie-in" clauses on technical assistance in the use of patents, trademarks, brand names, additional know-how to the present contract, and future expansion of the operation to the present contract.

3. Sale or resale clause (i.e., fixing prices of finished products of the licensee).

4. Clauses limiting manufacture and/or sale of similar (especially competitive) products.

5. Clauses putting responsibility for the secrecy of licensed know-how on licensee either limited to the duration of the contract, or extended beyond the contract term, i.e., indefinitely.

6. Clauses determining governing rules, and matters of arbitration in disputes, such as courts of licensor's country of base or origin, and the International Chamber of Commerce (Paris).

7. Clauses regarding licensor's assignment of the key personnel to the licensee's operation.

8. Quality control clauses, limiting production.
9. Clauses giving licensor exclusive right to any patented or unpatented invention, innovation, formulae, process, etc., as developed or discovered by licensee during the term of the contract.

10. Clauses concerning liabilities and indemnities arising from patent infringements and other circumstances, including licensee's sole responsibility and expenses and licensee's responsibility to act, but at licensor's remedial expenses.

11. Clauses restricting licensee to assign portions or all of the contract to third parties.

12. Clauses that do not relieve licensee from his/her obligations in force majeure.

13. Clauses regarding payment of fees and royalties, with a minimum based guaranteed of gross sales or net sales, or a fixed sum or equity participation. 41

This study reveals that the pharmaceutical industry had: (a) substantial unutilized capacity in domestically-owned firms, joint ventures, and foreign subsidiaries, (b) there was high "overpricing" as practiced by foreign suppliers for raw and intermediary materials as well as for packaged medicine (with the consequence of impeding the development of domestic industries), (c) domestic production was subject to a number of other restrictions such as market segmentation, export restriction, and price fixing, (d) prior to 1962, over 6,000 medicinal items have been imported into Iran without having ever been subject to a quality test of any kind, either in Iran or the country of origin (this uncontrolled importation has resulted in the steady importation into Iran of some medicines which have long been withdrawn from the markets of originating countries). (e) Some of the major transnational firms which had joint venture interests or subsidiaries of their own in Iran, had refused to export...
Iranian pharmaceuticals to other markets, even in the absence of "export restrictive clauses" in their license agreements. (f) The new regulation which went into effect in the late 1960s consisted of some controlling procedures which would require the imported medicines to have at least been in the market of the exporting country for a minimum of five years (this would have implied that a new antimalarial agent—e.g., a disease which had been rather prevalent in Iran but had been eradicated in Europe and the U.S.—would perhaps never have reached the Iranian market). And (g) the newly established Drug Quality Control Laboratory for testing imported medicines would have tested only 25 percent of the medicines, based on a random sampling.

The main denominator in all these manufacturing activities is the total dependency on foreign science-technology. Such total dependency was not limited to the industrial sector, but was also present in investment ventures for promotion of greater technical linkages between modern manufacturing and domestic agricultural raw materials. Although such linkages had already existed through the textile and sugar industries, in the early 1970s, a vegetable-shortening plant was established, for which Romania provided most of the experts and advisers. Since it was a capital-intensive and land-extensive type of production, the smallholder peasants did not benefit from the investment. It seems, the project was a part of "demonstration effect" at the time of the popularity of production and use of sunflower seeds.
The importation of machinery was accompanied by the imitation of capitalistic management principle. One outstanding instance of such principles is the similarity of a wage policy for increasing the worker's output. In reading of two entirely separate situations, the writer noticed this similarity: one of the most famous industrialists in Iran (Mahmood Ladjevardi whose industrial empire, in the 1970s, consisted of eighteen different, and yet interdependent, companies of a relatively diversified nature, geared primarily to producing consumer goods) established a textile mill in his birth place in 1948. People subscribed for 4/5 of the capital; pumps, spindles were imported from Britain and some looms from Japan, together with 3 Japanese experts. Workers were not producing at full capacity. The manager (capitalist, at that time management and ownership had not been separated) offered pecuniary incentive to increase production. The workers output increased by two and a half times. This policy is almost identical to the policy Henry Ford chose in the early years of his assembly line. Braverman (1974), in his now classic book, Labour and Monopoly Capital, writes, in order to increase the productivity, decrease the labour cost and maximize the profit, Ford fired numbers of workers, and then paying $5 a day, hired many fewer. All indications suggest that the Iranian capitalist had been familiar with this policy. He had been in the U.S. many times and more specifically in his vegetable shortenings factory he had close ties with the U.S. producers. In the early 1960s, he would import most of the ingredients for
vegetable shortening from the U.S., with a value of $30 million per
year.148

Notice that the Iranian capitalist applied the pecuniary
incentive in a totally different milieu. Such practices may be
limited because:

A productive enterprise or procession in the West depends
for its efficiency on its position in a technical complex
of facilities for supplies, services, transportation, and
communication, and on a complex of economic, legal and
other social institutions. The management methods which
work well within the plant and in its relationship to other
units, depends on a complex of attitudes toward
interpersonal relationships which are not closely
paralleled by attitudes elsewhere. (Hagen, 1971:125)

Another example of uncritical imitation and adoption of Western
technology was reported in the New York Times under a heading (which
only reflects the misunderstanding of the point by the reporter of
the U.S. most prestigious newspaper). "Farmers of Iran Resisting
Change",149 the article reads, "One hundred pregnant Holstein cows,
famous for their productivity, were shipped to Iran from the U.S. in
an effort to spur cattle productivity on Iran's farms. Within weeks
90 percent of their newborn calves died."150 There were many
incidents like this, in which large numbers of imported cows,
chickens, and sheep had been suffocated in airplanes or ships, large
quantities of eggs spoiled and tons of frozen meats were destroyed,
in the government's shortrun remedies for shortages, especially after
the 1973 increase in oil prices. The Holstein cows died because
their survival required a network of managerial and hygienic expertise
which was not available in Iran.
The problems of capital intensive and land-intensive were more fundamental in the disastrous projects of agri-businesses. The agri-business (was an alien system for Iranian agricultural production), imitated the West and was put in operation after the land reform.151 The original intention of the land reform was to distribute land among the majority of peasant households.152 But it was later changed to provide land for creation of farm corporations and agri-businesses, with the available capital from the sudden increase of the oil revenues to produce cash crops.

The idea of establishment of farm corporations and agri-businesses came into being in the third and fourth stages of the land reform.152 The process of creation of farm corporations began by turning peasant property into shares of the large corporations which led to the concentration of ownership and managed by state officials.153 The agri-business was intended to establish huge capitalistic agricultural enterprises, using the experiences of Latifundia and Soukhozi, in Latin America and the Soviet Union respectively.156 These agricultural corporations were to be joint-stock companies whose capital was provided by the state, as well as domestic and foreign private sources. The companies bought the peasants' lands at whatever price they wanted and since the state was a partner, they also deducted the peasants' debt obligations to various state agencies.155

The results of these emulative policies were: (a) the destruction of the Iranian village as an autonomous unit of social
life and labour; (b) the migration of the peasants to the edge of towns, turning them into wage labourers; (c) the zero growth of agricultural productivity; (d) the high rate of food inflation, because the growing food deficit could not be relieved by imports; and (e) the bankruptcy of the farm corporations and agri-businesses. Yet, the failure of these institutions in the Iranian economy is indicative of a more fundamental problem, when it is known that the state's average annual financial loans and grants to farm corporations was nineteen times the credit extended to peasant cooperatives. The more fundamental problem for the failure is addressed by H. Katouzian, an Iranian economist, who has studied the case:

...the traditional mode of production has (in spite of all the odds) performed better than the "modern" systems because both farm corporations and agri-businesses are (at different levels) purely uninstitutional and ahistorical inventions, transplanted into a given social framework from the air. Both these "modern" systems destroyed the technical characteristics and politicoeconomic relations of Iranian agriculture, and replaced them with completely alien and ill-adapted technological and institutional forms. Like all pseudo-modernistic strategies in Iran and elsewhere, they brought no progress, because any progress is by definition rooted in the existing history of the relevant entity: progress is a natural, sometimes even violent, extension of what there is already; it is not, and cannot be, the arbitrary superimposition of irrelevant blueprints. The farm corporations were set up normally against the will of the affected peasantry, and they were run by state bureaucrats. Agri-businesses were founded on the expropriation and eviction of thousands of peasants, in various villages, who then supplied the migrant wage labour for these factories; and they were managed by foreign technocrats who did not even understand the language of their employees, let alone know anything about the history, politicoeconomy or technology of Iranian agriculture. If it is clear why an attempt to create traditional Iranian-type village units of production in California would fail.
absolutely, then it should be equally clear why the uncritical application of Californian institutions and technology to Iranian agriculture failed so miserably. (Katouzian, 1981:311)

One example of such a huge capitalistic agribusiness is the Iran-California Company whose operation covered 10,000 hectares of land in Khuzistan, southwest of Iran, one of the most fertile lands in the country.158 One of the Iranian partners, who initiated this enterprise, was an engineer (Khalil Taleghani) who had a very close tie with the U.S. business circle, and who had begun his career by working in the U.S. Army Corps of Engineers as a civil engineer, (this is the same person who was designer of a dam in Golpaygan, in charge of a dam construction over the Karadja River whose consulting and contracting firms were U.S. companies. This person also established the Industrial and Mining Development Bank of Iran in the mid-50s and was its chairperson for years. This bank, in 1969, participated in the erection of the first paper company, the largest industrial company in the country after the National Iranian Oil Company, National Gas Company and the Steel Mill (in terms of equity capital).159 This may be seen as an example of close ties (scientific-technological and financial) between the decision-makers of Iran and foreign firms and their roles in a wide variety of activities. This also illustrates the uncritical adoption of the operations and policies of these firms in a different environment.
Society

In the period 1963-78 the total population of Iran grew from 23 to 35 million—this is an average annual rate of 2.9 percent. But this rate of growth has not been evenly distributed between urban and rural population. While the average annual rate of growth for rural population was 1.2, for urban population it was 4.6. The difference is largely due to the high rates of rural-urban migration. This high rate of migration and urban population growth created tremendous social problems, such as unemployment, underemployment, housing inflation (and the establishment of the shanty towns), lack of adequate urban transportation and other public utilities and services. However, two of the major areas of problem, related to this study were education and employment, which are addressed in the following sections.

Education

In the budget of 1972-73, prior to the oil-revenue explosion, expenditure on education was over 8 percent of total expenditure; development expenditure on education was 10 percent of total development expenditure; and total educational expenditure was 9 percent of the total plan budget. After the increase of oil revenue, educational expenditures were doubled. As the result of this budget increase, the enrollment increased at all levels:
The number of registered students in primary education including the Literacy Corps classes rose from 3.2 million in 1973 to 4.8 million in the end of 1977.\textsuperscript{164} At the secondary level, the number of students increased from 260,000 in 1962 to 2.3 million by the end of 1977.\textsuperscript{165} For higher education, the number of students increased from 59,000 in 1968, to 154,000 in the end of 1977 \textsuperscript{166} (it was 1,550 in 1935, 5,500 in 1950, and 28,900 in 1965).\textsuperscript{167} In 1977, there were also 67,900 students abroad in 38 countries, 45,340 of whom were enrolled in the U.S. colleges and universities.\textsuperscript{168}

Except for universities and teacher training colleges, in which there was a state monopoly, and nursery education, which was mostly supplied by private investors, the rest of the education sector was financed and administered by both state and private investors. These figures, however, do not show how the educational budget was spent, who benefited from it and what was the quality of education provided. A brief evaluation of educational expenditure along with other statistics may help address these concerns. By the end of 1977, only 65.6 percent of the age-specific population, between six and twenty-nine years, could read and write, which was made up of 81.9 percent of the urban, and only 48.0 percent of the rural, population in that age group.\textsuperscript{169} This means, on the basis of these and other figures, about 65 percent of the total population and 80 percent of the rural population (above the age of six) were still illiterate. And this figure for rural areas, is despite fifteen years of Literacy Corps
activities (Literacy Corps was exclusively concerned with literacy in rural areas).

In 1973-74, all primary and secondary education—even in private schools, was declared free of charge. As a consequence of the increase in oil revenues, the state began to pay all the fees for the educational institutions. The middle and higher income groups that could have afforded to send their children to more expensive private schools before benefited most from this program.

The high rate of expansion in the number of schools and students, particularly in higher education, generated numerous problems. Since the expansion was not preplanned and thus was not coordinated with other support systems, the lack of teaching, academic, administrative staff, and educational facilities resulted in uneven distribution of students within the various disciplines. The number of students in those disciplines (social science and humanities) which did not require close interaction between teacher and student and extra activities, such as laboratory experimentation, was therefore increased. The increase in the number of students in these disciplines also resulted in concentration of R & D expenditure in them, because the state could finance their projects overnight, if it could not provide adequate staff. However, since higher education was perceived by almost all poor and middle class families as the only possible (or the easiest possible) channel of social mobility, the number of applicants of higher education in the 1960's and 1970's reached a point that, each year, only one-tenth of them would be
admitted to higher education institutions. In such situation only a few hundred applicants could enter a discipline of their own choice. The rest of the applicants would be assigned to different disciplines based on criteria, put forth by the Ministry of Sciences and Higher Education and sometimes universities through general and specific entrance examinations. Every summer, the university entrance examination would become a national event, full of anguish, fear, hope and despair.

For the state, a way out of the situation of the shortage of teaching staff, was to invite those public and private employees with higher education degrees to teach in those disciplines with a high concentration of students. The point of interest is the class origin of students in higher education institutions. According to a survey conducted by the Minister of Science, and published in June 1973, students in universities and colleges who responded, 48 percent came from bureaucratic families, 35 percent from the industrial and commercial classes, 7 percent from the families of landlords and independent farmers, 2 percent from the urban working class, and 1 percent from the peasantry. In 1973 the last two classes made up around 85 percent of the country's population.

Since most of the scientific works, in Iran, are conducted by universities staffs, either in universities or in their affiliated institutions, and funded by the Iranian government, the following brief account of the characteristics of the major universities and
scientific institutions helps to illuminate the situation of such institutions in Iran.

**Scientific-Technological Institutions**

The first scientific institution, The Institute Pasteur, was organized in 1920. Besides the University of Tehran, which was founded as the first state university in 1934, other state universities which were established in Tehran and major provinces later are: Pahlavi University in Shiraz (founded 1945), Universities of Tabriz (1946), Meshed (1955), Ahvaz (1955), Isfahan (1960's), the National University of Iran (1960), and Arya Mehr University of Technology (1966) at Tehran. There were also two major institutes for engineering, the Badan Institute of Oil Technology (which teaches only in English and since 1939 has been training Iranians in the technology of oil) and Tehran Polytechnic Institute.¹⁷⁴ A higher school of forestry in Gorgan, a college of agriculture in Karaj, a trade school in Shiraz and an institute of Horticulture in Isfahan were other specialized schools and institutes.¹⁷⁵

Among the scientific institutions of Iran, The University of Tehran is most prominent. It was first modeled after French universities, but later in the 1960's adopted the educational system of the U.S.A. universities.¹⁷⁶ Although it is the largest university of the country, its central library holds only 146,867 books. It has scientific centers devoted to the study of medicine, atomic energy, and other fields. The nuclear center put a research nuclear reactor
in operation in 1967.177 The University has institutes of geography, geophysics, economic and social research. In some areas of research, such as marine desalination and the creation of plasma motors, scholars from the U.S.A., the Federal Republic of Germany, France, and Japan were cooperating with their Iranian researchers. Research in the Tehran Medical Center was concentrated on tropical medicine, helminthology, epidemiology and the study of malaria and trachoma and other infectious eye diseases. Medical research was also conducted at the Institute Pasteur, at institutes of medical parasitology and tropical hygiene, cancerous diseases, and dietetics, and at the State Pharmaceutical Institute. Research was coordinated by the Council on Scientific Research in Medicine and Public Health.178 There was an institute of medical research at the University of Tabriz that maintained contacts with French scientific establishments. The State Razi Institute conducted veterinary research. The Arya Mehr University of Technology in Tehran conducted research on industrial technology, mainly steel production, in cooperation with British scientists.179 At Pahlavi University in Shiraz (modeled on American universities, had contacts with the University of Pennsylvania that was designed to turn it into Iran's first "American" university; instruction was in English and four hundred of its 670 faculty members held Ph.D.'s from America or British universities)180 research was conducted in the physical and mathematical sciences with the cooperation of scientists from the U.S.A. and the Federal Republic Germany. Scientific research in agriculture was
concentrated at special centers in Karaj, Varamin, Gorgan, Isfahan, Meshed and other cities, and attention was focused on the selection and the increase in yield of wheat, barley, rice, cotton, sunflowers, soybeans, and similar crops. There were also scientific centers at the Ministry of Water and Power and the Ministry of Roads and Communications, the Iranian National Oil Company, and the Iranian Plan Organization. There were, in total, more than 100 scientific research institutions in Iran, in the early 1970's.

In 1967, the Scientific Research Committee, and the Institute for Educational and Scientific Planning were created as parts of the Ministry of Science and Higher Education to plan and supervise scientific research in Iran. A year later, in 1968, the Iranian Documentation Centre (IRANDOC) was established as a national center to serve the research efforts of science and technology. To achieve this objective, IRANDOC, with a staff of 45, has been involved in the following activities: (1) collecting, processing, and disseminating scientific and technical information; (2) supplying scholars with necessary information and services related to their researchers, at the national level; (3) publishing bibliographic and reference materials; (4) planning and coordinating the projects of national scientific and technical information networks and serving as a link to UNESCO's UNISIST (Universal System for Information in Science and Technology). The IRANDOC has few irregular publications and a library with holdings of 32,000 books and technical reports, and a subscription to 125 titles.
Despite the presence of these scientific institutions, the advance of science in Iran was slowed by a shortage of scientists; in some fields there were none at all.\textsuperscript{186} It is this researcher's opinion that one reason for this shortage is the Iranian government's inadequate attention and attempt to promote education and endogenous science-technology (based on statistics about the share of funds for education in the budgets of different periods, as has been shown in this and last chapters). Another reason for this shortage is the use of foreign scientists, engineers, technicians and other specialists in almost all stages of new projects, from planning to production and marketing, particularly in export enclaves, such as oil, which has lessened the severity of shortage of endogenous educated and trained manpower. Yet another reason for the shortage of scientists is the opposition of some of the religious leaders, who perceived the promotion of education in a new setting and explanation of events from a different perspective (non-theological) as a threat to their centuries of monopoly of education.\textsuperscript{187} The fact that higher education is, to compare with MICs, a recent development has also probably contributed to the problem. As indicated earlier, the first Iranians to seek higher education, a dozen or so, were sent to Europe in 1811, when Harvard University was already 175 years old. In 1851, the Shah of the time set up, with Austrian advice, an institution to train men for government service, but it was more high school than college. The first real university, Tehran, was founded in 1934.
But the number of universities has risen, to a total of fifteen by 1971.188

After the oil price explosion in 1973, four other universities, in different parts of Iran, were underplanning stages. One technical university was set up with the French system of education, and partially French faculty and instruction. Another was modeled after the West German system with German instruction. There was one for only graduate and post-doctoral courses which was under the supervision of Harvard University (which in 1970, gave the Shah a honorary LL.D.) and the fourth university was for all the arts: music, drama, cinema and... There was also a correspondence university (Open University) which was modeled after an English university with the same name. The operation of this university, however, remained limited due to the absence of adequate support systems. In 1972, the top business school in the (Iran Center for Management Studies) was established by some Harvard-graduated Iranian businessmen and government officials as "the main channel for bringing modern capitalism to Iran."189 The method of teaching in this university was the Harvard Business School case method and the instruction language was English. In 1976, the country's first university for women only (a show of the progress of Iranian women)190 was inaugurated by the Empress and carries her name. Another college for women was a four-year liberal arts college with a capacity of 720 for the "best-family" women, and with English as the only instruction language.191
Along with the growth of universities, 129 two- and four-year specialized colleges sprung up. Many of these began as free enterprises aimed at making big profits by ripping off tuition from desperate students who failed to get into the universities.

Forbis (1980) believes such an explosive growth in the number of universities, and students, led to the low quality of higher education, and despite such expansion, the colleges and universities could not keep up with the market created by the increase of secondary schools.

One may ask, why in so many institutions of higher education, the instruction was in a foreign language? And why such uncoordinated planning? Forbis (1980) provides part of the answer to the first question. He writes, "I met an Iranian businessman who, upon visiting the offices of Hitachi and Sumitomo in Japan, was astonished to discover that these firms recruited their staffs exclusively from Japanese universities. In Iran," he said, "we don't want people who graduate from the University of Tehran, they have got to come from some good foreign university" (Forbis, 1980:192). The answer to the second question (why such poor planning), has been given earlier. As a part of the "demonstration effect", the Shah was, perhaps, more willing to hear about the increase of enrollment than the quality in education which was more difficult to show. In a report published by the Ministry of Education, in the mid-1970's, the reported enrollment in primary and secondary schools was discovered
to be greater than the number of the country's primary and secondary age-group population.\textsuperscript{195}

Since the institutions of higher education could admit only ten percent of the applicants, the rest of the high-school graduates had two choices; either to register for a two-year compulsory military service, or to remain unemployed and take the risk of persecution for not registering for military service (the completion of military service was a prerequisite for employment, in both public and private sectors).\textsuperscript{196} However, every year, hundreds of thousands entered into the job market, to worsen the unemployment situation. The next section addresses this problem.

\underline{Unemployment}

According to the annual report of the Central Bank of Iran for 1977-78, the number of "potential employees" was 9.9 million, and that of "actual employees" was only 9.0 million, that is 900,000 workers or 9.1 percent of the labour force were unemployed.\textsuperscript{197} In the same period, the rural labour force was over 5.5 million, while the agricultural labour force was 3.2 million. And since the surplus of 2.3 million could not all have been engaged in rural handicrafts and trade, accordingly we have some indication about the size of rural unemployment.\textsuperscript{198}

What are the explanations for such a high rate of unemployment (putting aside underemployment for now), considering that in this period with the increase of oil revenues, and large investments in
industrial and service activities in the fourth five year plan, 66 percent of the development budget was allocated to the industry. The following are among the probable explanations:

A. The majority of the state's large-scale investment projects required the application of capital-intensive techniques.

B. By supplying cheap money capital, the state encouraged the private sector to apply capital-intensive techniques (even in smaller-scale investments).

C. The capital-intensive production techniques require limited modern administrative as well as technical skilled labour.

D. The lack of highly specialized personnel, as required by the highly sophisticated techniques, leads to underutilization of capacity, which in turn results in the employment of even fewer workers than would otherwise be possible.

E. The bureaucratic and highly centralized system of state enterprises, with lack of commitment of personnel at all levels.

This discussion of the situation of labour force and employment brings us to the relatively more important issue of the income distribution.

**Income Distribution**

There are only a few studies on the nature and movement of income distribution in Iran—perhaps because of the political sensitivity of the subject. Almost all of these few studies have been conducted in the last two decades. The first in-depth analysis of the subject was undertaken by a team of researchers from the International Labour Organization (ILO), in 1971-72. In their assessment of the consumption, expenditure, and income distribution figures for urban and rural households in 1969-70, they found a
concentrated distribution of income for Iran as a whole (Gini coefficient as high as 0.6 and 0.7) with extensive dissavings in the rural lower income groups, and extensive positive savings in the urban higher income groups (Oshima, 1973).

In another study by ILO, published in 1975, it was found that:

1. The country's urban/rural dichotomy was an important determinant of income expenditure inequality (and more so than were geographic disparities).

2. Apart from Tehran where inequality was the highest, income appeared to be distributed more equally in large rather than small cities. However, taken together, urban areas showed a higher degree of inequality than rural areas.

3. The urban/rural disparities tended to be higher in the southwestern regions (where natural resources were poor) and lower in the northwestern regions (where natural resources were richer).

4. Both the status and sector of employment accounted for larger portions of income inequality than urban/rural division. For example, the income disparity in the agriculture sector was lower than income disparity in two other sectors, and it was also lower in small businesses and self-employed professionals (lawyers, physicians).

5. The employment patterns were more important in the urban than rural areas in accounting for income disparities.

6. Incomes tended to be most concentrated among households with employers as heads (as opposed to those headed by government workers, self-employed workers, or wage and salary earners).

7. Inequality appeared to be higher in the less labour intensive sectors (manufacturing and services) than in the more labour intensive sectors (construction and agriculture). (Merhan, 1975:2-3)

The results of a few studies on income distribution by the Central Bank of Iran in 1974, using data for urban expenditures,
showed that the Gini coefficient of inequality had increased throughout most of the 1959-74 period. \(^{202}\) In 1959-60, the coefficient was 0.4552, in 1971-72, it was 0.5051, and in 1973-74, 0.4945. These studies also showed that:

1. The income share of the bottom 40 percent of households decreased from 13.90 percent in 1959-60 to 11.65 percent in 1971-72 (but gradually reversed its trend in the following years).

2. The share of the top 20 percent continually increased from the high level of 51.99 percent in 1959-60 to an extremely high value of 55.56 percent in 1973-74.

3. The share of total consumption for the middle expenditure group steadily decreased from 34.31 percent in 1959-60 to 32.48 percent in 1973-74 (Pesaran, 1976).

In contrast to the Central Bank's studies which were based only on the figures for urban households, a survey has been conducted by the Plan and Budget Organization based on data for rural groups, which makes the comparison between urban and rural groups possible. \(^{203}\) According to the Plan and Budget Organization survey on rural income groups, overall the pattern of the Gini coefficients indicates that rural inequality has increased. These two groups of studies show that the gap between urban/rural groups substantially widened during the period 1959-72; with the average consumption per head in the urban areas growing from about twice that of the rural areas in 1959-60, to more than three times by 1971-72. These studies also show the growing inequality during Iran's high economic growth years of the 1960s and early 1970s, and a structural change in the pattern of the urban distribution in 1971-72. Before that time,
increasing inequality was associated with a continuous shift in expenditures from the middle and bottom groups to the top group. But, after that time, the shift in expenditures seems to have been from the middle group to both the top and bottom income groups.

The findings of two other studies on the nutritional levels of both urban and rural inhabitants of Iran provide us with additional insights as to the pattern of income distribution. One study (Ghassemi and Massoudi, 1971) provides evidence on the nutritional levels of Tehran's (capital city) inhabitants. It reveals that since 1965 more than 25 percent of the capital city's households received nutritionally inadequate diets. Another study which is based on data both for urban and rural areas of the whole country shows that in 1972-73, 21 percent of the population (mostly urban) were undernourished, 20 percent (also mostly urban) were severely undernourished, and 3 percent (mostly rural) were dangerously undernourished (Azimi, 1978). Among rural areas, those of ethnic-tribal concentration seem to have been in a significantly worse condition than other parts of the country.

The plausible explanations for the increased urban/rural income disparity in the first set of studies are (a) the deterioration of agriculture's terms of trade; and (b) the disproportionate allocation of "development" expenditures among the various sectors (in the fourth five-year plan, only 13.5 percent of the total budget was allocated to agriculture as against 66.0 percent to industry). In the second set of studies, the differences between urban and rural
levels of undernourishment could be attributed to the relative self-sufficiency of the cultivating peasants, who could at least partially feed themselves from their own produce, and to the presence of those unemployed recent immigrants from rural areas living in the shanty towns.

One may ask: why such poverty and undernourishment in a country, which until 1968 was self-sufficient in basic foods? The following paragraph partially responds to this question.

Every two or three years, in the late 1960s and the early 1970s, the Shah gave the national and international parties to celebrate his glory. In 1968, he spent a few million dollars to celebrate his belated coronation; in 1971, he spent (in one estimate) 100 million dollars for an international party—inviting the heads of states, international celebrities with their favorite chefs and drinks, and he formed an army in the guise of the Persian army in 500 B.C. to celebrate and revive the hallucinatory glory of 2500 years of the Persian Empire. In 1973, he celebrated his victory over the popular 1963 mass uprising and his queen spent a few hundred thousand dollars annually to invite the avant garde artists to perform in the ruins of Persepolis for audiences of a few hundred.207

Summary

This chapter and Chapter V were intended to explain why and how Iran became dependent on the more industrialized countries' science—
technology, and to demonstrate the effects of such dependency on its social structure through an historical analysis of the general conditions of Iran in the context of the international political economic system. The emphasis was put on the period between 1941 and 1977 because of the unique historical importance of this period for Iranian society. The period started with the occupation of Iran by the Allied forces which further distorted the political-economic system of the country (the demand of the occupation forces for Iranian goods and services led to devaluation of Iranian currency by more than 100 percent; and the abdication of the leader with absolute arbitrary power created a political vacuum), and ended with a social movement at its peak, which resulted in the 1979 revolution.

This brief historical analysis of the general conditions of Iran from the early nineteenth century to 1977 suggests that two elements appear to have been more responsible for getting Iran involved in the major conflicts among colonial powers in the nineteenth century and thus give her a significant place in the international diplomacy. One element is the strategic importance of the Persian Gulf, and the other is the neighboring with Russia. However, in the late nineteenth century and beginning of the twentieth century another element, perhaps the more significant one, entered into the equation. The production of oil added to the importance of Iran. As the analysis of the role of oil in Iranian internal and external affairs suggests, oil might be considered as the major reason for Iran's scientific-technological dependency. The exploration and production
of oil were made possible by foreign science-technology and skilled human force. This means from exploration to marketing the oil sector was subject to foreign intervention (see first sentence of first chapter of this study).

This analysis also provided evidences to how and why scientific-technological dependency distorted the social structure of Iran. It was shown that the oil industry became an export enclave, and the major source of revenue for the government of Iran. As an export enclave, it was influenced by the international market and transnational corporations. The expansion of the oil sector required the expansion of other sectors (new equipment, services, trained personnel). The technology used in the production of oil was capital-intensive. The use of capital-intensive technology usually has two major consequences for an LIC such as Iran. One consequence is that since the country does not have capital, it has to borrow from foreign countries or banks, or to offer attractive incentives for foreign investment, both of which makes the economy of the country subject to foreign intervention. The other consequence is low employment in the sector using capital-intensive technology. For Iran, however, the first consequence was not the case because the Shah of Iran had already granted a 60-year concession to foreigners (see Chapter V), but the second consequence was the case (See Table 14). Furthermore, since the use of imported technology requires highly technical personnel, the main part of the employed personnel are foreigners (until 1973 the majority of the managers and highly
technical personnel in Iran's oil industry were foreigners).\textsuperscript{175} For these reasons the level of economic activity and capital accumulation was much higher in the oil sector than other sectors. This situation resulted in an uneven economic development.

It was demonstrated that the oil sector was an export enclave, that is, the major part of the produced oil was exported. The other sectors of Iranian economy, technically, were not advanced enough to provide the oil sector what it needed for operation and expansion. Therefore, the connection (in terms of exchanging goods and services) among different sectors of the economy were poor. This situation helped bring about economic disintegration.

It was argued that the oil sector was the most highly paid and the most advanced sector of Iranian economy, and thus the most desirable one for employment.\textsuperscript{176} The reasons for such a highly praised position for employment are numerous: (1) being the main source of Iranian government's revenue; (2) being closest to international arena; and (3) being administered by foreigners (it had to be competitive with other international companies to attract foreign personnel). For these reasons, there was disparities in wage rates among different economic sectors. This situation created sectoral heterogeneity.

The section on income distribution in Iran was a manifestation of the presence of inequality in access to valued goods and services. The reason for such inequality was discussed in the preceding section (disparity in wage rate). A situation in which there is inequality
in access to valued goods and services results in inequality among social classes. But what is the major social consequence of inequality among social classes? According to the "Dependency" Paradigm (the theoretical framework of this study) unequal distribution of income is in the nature of the capitalist system. What this statement implies is that the only way to equally distribute income is to change the power structure of society. The power structure of a society is changed through class conflict. Thus, the main social consequence of unequal distribution of income is class conflict.

Class conflict usually is manifested in protest demonstrations, political strikes, riots, assassinations and armed attacks. In most LICs protest demonstration and political strikes are not allowed, due to the undemocratic nature of the state in these countries, as they are in MICs. Riots, assassinations, and armed attacks are not totally reported and are kept secret as a matter of national security. The undemocratic nature of Iran's police state, brutality of its secret police (SAVAK), the suppression of opposition groups and suffocation of any critical voice by the Shah's police was discussed to delineate this case. With such characteristics, based on the "Dependency" paradigm, it is safe to consider Iranian state as a coercive authoritarian one.

The poor planning and irregularity in the educational system, particularly in higher education, was shown. It was argued that the major reason for the shortage of scientists in Iran, was the reliance
on foreign scientists and specialists working in the oil sector, which was the main source of revenue and foreign exchange, necessary for importation of more science-technology to build society's infrastructure. On the basis of this argument and the related discussions through this study, one may conclude that as a result of the reliance on foreign science-technology, and of the increasing demand for higher education (as a channel for social mobility for a majority of the Iranian youths), higher education in Iran was concentrated in those fields (social sciences and humanities) in which teaching is possible with minimum educational facility and teacher-student interaction. As a result of the concentration of higher education in non-technical fields, the R & D personnel and expenditure was also concentrated in those fields, because the imported science-technology has already developed.

In the next chapter the effects of Iran's dependency on exogenous science-technology on its social structure are empirically tested.
CHAPTER VII

THE CASE OF IRAN, A QUANTITATIVE ACCOUNT

The last two chapters were attempts to answer the questions of this study through the historical analysis of the general condition of Iran in the nineteenth and twentieth centuries. The aim of this chapter is to present a quantitative account of the effects of Iran's scientific-technological dependency on its social structure. Based on the theoretical discussions in the preceding chapters, a general hypothesis on the relationship between Iran's scientific-technological dependency and its distorted social structure was constructed. From this general hypothesis, ten specific hypotheses were derived and empirically tested to account for the distorted economic, socio-political and educational-scientific aspects of Iran's social structure.

General Hypothesis

The general hypothesis guiding the current investigation may be stated as: scientific-technological dependency of Iran has led to structural changes with negative consequences for that country. From this general hypothesis the following more specific hypotheses, for selected structural change areas, were derived for empirical testing. The areas chosen for testing focus on the economic, socio-political and education and science.
A. Economic Distortion:

1. Scientific-technological dependency of Iran has led to uneven economic development in that country.

2. Scientific-technological dependency of Iran has led to disarticulation of economy in that country.

3. Scientific-technological dependency of Iran has led to sectoral heterogeneity in the economy of that country.

4. Scientific-technological dependency of Iran has led to development of export enclaves in that country.

B. Socio-political Distortion:

1. Scientific-technological dependency of Iran has led to inequality among social classes in that country.

2. Scientific-technological dependency of Iran has led to class conflict in that country.

3. Scientific-technological dependency of Iran has led to economic marginalization in that country.

4. Scientific-technological dependency of Iran has led to the imposition of coercive authoritarian rule by the state in that country.

C. Educational-Scientific Distortion:

1. Scientific-technological dependency of Iran has led to the concentration of higher education in that country.

2. Scientific-technological dependency of Iran has led to the concentration of research and development (R & D) in that country.

To assess these hypotheses, the dependent variables are categorized into three interrelated clusters, namely:

1. Economic distortion, including:
   a. uneven development;
   b. disintegration of economy;
   c. sectoral heterogeneity;
   d. export enclaves;
2. Socio-political distortion, including:
   a. increasing inequality;
   b. increasing class conflict;
   c. increasing unemployment;
   d. imposition of coercive authoritarian rule by the state; and

3. Educational-scientific distortion, including:
   a. concentration of higher education; and
   b. concentration of research and development (R & D).

Figure 4 shows the categorization of dependent variables, the interrelationships among clusters, and social structure.

To test these hypotheses, the scores (ratio, percentage, U.S. dollar value) of each variable for Iran are compared with the mean of the scores of each variable for five More Industrialized Countries: The United States, United Kingdom, Japan, Federal Republic of Germany, and France. If the scores for given variables for Iran are less than the mean of the scores of those variables for the five MICs, the hypothesis is accepted, otherwise, if the score for given variables for Iran are greater than the mean of scores of those variables for the five MICs, the hypothesis is rejected.

Data and Data Collection

The majority of data used in this chapter were obtained from the published archives of major international organizations. For instance, the United Nations and its specialized agencies, such as United Nation's Educational, Scientific and Cultural Organization (UNESCO), International Labour Organization (ILO), and World Intellectual Property Organization (WIPO), World Bank, Stockholm
Figure 3. A model of scientific-technological dependency and its effects on the social structure of less industrialized countries.
International Peace Research Institute (SIPRI) and so on. Other data were obtained from the published works of independent comparative research scholars (e.g., Taylor and Jodice, 1983; Bornschier and Heintz, 1979). In some cases (income, wage labourer and so on) where data for Iran were not available in the published archives of major international organizations, data were taken from Iranian sources and books on Iran. All source documents appear under the relevant tables. However, readers are referred to the original source documents from which these data have been obtained for the protracted footnotes and other qualifying statements that normally accompany publication of international comparative data.

The following criteria were applied to selection of indicators:

(A) Timeliness, indicators reflect the designated phenomena for the time selected for study, 1977. The majority of indicators satisfy this criterion. Several, however, do not (for instance, inequality among social classes, and concentration of higher education indicators). These slightly older data were included for two reasons: (1) the importance of these indicators as measures of socio-political and educational-scientific distortions; and (2) the absence of acceptable alternative indicators.

(B) Accuracy, indicators included in this study are judged to give a reasonable portrayal of the designated aspects of social structures of the considered countries. The points that should, however, be clarified here are (1) the most internationally reported social indicators result from estimates made by planning and research
personnel in various national organizations, rather than from timely
surveys and researches by international organizations. In any event,
these estimates are the best sources of data available to the
investigator and are viewed to be adequate for purposes of the
present analysis; and (2) the accuracy of estimates presented to
international organizations varies depending on the capacity of
countries to provide accurate information. In some cases, problems
such as political oppression may influence the accuracy of data
reported.

(C) Equivalence, problems of comparability in concept
definition, operationalization and methods of data collection
constitute a major problem in comparative analysis (Przeworski and
Teune, 1970). In the selection of indicators for this analysis,
preference was given to the international organizations because these
organizations have standardized procedures in which the problems of
conceptual and methodological equivalency are considered. To this
investigator the indicators used in this analysis possess a
reasonable level of conceptual and methodological equivalency.

Indicators for which data could not be obtained for either Iran
or the five major more industrialized countries (such as number of
foreign advisors/consultants, and number of imported copies of books
and journals in the area of science-technology) were dropped out.
Indicators for which data could be obtained for at least three of the
five major MICs were included in the analysis.
**Conceptualization and Measurement**

**Scientific-Technological Dependency (STD)**

**Definition:** Scientific-technological dependency refers to a situation in a country in which the science-technology, the capacity to utilize and apply the science-technology, and the capacity to adapt, reproduce, and improve the science-technology is supplied and controlled by foreign countries and corporations.

**Measurement:** Several indicators are used to measure STD:

1. Fixed capital, measured by the import of capital goods as a proportion of gross domestic investment.
2. Disembodied capital—patents and trademarks—the percentage of patents and trademarks registered to foreign countries.
3. Carriers of science-technology: Few types of people could be considered as carriers of exogenous science-technology, namely, students studying abroad, and advisors or consultants; they are measured by:
   a. Dividing the number of students studying abroad by the total national university enrollment;
   b. Dividing the number of foreign advisors/consultants in the area of science-technology by the number of local R & D persons working in endogenous institutions (this was intended to be one of the indicators, but due to the absence of data was dropped out).
4. Correlates of science-technology: Among numerous correlates of science-technology, two require planning and pleading, that is, are actively sought by states; they are foreign aid and arms transfers and are measured by:
   a. Economic assistance divided by government spending;
   b. Dollar value of major weapons imports divided by government spending.
5. Books and Journals:

a. Number of imported book and journal titles in the area of science-technology divided by number of book and journal titles published in importing country;

b. Number of imported copies of books and journals in the area of science-technology divided by number of copies of books and journals published in importing country (these were intended to be part of the indicators, but for lack of data were dropped out).

Uneven Economic Development

Definition: Uneven economic development refers to a situation in which different sectors of the economy are at different levels of economic activity and capital accumulation.

Measurement: The indicator used to measure uneven development is output per worker for each sector: agriculture, industry, and service.

Economic Disintegration (or Disarticulation)

Definition: Economic disintegration refers to a situation in which various economic sectors tend to be poorly connected or articulated; that is, goods and services produced for domestic consumption are used only by limited sectors of the economy. For example, even though a substantial manufacturing sector may develop, it will be little oriented to producing capital goods for the agricultural sector.

Measurement: The indicator used to measure economic disintegration is transportation of goods that are exchanged among
economic units of the country, measured by the volume of domestic train, plane, and truck traffic, controlling for the size of the country's geographic area and economy (GDP).

**Sectoral Heterogeneity**

Definition: Sectoral heterogeneity refers to a situation in an economy in which activities occurring within various sectors vary widely.

Measurement: The indicator used to measure sectoral heterogeneity is the disparities in wage rates, measured by dividing total compensation of employees in each economic sector by the number of employees in the same sector.

**Export Enclave**

Definition: Export enclave is defined as a pattern of economic activity wherein foreign trade becomes highly concentrated upon one or a few products.

Measurement: The value of a country's most important export commodity is used as an indicator to measure this variable, and measured by the dollar value of a country's most important export commodity as a percentage of its total exports.

**Inequality Among Social Classes**

Definition: Inequality among social classes, here, refers to the inequality in access to valued goods and services.
Measurement: The indicator used to measure this variable is income of different social classes, as measured by the size distribution of income which reports what percentage of the total population receive what percentage of total income.

**Class Conflict**

Definition: Class conflict refers to conflict over distribution of means of production and/or access to state power.

Measurement: Several indicators are used to measure this variable:

1. Protest demonstration;
2. Riot;
3. Political strike;
4. Assassination;
5. Armed attacks.

This is also measured by the sum of the number of these manifest expressions of conflict over the societal distribution of economic goods and/or access to state power.

**Economic Marginalization**

Definition: Economic marginalization refers to the extent to which groups are incapable of maintaining their economic position in society.

Measurement: Two indicators are used to measure economic marginalization:
1. Stagnation of standard of living, measured by the change in real wages over time;

2. Economic importance of the workforce, measured by the proportion of economic activity accounted for by wages.

**Coercive Authoritarianism of the State**

**Definition:** Coercive authoritarianism of the state refers to a centralized coercive state in which the military is a politically dominant force.

**Measurement:** Three indicators are used to measure coercive authoritarianism of the state:

1. The size of coercive forces, measured by number of personnel actively employed in military armed forces and in paramilitary and gendarmerie;

2. The political-governmental role of coercive agencies, measured by the extent to which governmental positions (at or above central cabinet levels) are held by those who also hold roles in hierarchies of the armed forces;

3. The extent of coercive social control by armed forces, measured by frequency and severity of coercive negative sanctions targeted at social collectivities.

**Concentration of Higher Education**

**Definition:** Concentration of higher education refers to the concentration of higher education on specific areas of study.

**Measurement:** Two indicators are used to measure concentration of higher education:

1. Uneven distribution of enrollment in study areas at higher education institutions, measured by number of enrollments in each area divided by total number of enrollments;
2. Uneven distribution of scientific books and journals over areas of science, measured by number of book titles in each area of science divided by total number of scientific book titles, and number of journal titles in each area of science divided by total number of scientific journal titles.

**Concentration of Research & Development (R & D)**

**Definition:** Concentration of Research & Development refers to the concentration of Research & Development on specific areas of science.

**Measurement:** The indicator used to measure concentration of R & D is uneven distribution of R & D over areas of science, measured by ratio of R & D personnel in each area of study to total number of R & D personnel in country, and ratio of R & D expenditure in each area to total R & D expenditure in country in U.S. dollars.

**Test of Hypotheses**

The first indicator in measuring scientific-technological dependency is fixed capital. Here we are concerned with the import of capital goods. The importation of capital goods represents an introduction of the physical tools of technology into a society, and the penetration of the products of outsiders into the plants and factories of a country. The importation of such goods may result in the strong and inappropriate invitation of productive methods (e.g. toward greater technical sophistication, and higher capital intensity) and may be associated with greater emphasis on the
production of luxury consumer goods (Goulet, 1978; UN, 1974). Data were taken from UN Yearbook of International Trade Statistics, 1980.¹

The second indicator used in measuring STD is disembodied capital, that is, "patents and trademarks". As discussed in Chapter IV, as modern technology tends to come in large packages of products and processes, acceptance of foreign patents and trademarks for substantial parts of such packages is highly likely to entail continuing dependency for other parts. The names, brands, and titles so important to modern marketing practice, which are restricted in use by trademark protection, form a part of the "technological package". Data on foreign and domestically held patents and trademarks were taken from "Industrial Property" (1977), the Journal of the World Intellectual Property Organization.²

The third indicator to measure STD is related to the non-physical, or human, aspect of science-technology, and consists of two groups of actors, students studying abroad and foreign advisors-consultants. It has long been known that students studying abroad are an important means through which foreign culture in general, and science-technology in particular, is transmitted to a segment of a country's future elite. Foreign advisors-consultants, too, bring their culture, and scientific-technological knowledge. While not true in every case, their tastes and attitudes have a tendency to diffuse into the scientific-technological communities and in the long-term into the general population. Data on students studying abroad were gathered from UNESCO Statistical Yearbooks.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Unfortunately, we were unable to gather data on advisors-consultants. Thus only students studying abroad is the third indicator.

The fourth indicator to measure STD is concerned with those aspects of ties among nations that are actively sought and require both planning and pleading. Two such ties that are relevant to this study and may be viewed as "correlates" of science-technology are "foreign aid" and "arms transfers". "Foreign aid" is not applicable to this study because we are comparing a less industrialized country (Iran) which receives foreign aid, "economic assistance," with five major More Industrialized Countries which do not receive economic assistance. Arms transfer, however, is a significant factor in STD. A major part of the world R & D personnel and expenditure is devoted to experiment and development of new weapons, resulting, undeniably in major scientific-technological breakthroughs. And almost all countries import arms. Data were taken from The Journal of Peace Research by Stockholm International Peace Research Institute (SIPRI) on the dollar value of major weapons imports. The indicator was then divided by government spending (data gathered from the UN Yearbook of National Accounts Statistics (1980). Since deliveries of major weapons tend to be "lumpy", a five-year moving average (from 72-77) was computed from The Journal of Peace Research (1980).

As Table 19 shows, while the mean of scores of scientific-technological dependency indicators for Iran is 44.82, it is 16.19 for five major More Industrialized Countries.
### Table 19
Scientific Technology Dependency (1977 Data)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Country</th>
<th>Iran</th>
<th>France</th>
<th>Fed. Rep. of Germany</th>
<th>Japan</th>
<th>United Kingdom</th>
<th>United States</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Capital: The import of capital goods as a proportion of gross domestic investment (U.S. Dollar Value)</td>
<td></td>
<td>1.0656</td>
<td>0.5370</td>
<td>0.5862</td>
<td>0.0482</td>
<td>1.2772</td>
<td>0.2809</td>
<td>0.5459</td>
</tr>
<tr>
<td>Disembodied Capital: Patents and Trademarks. The percentage of P-T registered to foreign countries</td>
<td></td>
<td>82.96</td>
<td>57.30</td>
<td>41.09</td>
<td>9.52</td>
<td>70.88</td>
<td>29.37</td>
<td>41.63</td>
</tr>
<tr>
<td>Carrier of Science-Technology: Students studying abroad-divided by total national university enrollment</td>
<td></td>
<td>35.78</td>
<td>1.14</td>
<td>1.27</td>
<td>0.55</td>
<td>1.38</td>
<td>0.15</td>
<td>0.89</td>
</tr>
<tr>
<td>Correlate of Science-Technology: Arms transfers—The percentage of major weapons imports to government spending</td>
<td></td>
<td>59.48</td>
<td>26.98</td>
<td>17.61</td>
<td>8.91</td>
<td>23.82</td>
<td>31.21</td>
<td>31.70</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>44.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16.19</td>
</tr>
</tbody>
</table>

**Sources:**
- UN Yearbook of International Trade Statistics (1980), Passim
- UNESCO Statistical Yearbook (1980), Passim
- SIPRI Journal of Peace Research (1980), Passim
Hypothesis 1. Scientific-Technological Dependency of Iran Has Led to an Uneven Economic Development in that Country.

It was argued in Chapter II, that the transformation of the peripheral economy toward a capitalist mode of production occurs at very different rates for different sectors of the economy. And because this pattern of differential growth tends to be unbalancing—capital accumulation is greatest where productive capacity is already largest—the result, over some range, is ever-increasing levels of uneven development. The indicator for measuring uneven development was output per worker for each sector. The measure then is an indicator of variation among levels of output per worker across selected economic sectors. This measure is the weighted sum of deviations of the sectors from the weighted mean. Each sector is weighted by its relative size (number of workers) since large sectors have more impact on the level of uneven development than do small sectors. The sectors used are agriculture, manufacturing, and services. Data for computation were taken from the UN Yearbook of National Accounts Statistics (1980), and the International Labour Office's Yearbook of Labour Statistics (1980).

Table 20 demonstrates the range of variation of output per worker across these economic sectors for Iran and five major More Industrialized Countries. Since the range of variation for Iran is larger than the mean of range of variations for five other countries, therefore, using these indicators the data in Table 20 suggest the
acceptance of hypothesis that scientific-technological dependency of Iran has led to uneven economic development in that country.

Table 20
Uneven Economic Development (1977 Data)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Output Per Worker (000$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agriculture</td>
</tr>
<tr>
<td>Iran</td>
<td>$2.528</td>
</tr>
<tr>
<td>France</td>
<td>$9.036</td>
</tr>
<tr>
<td>Japan</td>
<td>$4.582</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$8.537</td>
</tr>
<tr>
<td>United States</td>
<td>$14.740</td>
</tr>
<tr>
<td>Mean</td>
<td>$8.874</td>
</tr>
</tbody>
</table>


Hypothesis 2. Scientific-Technological Dependency of Iran has led to Economic Disintegration in that Country

Economic disintegration is another important aspect of the structure of development, and is related conceptually to uneven development. It is concerned with the phenomenon whereby goods and services produced for domestic consumption are used only in limited sectors of the economy. The integration, here, means the degree of well-connectedness of an economy. The notion of connectedness
usually contains three components: existence and balance of sectoral linkages relative to the overall level of activity in the system (Galtung, 1971). That is, an economy with a flow of production between two given sectors is better connected than is an economy lacking such a flow, and the larger the flow, the better connected. The connectedness also means that an economy with equal resource flows among sectors is better integrated than is one where the flows are very high between some sectors and very low between others. What this implies is that imbalanced economies are "hierarchical" ones with many vertical but few horizontal connections (Galtung, 1971). Thus, if the sum of all flows in one economy is greater than in another, then, the first economy is better connected and hence more integrated.

Although the connectedness, or integration, of an economy is usually measured by an input-output table, which is a matrix representation of flows of goods and services between sectors of the economy wherein each entry reflects the outputs from one sector which enter as inputs into another sector, due to the unavailability of such a table for Iran, an indirect indicator was used here. This indirect indicator was devised based on the idea that if goods are exchanged they must be transported. The assumption here is that most firms in the same industry are located relatively close together, while different trade will cover long distances relative to the size of the country. Data on the volume of domestic train, plane, and truck traffic was taken from the UN Statistical Yearbook, and

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
controlled for the size of the country's geographic area and economy (GDP).

As Table 21 indicates, the score of the indicator for economic disintegration for Iran (2.68) is greater than the mean of scores for the five MICs. This suggests that the firms in the same industry in five MICs are located closer together than the firms in the same industry in Iran. Thus, using this indicator, the data in Table 21 suggest the acceptance of hypothesis that scientific-technological dependency of Iran has led to economic disintegration (disarticulation) in that country.

Hypothesis 3. Scientific-Technological Dependency of Iran Has Led to Sectoral Heterogeneity in that Country

According to the discussion in Chapter II, sectors in highly homogeneous economies have very similar internal characteristics, and sectors in strongly heterogeneous economies vary widely. All economic sectors, in varying degrees, utilize different factors of production: land, labor, and capital. But it cannot be expected that all economic sectors have open to them the same range of production functions. Hence to measure the divergence of economic sectors, the emphasis is on the rate of return to factors of production than in the amounts of the factors themselves. The primary concern here is with the degree to which wages in different economic sectors systematically diverge, and are more likely to lead to exploitation of peasants and small tradesmen, and/or to the
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Country</th>
<th>Domestic Traffic</th>
<th>Commercial Vehicles**</th>
<th>Size</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Train Net Ton/Km</td>
<td>Plane Ton/Km m(m)</td>
<td>GDP</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5617</td>
<td>77.2</td>
<td>204.0</td>
<td>636,294</td>
</tr>
<tr>
<td></td>
<td>Iran</td>
<td>20118</td>
<td>984.1</td>
<td>1783.7</td>
<td>94,200</td>
</tr>
<tr>
<td></td>
<td>Britain</td>
<td>67569</td>
<td>1557.4</td>
<td>2375.0</td>
<td>212,973</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>55742</td>
<td>1204.2</td>
<td>1389.9</td>
<td>95,975</td>
</tr>
<tr>
<td></td>
<td>Federal Republic</td>
<td>41317</td>
<td>1147.5</td>
<td>11553.0</td>
<td>147,470</td>
</tr>
<tr>
<td></td>
<td>of Germany</td>
<td>1206366</td>
<td>7922.4</td>
<td>30092.9</td>
<td>3,615,122</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.262</td>
</tr>
</tbody>
</table>

**Commercial vehicles including: vans, lorries (truck), buses, tractors and semi-trailer combination but excluding trailer and farm tractors.

Sources: UN Statistical Yearbook (1980), Passim
Encyclopedia of Countries of the World (1984), Passim
emergence of a "labor aristocracy". Therefore, "wage" is taken as an indicator.

Data were collected from the ILO Yearbook of Labour Statistics (1980) on the total compensation of employees in each economic sector for the five major MICs. The data are estimates, based on various sources, for Iran (because data on wage for Iran are not available in ILO Yearbook for 1977), and then divided by the population employed in that sector. This quotient represents the wages paid over a year's time to an average worker in each sector. The standard deviation of these average wages across sectors was then computed, weighting each sectoral component by the size of the population employed in that sector.

Table 22 illustrates that in the case of Iran, the average wage paid to an average worker in the industrial sector is almost four times as much as the average wage paid to an average worker in the agricultural sector and nearly two times as much as that paid to an average worker in the service sector. The mean of the scores (comparing sectors in each country with each other) for the five MICs in the industrial sector is nearly two times as much as that in the agricultural sector; but it is less than that in the service sector. Therefore, using this indicator, the data in Table 22 suggest the acceptance of hypothesis that scientific-technological dependency of Iran has led to sectoral heterogeneity in that country.
Table 22
Sectoral Heterogeneity (1977 Data)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Average Wage Paid to an Average Worker $ (Year)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agriculture</td>
</tr>
<tr>
<td>Iran&lt;sup&gt;a&lt;/sup&gt;</td>
<td>$686</td>
</tr>
<tr>
<td>France</td>
<td>$4296</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>$6204</td>
</tr>
<tr>
<td>Japan</td>
<td>$3444</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$3888</td>
</tr>
<tr>
<td>United States</td>
<td>$5508</td>
</tr>
<tr>
<td>Mean</td>
<td>$4668</td>
</tr>
</tbody>
</table>

Source: ILO Yearbook of Labour Statistics (1980), Passim
<sup>a</sup>: Data for Iran were estimated based on various sources

**Hypothesis 4. Scientific-Technological Dependency of Iran Has Led to Development of Export Enclave in that Society**

It was argued, in two previous chapters, that a major background theme of dependency paradigm is the historical transformation of LICs into export-oriented, undiversified economic units. The continuation of dependency of LICs on MICs has led to a pattern of economic activity characterized by the predominance of trade and the development of export enclaves. Foreign trade became of progressively greater importance to LICs, and trade became highly concentrated upon export of one or a few products, generally products

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
from the extractive and agricultural sectors. The agricultural and extractive export enclaves that were created tended to be the only "dynamic" sectors, so that the peripheral economy became totally oriented to their maintenance and growth.

To measure this variable, there were two choices, one either to use "Commodity Concentration in Export" for 1972, from "Compendium of Data for World-System Analyses", a sourcebook of data based on the study of MNC's, economic policy and national development, or "Concentration Index of Export Commodities" for 1975 from Taylor and Jodice World Handbook of Political and Social Indicators (1983), Third Edition, Vol. 1. The "Concentration Index of Export Commodities" was chosen for being more comparable and of recent date.

In explaining how the index was constructed, Taylor and Jodice write:

Commodity groupings are defined by the Standard International Trade Classification (SITC) and revised in United Nations Statistical Papers, Series M, Number 34. These 1,312 items are classified into 56 divisions (corresponding to the two digit SITC commodity classification) which form the basis for this series. Concentration is defined as the sum over all export divisions of the squares of the proportions of total exports accounted for by each division. Concentration is higher when there are fewer export divisions and a greater value is obtained for the largest divisions. (Taylor and Jodice, 1983:232)

Table 23 shows that the mean of the scores for five MICs is less than the score for Iran. Thus, using this indicator, the data in Table 23 suggest the acceptance of hypothesis that scientifi-
technological dependency of Iran has led to development of export enclave in that country.

Table 23
Export Enclave (1975 Data)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Concentration Index of Export Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>0.936</td>
</tr>
<tr>
<td>France</td>
<td>0.087</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>0.120</td>
</tr>
<tr>
<td>Japan</td>
<td>0.167</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.103</td>
</tr>
<tr>
<td>United States</td>
<td>0.096</td>
</tr>
<tr>
<td>Mean</td>
<td>0.114</td>
</tr>
</tbody>
</table>


Hypothesis 5. Scientific Technological Dependency of Iran Has Led to Inequality Among Social Classes in that Country

Corresponding to the meaning of inequality among social classes presented here, the incomes of different social classes should be compared. However, there are no data available on incomes of social classes, although there are suggestions made as to the measurement of social classes.\(^7\)
Here, size distribution of income is used, which reports which percentages of the total population receive what percentages of total income.\textsuperscript{5} Data for the five MICs were taken from \textit{World Handbook of Political and Social Indicators, 1983} by C. L. Taylor and D. A. Jodice, and data for Iran were taken from "Income Distribution in Iran", 1976, by M. H. Pesaran.

Table 24 contains these data and shows that the top 20 percent of the total population in Iran receives more than half of the total income and this is almost five times as much income as the bottom 40 percent of the population receives. The income inequality is even greater when comparing the percentage of income that goes to the top 10 percent and bottom 40 percent of the population respectively. The former group receives nearly three times as much income as the latter group receives. The income inequality for the five MICs is 2-1/2 and 1-1/2 times respectively. Thus, using this indicator, the data in Table 24 suggest the acceptance of hypothesis that scientific-technological dependency of Iran has led to inequality among social classes in that country.
### Table 24

**Inequality Among Social Classes**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Iran</th>
<th>France</th>
<th>Federal Republic of Germany</th>
<th>Japan</th>
<th>United Kingdom</th>
<th>United States</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top 10%</td>
<td>Top 20%</td>
<td>Percent</td>
<td>Bottom 40%</td>
<td>Date (Year)</td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>Indicator</td>
<td></td>
<td></td>
<td>Percent</td>
<td></td>
<td></td>
<td>Percent</td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Percent</td>
<td>Percent</td>
<td>Percent</td>
<td>(Year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>32.79</td>
<td>55.56</td>
<td>11.65</td>
<td>72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>30.4</td>
<td>46.9</td>
<td>14.1</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>30.3</td>
<td>46.2</td>
<td>16.8</td>
<td>73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>27.2</td>
<td>41.0</td>
<td>21.0</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>23.5</td>
<td>38.8</td>
<td>18.9</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>26.6</td>
<td>42.8</td>
<td>15.2</td>
<td>72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>27.6</td>
<td>43.01</td>
<td>17.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**Hypothesis 6. Scientific-Technological Dependency of Iran Has Led to Class Conflict in that Country**

The problems of inter-class, intra-class, and regional inequality that are associated with the structural transformation of the peripheral economy often give rise to manifest expressions of conflict over the societal distribution of economic goods. These may occur either in the labour-management arena, or in more directly politically relevant forms as general strikes, riots, demonstrations, and terrorism. As the state becomes more deeply and pervasively
involved in the economy, conflict is frequently stimulated over access to state power. For the majority of Less Industrialized Countries a consequence of the several processes of structural transformation which are experienced through incorporation in the world capitalist system is conflict over the nature and direction of those transformations. Obviously, LICs differ in the form, extent, and severity of conflict that is manifested within them.

For the measurement of manifest class conflict we used data from Charles L. Taylor's Third Edition of the *World Handbook of Political and Social Indicators, 1983*.

According to Table 25 the mean of scores for the five MICs is greater than the score for Iran. Thus, using these indicators, the data in Table 25 suggest the rejection of hypothesis that scientific-technological dependency of Iran has led to class conflict in that country.

**Hypothesis 7. Scientific Technological Dependency of Iran Has Led to Economic Marginalization in that Country**

It was argued in Chapter II that, according to the dependency paradigm, one of the consequences of dependency of LICs on MICs is economic marginalization of workers. That is, despite the fact that there may be a "labor aristocracy", many of the labouring class become "marginal" to the economy and hence are unemployed or underemployed, and the economic position of the rest remains at the economic "margin". Two indicators were used to measure economic
Table 25
Class Conflict (1977 Data or Closest Date)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Country</th>
<th>Protest Demonstration</th>
<th>Riots</th>
<th>Political Strike</th>
<th>Assassination</th>
<th>Armed Attacks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Iran</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
<td>36</td>
<td>9</td>
<td>10</td>
<td>0</td>
<td>296</td>
<td>351</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>11</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Federal Republic of Germany</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>United States</td>
<td>51</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Mean of Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>97</td>
</tr>
</tbody>
</table>

marginalization: (1) economic importance of the workforce; (2) stagnation of the living standard. The former refers to the economic importance of labour in the productive process, while the latter refers to the stagnation of the standard of living of the labouring class.

The economic importance of the workforce was measured by the proportion of economic activity accounted for by wages, for which the data were taken from the *Yearbook of National Accounts Statistics* (UN, 1980) to be divided by the GDP. The stagnation of the living standard was measured by the change in real wages over time, for which the data were gathered from the *ILO Yearbook of Labour Statistics* (ILO, 1980) on non-agricultural wages to be controlled by the rate of consumer price inflation as reported in the same source (due to the absence of data for Iran, estimations were made based on various available sources).\(^8\)

Table 26 illustrates that the score of stagnation of the standard of living for Iran is 6 while the mean of scores for the five MICs is 45.4; and the score of the economic importance of the workforce for Iran is 0.178 while the mean of scores for the five MICs is 0.586. Thus, using these indicators, the data in Table 26 suggest the acceptance of the hypothesis that scientific-technological dependency of Iran has led to economic marginalization in that country.
Table 26
Economic Marginalization (1977 Data)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Country</th>
<th>Stagnation of Standard of Living</th>
<th>Economic Importance of Workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Iran</td>
<td>6</td>
<td>0.178</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>33</td>
<td>0.616</td>
</tr>
<tr>
<td></td>
<td>Federal Republic of Germany</td>
<td>63</td>
<td>0.597</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>48</td>
<td>0.558</td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
<td>19</td>
<td>0.543</td>
</tr>
<tr>
<td></td>
<td>United States</td>
<td>64</td>
<td>0.617</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>45.4</td>
<td>0.586</td>
</tr>
</tbody>
</table>

Sources: Yearbook of National Accounts Statistics (1980), Passim
ILO Yearbook of Labour Statistics (1980), Passim

Hypothesis 8. Scientific-Technological Dependency of Iran Has Led to Imposition of Coercive Authoritarian Rule by the State in that Country.

It was argued in Chapter II that one of the important issues discussed by dependence theorists is the apparent growth of a statist class interest, in a number of peripheral societies, that grows out of the bourgeois control of the state, but develops beyond that to a point where new class interests come to the fore and express themselves in coercive authoritarian policy. These class interests remain closely tied to those of the bourgeoisie but have their own basis in the apparatus of the state—-(in the control of the means of
coercion). These statist class interests are largely centered in the new military establishments. As the military emerges as a politically dominant force and loses its class ties to the aristocracy and the bourgeoisie, it creates this new coercive "state bourgeoisie". Although coercive authoritarianism may not be a new phenomenon for many LICs, however, its development and socially pervasive centralization is notable.

In measuring this concept we are concerned with three phenomena: the relative size of the coercive apparatus of the state; the political-governmental role played by coercive agencies; and their social-political activities. In a word, the concern here is the development of a large, politically dominant, and socially regulatory coercive apparatus. The formula, therefore, is:

\[
\text{Coercive authoritarianism of the state} = \text{size} \times \text{governmental role} \times \text{social control of the coercive forces of the state (Duval and Shamir, 1978).}
\]

The size of coercive forces was measured by manpower actively employed in military armed forces and in the paramilitary (gendarmerie), that is, military manpower per thousand working-age persons. Data were derived from Taylor and Jodice World Handbook of Political and Social Indicators, 3rd Edition, Vol. 1 (1983), and was checked with the Stateman's Yearbook, 1980. The political-governmental role of coercive agencies was assessed by measuring the extent to which governmental positions (at or above central cabinet levels) are held by persons who also hold roles in

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
hierarchies of the armed forces. The indicator here is the percentage of time central cabinet positions are held by military personnel. Data were taken from Taylor and Jodice World Handbook of Social and Political Indicators, 3rd Edition, 1983. For the extent of coercive social control by armed forces, the frequency and severity of coercive negative sanctions (imposition of sanctions and political executions) were used. Data were taken from C. L. Taylor and D. A. Jodice World Handbook of Social and Political Indicators, 3rd Edition (1983), Vol. 1.

Table 27 shows that the mean of scores of coercive authoritarianism of the state for five MICs is greater than the score of coercive authoritarianism of the state for Iran. Thus, using these indicators, the data in Table 27 suggest the rejection of hypothesis that scientific-technological dependency of Iran has led to coercive authoritarianism of the state in that country.

Hypothesis 9. Scientific-Technological Dependency in Iran Has Led to Concentration of Higher Education in that Country

The importation of the means of production from MICs by LICs shapes the process of economic development of LICs so as to require further inputs from MICs. The operation and maintenance of these imported means of production not only require capital but also highly educated and trained personnel. To attract foreign capital and transnational corporations to invest in their countries, the states of LICs tend to put their emphasis on providing facilities to
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Country</th>
<th>Size of Coercive Forces</th>
<th>Political-Governmental Role of Coercive Agencies</th>
<th>Extent of Coercive Social Control by Armed Forces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Military Manpower</td>
<td>Percentage of Time</td>
<td>Coercive Negative Sanctions:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Per 1000</td>
<td>Central Cabinet Positions Held by Military Personnel</td>
<td>Frequency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working-Age Persons*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Armed and Paramilitary Forces)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>22.9</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>France</td>
<td>17.4</td>
<td>-</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>12.6</td>
<td>-</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>3.2</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>9.8</td>
<td>-</td>
<td>46</td>
<td>-</td>
</tr>
<tr>
<td>United States</td>
<td>15.5</td>
<td>-</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Armed forces refer to military personnel on active duty. Paramilitary forces are included if these forces are similar to regular units in their organization, equipment, training, and mission. Reserves forces are generally not included.

Sources: The Statesman's Yearbook (1980), Passim
educate and train people in the areas TNC's and foreign capital require the presence of relatively cheap, but educated and trained personnel. This in itself leads to concentration of higher education and R & D.

Another part of the process of concentration of higher education and R & D stems from the fact that in most of the LICs anything associated with MICs is more prestigious and perceived as a status symbol. This and the fact that foreign firms and companies pay more salary and reward are inducements strong enough to attract potential employees. This preference would lead to over-enrollment in some areas of study and consequently concentration of higher education and R & D personnel in areas directly involved in both provision of facilities for operation of foreign firms and companies, and their activities such as engineering, commercial and business administration.

Data were taken from UNESCO Statistical Yearbook for 1976 (if data were not available for 1976, data for 1978 have been used; data for 1977 were not available), and the ratio of students in each field was computed by dividing the number of students in each field by total number of enrolled students.

Table 28 shows that the score of students in the field of engineering for Iran, 13.50, is the closest to the mean of scores of engineering for three MICs. In the case of commercial and business administration, the score for Iran is much greater than that of three MICs. Thus, using this indicator, the data in Table 28 suggest the
Table 28
Concentration of Higher Education (1976 Data)*

<table>
<thead>
<tr>
<th>Country</th>
<th>Field of Study</th>
<th>Iran</th>
<th>France</th>
<th>Germany</th>
<th>Japan</th>
<th>United Kingdom</th>
<th>United States</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Science and Teacher</td>
<td>Training</td>
<td>6.42</td>
<td>28.05</td>
<td>7.58</td>
<td>3.83</td>
<td>13.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humanities, Religion and Theology</td>
<td>13.49</td>
<td>5.88</td>
<td>13.40</td>
<td>14.03</td>
<td>11.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fine and Applied Arts</td>
<td>1.24</td>
<td>3.13</td>
<td>2.26</td>
<td>3.88</td>
<td>2.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Law</td>
<td>1.97</td>
<td>6.55</td>
<td>--</td>
<td>3.38</td>
<td>4.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social and Behavioral Science</td>
<td>9.22</td>
<td>16.98</td>
<td>40.62</td>
<td>12.93</td>
<td>23.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commercial and Business</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administration</td>
<td>7.38</td>
<td>1.14</td>
<td>--</td>
<td>5.91</td>
<td>3.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass Communication &amp; Document</td>
<td>0.84</td>
<td>0.36</td>
<td>--</td>
<td>0.35</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home Economics &amp; Domestic Science</td>
<td>0.52</td>
<td>0.42</td>
<td>1.40</td>
<td>0.18</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Service Trades</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.10</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Natural Science</td>
<td>10.58</td>
<td>6.08</td>
<td>2.38</td>
<td>13.68</td>
<td>7.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mathematics &amp; Computer Science</td>
<td>5.26</td>
<td>2.69</td>
<td>0.75</td>
<td>3.58</td>
<td>2.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical &amp; Health-Related Science</td>
<td>15.40</td>
<td>7.78</td>
<td>5.61</td>
<td>7.26</td>
<td>6.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>13.50</td>
<td>15.58</td>
<td>19.70</td>
<td>12.71</td>
<td>15.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Architecture &amp; Town Planning</td>
<td>2.14</td>
<td>2.70</td>
<td>--</td>
<td>1.90</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trade, Craft &amp; Industrial Programs</td>
<td>0.01</td>
<td>--</td>
<td>--</td>
<td>0.09</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transport and Communication</td>
<td>--</td>
<td>--</td>
<td>0.10</td>
<td>0.67</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agriculture, Forestry and Fishery</td>
<td>5.22</td>
<td>2.26</td>
<td>3.16</td>
<td>1.26</td>
<td>2.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other and Not Specified</td>
<td>6.81</td>
<td>0.39</td>
<td>2.48</td>
<td>14.85</td>
<td>5.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data for 1977 were not available; if data for 1976 were not available, data for 1978 were used.

Source: UNESCO Statistical Yearbook (1976 and 1978), Passim
acceptance of hypothesis that scientific-technological dependency of Iran has led to concentration of higher education in some fields of study in that country.

**Hypothesis 10. Scientific-Technological Dependency of Iran Has Led to Concentration of R & D in that Country**

For concentration of R & D, data for R & D expenditure by field of activities were not available for Iran. On the basis of data for R & D personnel by field of science (Table 29) in Iran, 36.10 percent of total R & D personnel are active in agriculture against 6.21 (mean) for four MICs, 22.30 percent in social science and humanities against 13.51 (mean) for four MICs, and only 7.79 percent in engineering and technology against 25.63 (mean) for four MICs. Thus, concentration of R & D personnel is not in fields of engineering and commercial and business administration, but rather in agriculture and social science and humanities (that is, the fields on which R & D personnel, for a less industrialized country, such as Iran, in its attempts for more industrialization are expected to be more concentrated). Therefore, using this indicator, the data in Table 29 suggest the acceptance of hypothesis that scientific-technological dependency of Iran has led to concentration of R & D in that country.
Table 29
R & D Personnel by Field of Science
As Percentage of Total R & D Personnel (1971 Data)

<table>
<thead>
<tr>
<th>Country</th>
<th>Natural Science</th>
<th>Engineering and Technology</th>
<th>Medical Sciences</th>
<th>Agriculture</th>
<th>Social Science &amp; Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>14.20</td>
<td>7.79</td>
<td>19.61</td>
<td>36.10</td>
<td>22.30</td>
</tr>
<tr>
<td>France</td>
<td>39.32</td>
<td>35.50</td>
<td>14.88</td>
<td>2.77</td>
<td>7.53</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>34.12</td>
<td>14.72</td>
<td>25.90</td>
<td>5.98</td>
<td>19.27</td>
</tr>
<tr>
<td>Japan</td>
<td>26.27</td>
<td>35.23</td>
<td>12.86</td>
<td>7.08</td>
<td>18.55</td>
</tr>
<tr>
<td>United States</td>
<td>40.09</td>
<td>17.06</td>
<td>25.12</td>
<td>9.02</td>
<td>8.70</td>
</tr>
<tr>
<td>Mean</td>
<td>34.95</td>
<td>25.63</td>
<td>19.69</td>
<td>6.21</td>
<td>13.52</td>
</tr>
</tbody>
</table>

1 Data relates to higher education sector only.
2 Not including data for law.
3 Not including data for humanities, education and arts.

Source: UNESCO Statistical Yearbook, 1972 (the latest data available for Iran), Passim.

To sum up, ten hypotheses were tested. Data (using the indicators used in this study) suggested eight hypotheses be accepted and two be rejected as follows:

Hypotheses:

1. Uneven economic development  Accepted
2. Economic distintegration    Accepted
3. Sectoral heterogeneity      Accepted

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
4. Export enclave  Accepted
5. Inequality among social classes  Accepted
6. Class conflict  Rejected
7. Economic marginalization  Accepted
8. Coercive authoritarianism of the state  Rejected
9. Concentration of higher education  Accepted
10. Concentration of R & D  Accepted

We now turn to the analysis of these tested hypotheses.

**Analysis**

Before analyzing the test of hypotheses, it should be mentioned that unavailability of appropriate data for Iran has made it very difficult to consider a variety of indicators for measurement of selected variables. Therefore, the indicators had to be limited to available data. The accuracy and availability of data on Iran have been one of the more frequently cited complaints by scholars studying Iran. Some examples of such concerns are provided below.

The scores of all indicators of scientific-technological dependency in Table 19 indicate that Iran, in terms of science-technology is much more dependent on other countries than the five major MICs. Iran's capital good imports are almost twice as much than that of the five MICs. This proportion of two to one is also the case in the disembodied capital. The percentage of patents and
trademarks registered to foreign countries in Iran is two times higher than the mean of the percentages of patents and trademarks registered to foreign countries in the five MICs. In the case of the carrier of science-technology, that is, the percentage of students studying abroad, the proportion is forty to one; while this percentage for Iran is 35.78, the mean of percentages for the five MICs is 0.89. In the last indicator, correlate of science-technology, the score for Iran is two and half times higher than the mean of the scores for the five MICs. The percentage of major weapons import to government spending for Iran is 59.48, whereas the mean of such percentages for the five MICs is 21.70.

Now that scientific-technological dependency of Iran on other countries is shown, the ten hypotheses which were tested earlier are analyzed.

Uneven Economic Development

The basic assumption here is that MICs have a more even pattern of economic development than LICs. The argument for this is that because MICs are able to develop their science-technology, they have the capability to utilize, apply, adapt, reproduce, and improve the available science-technology. This ability is reflected in the evenness of the workers' output in the dominant economic sectors of these countries as it is shown in Table 20. In contrast, the scores for workers' output in Iran are highly uneven, highest in manufacturing sector and lowest in agriculture. The reason for this
notable unevenness is the same as mentioned above. That is, Iran has been dependent on exogenous science-technology, and has not had the capacity to fully utilize, apply, adapt, reproduce and improve the available science-technology in reaching a desirable even development. Why is output per worker in the manufacturing sector in Iran so high relative to that of agriculture and services sectors? Isn't it because the manufacturing sector has been more effected by imported science-technology? After all, the manufacturing sector in Iran has been the most recent among economic sectors to be developed (Halliday, 1979). This phenomenon is not, of course, limited to Iran. As indicated in Chapter II, the majority of LICs, after WWII accepted the "scientific-technological myth", followed the direction prescribed for them by MICs' social science scholars, and chose the policy of modernization (Westernization). The implementation of such policy required the importation of means of production from MICs.

By accepting modernization as their development strategy, most of the LICs put all their efforts in building their manufacturing sector by importing heavy machineries with little planning or study about the consequences. In this process, they almost totally ignore their agriculture sectors. And since a manufacturing sector, notably a newly established one, requires a compatably developed services sector, LICs invest some of their efforts in this sector, at the expense of agriculture. And this process led to an uneven pattern of development.
One of the most important consequences of such uneven pattern of development was economic disintegration.

**Economic Disintegration**

It was indicated earlier in this chapter that connectedness usually contains three components: existence and balance of sectoral linkages relative to the overall level of activity in the system; i.e., an economy with a flow of production between two given sectors is better connected, than is an economy lacking such a flow, and the larger the flow, the better the connectedness. This is obviously a description of economy of a country with an established scientific-technological capacity and capability. The sectors of such economy are largely able to produce goods and services that other sectors need, therefore the flow of production among sectors is a necessary condition, if not sufficient one (the import of means of production by MICs is an indication of such condition). For a country like Iran, however, the flow of production among sectors is very low for several reasons: first, each sector of economy is separately dependent on an exogenous science-technology; industry is an assemblyline industry, that is, the components of production are not coming from other sectors but from other countries; third, most of the economic activities are parts of a "demonstration effect" and are not geared toward a genuine development.

In Table 22 the score of economic disintegration for Iran is 2.68 while the mean of scores for five MICs is 0.262, a difference
which is not surprising considering the different levels of these countries' industrialization.

*Export Enclave*

The high concentration of export upon one or a few products is one of the well-recognized characteristics of LICs. Another characteristic of these countries is the lack of foreign exchange. They need foreign exchange in order to import goods and services necessary for the construction of the infrastructure of their economy. To obtain foreign exchange they have to export the product for which there is a market. They plan the industrialization of their economy by counting on the earned foreign exchange from export. Since developing the expertise and process of other products require long-term planning and is very difficult for LICs to achieve, they have to depend on the export of the same product for earning foreign exchange in order to make their industrialization effort proceed. To mitigate their vulnerability against crises and international market fluctuations, LICs have to export more and more of their one or few marketable products (Furtado, 1979). To produce more and to increase their productivity, they need to import science-technology from MICs, i.e., the same countries to which they are exporting their products. To import science-technology which is very costly for LICs and not compatible with the products they export, these countries need to export more and more, sometimes more cheaply (Furtado, 1979).
This circular dependency of export of one or few products for import of science-technology leads to the export enclave. Table 23 shows how close Iran is to being totally dependent on export of one commodity, that is oil (the subject to be returned to later). "1" in the index refers to the total dependence on export of one product; the mean of indexes for five MICs is 0.114.

**Class Conflict**

It would be oversimplification to argue, on the basis of scores in Table 24, that scientific-technological dependency leads to increasing class conflict in five MICs but not in Iran. The analyses of previous hypotheses support this claim of oversimplification. This is so because for the majority of LICs, the reported statistics do not represent the undemocratic nature of the state in these countries. It was indicated, in the last two chapters, that in most LICs protest demonstrations and political strikes are not allowed as they are in MICs and riots, assassinations, and armed attacks are not totally reported as they are in MICs because the few available independent media are subject to censorship and such information is kept secret as a matter of national security. Therefore, the result of this hypothesis should be interpreted with caution. The analysis of class conflict hypothesis requires an understanding of the degree of democratic nature of states in countries under study, thus allowing or forbidding collective political activities.
A dialectical approach was chosen for this study, because of the inadequacy of quantitative methods in explaining social dynamics which entails a consideration of totality. A brief historical account of the nature of state in Iran, specifically in the twentieth century, the time of the state's increasing involvement in its economy which led to increasing class conflict over access to state power, was presented in the last two chapters.

Coercive Authoritarianism of the State

The analysis of this hypothesis which is closely related to the manifestations of class conflict also requires an historical account of the authoritarian nature of the state of Iran which was the subject of the last two chapters. It was indicated that the Shah with arbitrary power over the people and their property, was head of the state and the supreme commander and chief of the army. Although one of the basic aims of the Masrute Revolution, the creation of a constitution for conditioning the despotic arbitrary power of the Shah, was achieved, it was, however, overlooked by the monarchs (both Shahs of Pahlavi dynasty were military men). Thus, in looking at the percentage of time central cabinet positions were held by military personnel, the role of the Shah should be taken into account. Also, in interpreting the results of the test of this hypothesis, attention should be paid to the statistics presented in Table 27. While size of coercive forces (military manpower per 1,000 working-age population) for Iran is 22.9, it is 11.7 for the five major MICs (the
mean of their scores). Yet when it comes to the extent of coercive social control by armed forces (frequency of coercive negative sanctions) the score for Iran is (0) in contrast to 19 for five major MICs (the mean of their score). Considering what was said about the censorship of media and the secrecy of information on reaction of Iranian government to opposition groups, and the share of army of the country's total budget, the absence of coercive social control by the armed forces (coercive negative sanction) in the case of Iran is more likely a result of censorship and secrecy, than a result of absence of coercive social control. In such cases, the writer, therefore, prefers qualitative study over quantitative one.

Concentration of Higher Education

One would expect, in an even pattern of development, the percentage of students in the area of science education science and teacher training is one of the higher percentages, because of the desperate need of LICs for science educators. As Table 26 shows this is not the case for Iran. While the percentage of students in engineering for Iran (13.50) is very close to the mean of percentages of students in the same area for three MICs (15.99), in education science and teacher training it is almost half. One's expectation could reasonably be expanded to agriculture since Iran has a predominantly agricultural economy, however, only 5.22 percent of the enrolled students are in agriculture. At the same time 7.38 percent of Iranian students are in the area of commercial and business
administration, which is twice as much of the percentage of students in the same area for three MICs. If there was a centralized educational planning, based on needs assessment in Iran, these figures might have been viewed as signs of progress toward industrialization. But as the figure for science education might reveal part of the problem, there was not a centralized educational planning based on needs assessment. The determinant force in the trend of enrollment was market which was dominated by foreign firms and responsive to their demands.

One important phenomenon which is interesting to note is that the highest percentage of students is in medical and health-related science (15.40). But according to the Iran Almanac (1976) more than two thirds of Iranian physicians are out of country. This is a severe external brain drain. To this investigator a logical question to be asked is: where would these physicians be, had they had traditional or endogenous medical training (like Chinese physicians and acupuncture)?

**Concentration of R & D**

In contrast to concentration of students in engineering and commercial and business administration, R & D personnel are concentrated in agriculture, social science and humanities. While the percentage of R & D personnel in medical sciences for Iran and four MICs is identical, 19.61 and 19.69 respectively, in engineering and technology it is highly different, 7.79, and 25.63. In
agriculture, social sciences and humanities the opposite direction is the case, that is, the percentages for Iran are 36.10 and 22.30 respectively, against 6.21 and 13.51 for four MICs.

Since data are not clear on the subfields, we could assume that the field of engineering and technology with 7.79 percentage of R & D personnel includes agricultural engineering and technology. In this case it could be argued that the data show how little emphasis has been put on engineering and technology, or, in other words, how great the dependency on exogenous science-technology has been. Part of the reason for this argument is that TNCs and MICs allocate only negligible percentage of their R & D expenditure to LICs. The same argument is correct for the contrast between two fields of natural science and social sciences and humanities. For Iran they are 14.20 and 22.30 respectively, while for four MICs they are 34.95 and 13.51. Why is it that the percentage of R & D personnel in natural science for Iran is much less than the percentage for social sciences and humanities, while the distribution for MICs, is exactly opposite? Which of the two countries, Iran or MICs should have more R & D personnel in natural science than in social sciences and humanities? After all, in LICs a position in R & D does not have as much financial reward or social prestige as a position in the medical sciences. Among the reasonable explanations for the relative large number of R & D personnel in social sciences and humanities in Iran is that in contrast to natural science that requires some minimum facilities (equipment, laboratory, and trained personnel), research
in social sciences and humanities can be done with simple, usually available facilities.

The above questions could, for the most part, be answered and explained by looking at the pattern of scientific-technological dependency of LICs, and in this case, Iran. And, here, by scientific-technological dependency we mean a part of the totality of the history of a country in the context of her relationship with other countries, the subject of the next chapter.

Summary

Drawing upon the "Dependency" paradigm and the historical analysis of the general condition of Iran in the context of the global political-economic system during the nineteenth and twentieth centuries, the relationship between Iran's scientific-technological dependency and its social structure was empirically tested in this chapter. A general hypothesis was constructed, emphasizing what the researcher termed "distorted" arenas. From this general hypothesis, ten more specific hypotheses were derived and empirically tested to determine if the hypothesized "distortions" were evidenced within economic, socio-political and educational-scientific arenas of Iran's social structure.

Data used in this study suggested eight hypotheses be accepted and two hypotheses be rejected as follows:
A. Economic distortion: scientific-technological dependency of Iran has led to:

1. Uneven economic development in that country  
   Accepted

2. Disintegration of economy (i.e., various economic sectors tend to be poorly connected) in that country  
   Accepted

3. Sectoral heterogeneity (i.e., activities occurring within various sectors of an economy vary widely) in that country  
   Accepted

4. Development of export enclaves in that country  
   Accepted

B. Socio-political distortion: scientific-technological dependency of Iran has led to:

1. Inequality among social classes in that country  
   Accepted

2. Class conflict in that country  
   Rejected

3. Economic marginalization in that country  
   Accepted

4. Coercive authoritarianism of the state in that country  
   Rejected

C. Educational-scientific distortion: scientific-technological dependency of Iran has led to:

1. Concentration of higher education  
   Accepted

2. Concentration of research and development (R & D)  
   Accepted

Figure 4 illustrates the relationship between Iran's scientific-technological dependency on foreign sources and its social structure.
Figure 4. The effects of scientific-technological dependency of Iran on its social structure.
CHAPTER VIII

SUMMARY, CONCLUSION AND IMPLICATION

Summary

This study attempted to answer two questions. First, why and how Iran as a less industrialized country became dependent on the more industrialized countries for science and technology or why Iran's scientific-technological capability did not concurrently evolve with its forces of production. The second question was what effect(s) did this scientific-technological dependency have on Iran's social structure?

The "Dependency" paradigm was chosen as the theoretical framework of the study because it is an interdisciplinary approach and basically an historical perspective which the nature of the study's questions require. General conditions of Iran in the context of the global political economic system, during the nineteenth and twentieth centuries were analyzed through an historical analysis. Drawing upon the "Dependency" paradigm and this historical analysis, a general hypothesis focusing on the relationship between Iran's scientific-technological dependency and its social structure was constructed, emphasizing what the researcher termed "distorted" arenas. From this general hypothesis, ten more specific hypotheses were derived and empirically tested to determine if the hypothesized
"distortion" was evidenced within the economic, socio-political and educational-scientific arenas of Iran's social structure.

The general hypothesis stated that scientific-technological dependency of Iran has led to structural changes with negative consequences for that country. Three separate, but related, dimensions of Iran's social structure (the economic, the socio-political, and the educational-scientific) were identified and ten specific hypotheses were formulated for empirical assessment. The focus in each dimension was on the "distortion" that may result due to scientific-technological dependency.

The specific hypotheses were:

A. Economic distortion: scientific-technological dependency of Iran has led to:

1. Uneven economic development in that country.
2. Disintegration of economy (i.e., various economic sectors tend to be poorly connected) in that country.
3. Sectoral heterogeneity (i.e., activities occurring within various sectors of an economy vary widely) in that country.
4. Development of export enclaves in that country.

B. Socio-political distortion: scientific-technological dependency of Iran has led to:

1. Inequality among social classes in that country.
2. Class conflict in that country.
3. Economic marginalization in that country.
4. Imposition of coercive authoritarian rule of the state in that country.
C. Educational-scientific distortion: scientific-technological dependency has led to:

1. Concentration of higher education in that country.
2. Concentration of research and development (R & D) in that country.

Data used in this study suggested eight hypotheses be accepted and two hypotheses be rejected as follows:

1. Uneven economic development
2. Economic disintegration
3. Sectoral heterogeneity
4. Export enclave
5. Inequality among social classes
6. Class conflict
7. Economic marginalization
8. Coercive authoritarianism of the state
9. Concentration of higher education
10. Concentration of research and development (R & D)

While the data above indicate somewhat the effects of dependency upon selected dimensions of Iran's social structure, they do not provide the answers to the initial questions of how and why such dependency occurred in the first place. To answer these questions of how and why dependency occurred, the researcher turned to historical materials for clues. Based upon the historical analysis, retrospectively it is concluded that in the nineteenth and twentieth centuries, four factors played decisive roles in the nature and direction of Iran's dependency on more industrialized countries.
First, the military and economic significance of the strategic position of the Persian Gulf. In the last two centuries, the Persian Gulf and Iranian shores in the area have been used by more industrialized countries for various purposes. For example, the British used the ports for reaching to India and China and for commercial transactions, in the early nineteenth century. They were used by the Allied forces for fighting Nazi Germany and sending ammunitions to the Soviet Union during the Second World War. They have also been used for extracting and exporting oil. The Persian Gulf was also significant because of the closeness of the Iranian oil fields and refinery. Further, in the early 1970s, an American military base was built in the area. The access to the Persian Gulf, therefore, facilitated the penetration of more industrialized countries into Iran.

The second major factor accounting for this dependency reflects the neighboring of Iran with Russia (one of the colonial powers in the nineteenth century) or the Soviet Union (one of the superpowers in the twentieth century) has been an influential factor in Iran's dependency. In the first quarter of the nineteenth century, Iran's armed forces were defeated in her wars with Russia resulting in the (among other things) loss of some territories to Russia by two treaties (Golestán and Turkmanchay). The last treaty gave Russian commercial and consular agents entrance to Iran, and this began a commercial and diplomatic rivalry between Russia and Britain that continued until the Russian Revolution of October 1917. Iran's
attempt (in 1857) to regain part of the lost territory from Russia failed. To compensate for the war expenses the Shah of that time sold various concessions to the Europeans, such as banking, trade tariff, and customs control. In the Second World War, Iran was occupied by the Allied forces and its facilities were used for sending ammunitions to support the Soviet Union against German forces. For such contributions to the victory of the Allied forces (although involuntary) Iran was called "Victory Bridge". However, the occupation of Iran distorted its political-economic system (the demand of the occupation forces for Iranian goods and services led to the devaluation of Iranian currency by more than 100 percent, and the abdication of the Shah, with despotic arbitrary power, created a political vacuum).

The third major factor involved in Iran's dependency was the historic role of despotic, arbitrary power of the Shah as the central authority, and the Shah's uncritical adoption of other countries' reform policies. Because of such power, the Shah's attitudes toward the nature and direction of reforms was far beyond laws and plans. The reforms, therefore, were not systematically planned and organized, nor based on need assessments and feasibility studies, to include and integrate all sectors of the economy and all aspects of society. As a result of such inadequately planned reform policies and the penetration of more industrialized countries into the economy of Iran, the affiliation of some strata of the social classes with the rival more industrialized countries was changed. The traditional
ruling elite and part of the emerging middle class became the British, German, and later, American allies, and the emerging working class and intelligensia were attracted to the Soviet Union. This change increased ideological heterogeneity among the various social classes.

The development of the oil industry and the emergence of Iran as a major oil-exporting country is the fourth factor responsible for Iran's dependency. Iran, as a strategic oil-exporting country, became highly significant for the global strategies of more industrialized countries. The oil industry also became the main source of revenue and foreign exchange for the Iranian government. Since the oil industry was developed and managed by the more industrialized countries' oil cartels, by becoming the main source of finance for the Shah's reform policies, these reform policies became subject to the international market fluctuations. By exporting more and more oil to finance its reform policies, Iran became more and more vulnerable to external factors.

Of these four factors believed to be responsible for Iran's dependency, the development of the oil industry seems to have been the main factor for its scientific-technological dependency. The oil industry was developed, in all its stages, from extracting to marketing, by foreign engineers, technicians, and other specialists (see Chapters V and VI of this study). Furthermore, since the supporting systems such as materials and facilities (machinery and tools, chemicals, transportation, and accommodation for personnel)
necessary for the development and administration of the oil industry, were not available in Iran, these systems were also developed and administered by foreign specialists. The extension and maintenance of those supporting systems needed funds and specialized personnel. Those supporting systems were financed by exporting more and more oil. The specialized personnel, if Iranian, whether going abroad to study or studying in Iran, had to learn about those supporting systems (i.e., the specific model of machinery and related techniques). Iranian universities, thus, provided curricula responsive to the needs of those supporting systems. To do so, Iranian universities needed faculties specialized in the same or similar models of machinery and techniques (including management, accounting, etc.), and pertinent educational facilities as found in more industrialized countries.

This process (the more industrialized countries' monopoly of the production and distribution of knowledge-information, and the various mechanisms (see Chapters III and IV of this study) used by these countries to maintain their dominant position in the global political-economic system) made more aspects (such as the aforementioned supporting systems) of Iranian society dependent on the more industrialized countries' science-technology.

The scientific-technological dependency of Iran, therefore, distorted its social structure by making the oil industry an export enclave. This export enclave led to: (a) uneven economic development; (b) to economic disintegration; (c) to sectoral
heterogeneity; (d) to economic marginalization; (e) to inequality among social classes; (f) to the concentration of higher education in areas of engineering and business administration; and (g) to the concentration of research and development (R & D) in areas of social sciences and humanities.

In this researcher's opinion, this conclusion provides the answer to the questions put forth as the problem of the study. The questions are: (a) why and how Iran (a less industrialized country) became dependent on more industrialized countries' science-technology, or why and how Iran's scientific-technological capability did not concurrently evolve with its productive forces; and (b) what effect(s) did Iran's scientific-technological dependency have on its social structure.

The responses to the questions of this study have theoretical, research and policy implications. These implications are elaborated in the following sections.

Theoretical Implication

The findings of this study support all assumptions of the "Dependency" paradigm except the one concerning the colonial era. The situation of Iran in the colonial era appears to be an anomaly to the "Dependency" paradigm. The anomaly is this: according to the "Dependency" paradigm, the control structure used by colonial powers in the colonial era to maintain their dominant position, was direct military force through formal political subjugation (colonialism).
But, it was found in this study, that this assumption does not explain the Iranian situation in the colonial era. Iran was not formally politically subjugated, in other words, Iran was not colonized, although military force was involved in its defeat in wars with Russia. In explaining Iran's dependency in the colonial era, one may, therefore, assume a more important role for the despotic arbitrary power of the Shah as a central authority (an internal factor) than for formal political subjugation to the colonial powers (an external factor) as the "Dependency" paradigm implies.

Such explanation points to an anomaly to the "Dependency" paradigm. This anomaly is, perhaps, due to the fact that the "Dependency" paradigm has been formulated based on the results of studies about colonized countries. Such explanation also raises questions which warrant further research. The questions are: If one assumes that the despotic arbitrary power of the Shah, as central authority, has played a more important role in Iran's dependency than formal political subjugation to the colonial power in the colonial era, would a different power structure (political system) have prevented Iran's dependency? If so, what type of power structure (political system)? A representative parliamentary democracy? A direct participatory democracy? or...

In this researcher's opinion, the findings of this study, if supported by other studies, on other less industrialized countries with historical characteristics similar to Iran, and responses to the raised questions ask for reformulation of the "Dependency" paradigm.
Such reformulation, which takes cases similar to Iran into consideration, will more likely increase the explanatory and predictability power of the "Dependency" paradigm. The result of the empirical test of the ten hypotheses on the relationship between Iran's scientific-technological dependency and its distorted social structure suggested that Iran's scientific-technological dependency has had negative effects on its social structure. This supports the "Dependency" paradigm's assumption that, in the neo-colonial era, indirect control structures (such as science-technology) that are used by the center to maintain its dominant position in global political-economic system, distorts social structure of the periphery (see Chapter II). This is in contrast to the "Modernization" paradigm's assumption that diffusion-adoptation of modern social institutions (such as nuclear family, modern education and technology) by a "traditional" society has positive effects on its "modernization" or development. It was shown (in Chapter II) that "modernization" theorists believe that one of the main factors for the underdevelopment of less industrialized countries is the lack of modern science-technology. Thus, to develop, they argue, the less industrialized countries must adopt science-technology from more industrialized countries. The critiques of the "Modernization" paradigm refer to this as "scientific-technological" myth.

This study showed that two distinct states of science-technology in a less industrialized country would distort its social structure. First, if the adopted science-technology is not integrated into the
productive forces of the less industrialized country through a deliberate, long-term planning (see below, "selective dissociation" as an examplar policy). Second, if science-technology in the less industrialized country does not concurrently evolve with its productive forces, a case in which the country needs to import science-technology in order to be competitive in the world market. Thus, the unconditional adoption of more industrialized countries' science-technology does not lead to an even economic development in the less industrialized countries, although it may lead to an increase in productivity in some sectors of the economy such as extractive and mining (see Chapters II and III).

If the findings of this study regarding the negative effects of unconditional adoption of more industrialized countries' science-technology on the social structure of a less industrialized country is supported by other studies, the "Modernization" paradigm needs to be reformulated to include the conditions necessary for the adopted science-technology to yield positive effects on development of a less industrialized country. The explanatory and predictability of the "Modernization" paradigm is more likely to be enhanced, if the above-mentioned conditions, under which adoption of western science-technology would lead to an even economic development in less industrialized countries, are taken into account. In the words of Portes:

Premature modernity-in-underdevelopment, excessive aspirations and secularism, and sophistication bearing no relationship to its social and economic context may make of
the most Westernized sectors the main obstacle to initial stages of national development. As Horowitz (1966:308) states: "interestingly, where modernism has been extremely applied, industrialization has had little success. Far from serving as a demonstration effect of the advantages of industrialization, modernism serves to reinforce the existing social structure by showing how it is possible for a small section of the population to share in the goods of the scientific-technological world without altering the forms of human relations or the character of social production. Thus, modernism may serve, ironically, to underwrite traditionalism and not to displace it." (1973:36)

In addition to the research that may be conducted on the questions raised by this study, there are a number of other research implications which are important for those less industrialized countries which are attempting to reduce their scientific-technological dependency. These are presented in the section that follows.

Research Implication

In Chapter IV several reasons were given for the persistence of less industrialized countries' scientific-technological dependency and its intensification in a qualitatively higher level. These were (a) mechanisms or control structures used by more industrialized countries and their transnational corporations, including turnkey plants, obsolescence, and computerization of plants, (b) the more industrialized countries' monopoly of knowledge-information production and distribution, (c) the lack of indigenous specialists and, therefore, the lack of adequate long-term planning in less

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
industrialized countries, and (d) the less industrialized countries' limited access to various suppliers.

To increase their scientific-technological autonomy, the less industrialized countries need to emphasize on issues such as: (a) comparative research on the science-technology purchase agreements (see Chapter IV), (b) research about the alternative sources for acquisition of various machineries and techniques to reduce dependency on one source, (c) research on the possibility of expanding the country's knowledge-information production capability without increasing the country's dependency on exogenous sources, and (d) research on the plausible ways to integrate the imported science-technology into the productive forces and educational-scientific institutions of the country. The emphasis, specifically, should be on the research concerning future trends. This is discussed in more detail below, because (as indicated earlier) the less industrialized countries' scientific-technological dependency has been intensified at a qualitatively higher level through the introduction of computers into various production processes. It was argued, in Chapter III, that because of the concentration of the knowledge-information industries in the more industrialized countries and the speed of change in this industry, this trend (intensification at a higher level) will continue in the foreseeable future. Research on future trends may help less industrialized countries to engage in more informed plannings.
Research on Future Trends

The emergence of a highly automated economy in the more industrialized countries will undoubtedly further intensify the less industrialized countries' scientific-technological dependency. To understand the nature of this trend we need to consider the peculiarities (described below) of this phase of automation in more industrialized countries.

The process of automation, in more industrialized countries, entered a new phase during the 1970s, when the separation of hardware from software became economically important. It became economically important with the development of robots and their incorporation into data-controlled production systems. The separation of hardware from software marks a radical departure from earlier forms of the development of machinery, that is the direct continuation of the prolonged historical process of mechanization. Software, representing a special form of the commodification of knowledge, now, is the essential element in the large automated systems—so-called—"flexible manufacturing systems".

It is not the separation of software from hardware which is important. It is rather the implications of such separation in the production process that entails careful consideration. Although the separation of knowledge from labour and machinery, and its emergence as an independent commodity and element in production is not a new phenomenon, the application of software to manufacturing is. What this application means is that (a) the worker's knowledge may be
separated from the worker and may itself become a commodity, and (b) that a single machine may be made to vary its movement without alteration to its mechanical structure. This mechanism (which enables robots to perform complex and coordinated actions with flexibility close to the human worker) is in contrast to what the productive process has always implied, that is, the combination of machinery and human labor. This means that we have on the one hand, machines which work automatically, endlessly responding to the instructions provided by workers who may be physically far removed from the production site and, on the other, the increasing channeling of living labor into the process of designing, composing and altering those instructions themselves.⁹

High automation has different consequences for more industrialized and less industrialized countries. In the more industrialized countries it first, leads to a trend called "softening of the economy", in which the share of capital expenditure on non-material inputs such as software, data services, planning, and research and development increases rapidly, and then to what is coming to be known as the "perpetual innovation system" or "information society", which involves continual alteration of productive techniques and stimulation of the demand for new products.¹⁰ The continued production of new knowledge and products with the speed and consistency necessary to maintain corporate profit, on which the long-term survival of highly automated economies is based, requires a workforce which is highly flexible.¹¹ That is,
a workforce that can be easily taken up and easily discarded, or a large pool of part-time, temporary and contract labor. It is, however, more likely that with such highly changing employment patterns, the highly automated countries, will intensify their efforts to find new channels for penetration into less industrialized countries in order to sustain the demand for the products of innovation. Thus, more industrialized countries which are being transformed into highly automated "information societies" will use the products of their automated factories and the commodified knowledge of their innovation-producing corporations to strengthen the ties of dominance/dependence between themselves and less industrialized countries.¹²

More research, therefore, needs to be conducted by less industrialized countries to analyze the probable future trends in more industrialized countries and their implications in the relationships between the two groups of countries. The results of such research would more likely help less industrialized countries to prepare themselves for the negotiations with more industrialized countries.

More research need, particularly, be directed toward those areas which have been identified as being responsible for less industrialized countries' dependency (see Chapter III and IV of this study) such as:

A. the general characteristics of the country, including the social value system, mobility, working traditions and habits, attitudes and taboos of the target population,
market size, the conditions of the pertinent infrastructure and scientific-technological base for the possible technique modification, the efficiency of the existing organizational structure, government support and regulations; and so on;

B. the characteristics of the mechanisms of scientific-technological dependency, including machinery and intermediate inputs, patents and trademarks, consultants and advisers, citizens of the country working and/or studying abroad, and published materials; and

C. the characteristics of the various forms of legal arrangements and contracts, including the appropriateness of particular forms of legal arrangements or contracts to a specific type of machinery and/or technique. For example, based on the different characteristics, such as manufacturing process, product, marketing, capital and research and development (R & D) intensity, sophistication, and life cycle, different contracts would be more appropriate from the less industrialized countries' point of view (see Chapter II and IV for reasons).

Now, that the factors responsible for scientific-technological dependency of less industrialized countries, in general, and Iran, in particular, are recognized, what is to be done in order to reduce or end this dependency. The next section contains some suggestions.

Policy Implication

It was argued, in Chapters III and IV, that two factors were preventing the less industrialized countries from achieving scientific-technological autonomy. First, the absence of articulated linkages among various sectors of society, particularly among educational and scientific institutions and the various productive forces, because the social system and the "means of production" in less industrialized countries have not evolved concurrently and integrally. Second, the absence of the capability to produce their
own "means of production". One policy that allows a less industrialized country to overcome these two shortcomings is "Selective Dissociation". The features and importance of this policy are elaborated in the following section.

Selective Dissociation

This policy advocates disengagement as much as possible from, and avoidance of becoming integrated (any more than necessary) into the global production, marketing, and financial system dominated by more industrialized countries and their transnational corporations. It is a long-term policy because for less industrialized countries it takes time to develop and deploy their scientific-technological capability, and because their production systems have been functioning historically at a low level\textsuperscript{13} (Morehouse, 1982).

One reason for this low level of productivity is the fact that the scientific-technological policies in most of the less industrialized countries are implicitly built upon two views: (1) a linear view of the innovation process, and (2) the "trickle down" process. These policies have usually failed (Hveem, 1983).

To be successful, a "selective dissociation" policy should at least meet two basic requirements. One is long-term planning, and the other is the linkage between science-technology and local demands (Morehouse, 1982). The long-term planning should be sufficiently responsive to the issue of linkages among the various sectors of society. Even in such ambitious policies as "science-technology
import substitution" whereby locally generated science-technology replaces the components of imported packages, the issue of linkages should be given prime importance (Morehouse, 1982).

This researcher believes the successful implementation of a policy such as "selective dissociation" depends on a number of conditions. What follows is a brief account of these conditions:

1. The presence of a national scientific-technological system corresponding to the levels and types of the country's economic activities. This system is necessary because, to this researcher, with the present low level scientific-technological capacity in less industrialized countries, it seems the import of science-technology will continue for decades to come. But, as it was argued earlier, the problem is not the import of science-technology, but rather the mechanisms through which it is imported and how it is adapted and linked to the local demand.

2. The presence of some mechanisms through which science-technology is imported should assure a sequence of central monitoring, filtering, adaptation and assimilation. According to Morehouse (1982) experiences of different countries show that monitoring can be achieved immediately, filtering in the short run, adaptation and some assimilation in the medium run, and locally-based innovation as well as basic research and development (R & D) in the long run.

3. Higher proportions of the budget that are being spent for the import of science-technology, should be allocated to the national scientific-technological system for improvements of the existing production systems and indigenous science-technology. Specific attention should also be paid to systematic adaptation of new methods developed by others. These would be possible by more funds for R & D, whereby the national scientific-technological institutions and personnel would be closely integrated into and responsive to national development objectives and needs.

4. If LICs will continue to import science-technology for decades to come, it is this researcher's contention that they are better off by: (a) coordinating their S-T policies, at least at the regional level, (b) developing a system of exchange and support among themselves, particularly, in order to strengthen their position in negotiation (in terms of trade) with suppliers, (c) shifting
a high proportion of their S-T imports from more industrialized capitalist countries and transnational corporations to state socialist countries, which have fewer side effects (e.g., socialist states), and to newly industrialized countries, such as India, which are cheaper, less packaged and potentially more appropriate to the needs of LICs. India has recently become a competitor with MICs in providing consultancy services in the areas of S-T to LICs,\(^{(d)}\) (d) they need to diversify the suppliers, \(^{(e)}\) they need to demand the fullest possible transfer of S-T, more specifically know-how, and "plant in production" contract, whereby the labor force is being trained on-site and production continues at the desired level, according to required quality specifications. This needs to be both coordinated and integrated with education and vocational training, and with the continuous process of reorganization of a more autonomous national scientific-technological system,\(^{(f)}\) (f) they need to establish a center for gathering and diffusing information, especially information about information, about different aspects of S-T imports with an up-to-date process, \(^{(g)}\) there is a need for creating a central committee for monitoring, and final decision-making, to be composed of representatives of different economic sectors, of units directly involved, and of the various sociological research institutions (for the study of unanticipated social impacts of the imported S-T), under the leadership of the highest office in the country, as a source of political support. The creation of such a central decision-making committee is necessary, due to the absence of an adequate number of knowledgeable experts and for coordination of all attempts in this area (the preliminary study is done by concerned units). This measure makes the greater integration of the concerned units, for example, maintenance and repair possible (Lall, 1978, Morehouse, 1982).

Although this study looked at the past to explain the situation of scientific-technological dependency of Iran and emphasized an inward-looking and self-reliant approach to development of these countries, in an attempt to answer two questions put forth at the outset of the study, it raised a number of questions about the future and the nature of an outward looking approach. This approach emphasizes new institutions (regional, inter-regional, and
international) that can be evolved by LICs (such as OPEC) to give them an influential role in global negotiations, and to conduct research on the nature and direction of collective actions for reducing their dependency. The following questions may be the subject of further research:

1. What are the alternative future trends in relationships between LICs and MICs in terms of science-technology?

2. What characteristics should the new institutions (of cooperation among LICs) have in order to be both strong enough and flexible enough to deal with the probable future problems?

3. What role could the new institutions play in the exchange of knowledge-information about new trends in science-technology, and in the preparation of LICs for negotiation with MICs? and

4. How could LICs carry out their development plan in the case that surrogate wars between superpowers be enacted in their countries?
NOTES — CHAPTER I

1. The final manifestation of LIC's action was formation of "group 77" and demand for New International Economic Order (NIEO). For more information NIEO see the publications of special agencies of United Nations on development, such as UNITAR, and UNCTAD.

2. See numerous publications that have been initiated by the 1979 United Nations Conference on Science and Technology for Development (UNCSTD), which was held in Vienna.


In an analysis of 56 national papers about constraints faced by developing countries in using science and technology which were prepared by developing countries for the United Nations Conference on Science and Technology for Development, it was found that over 90 percent of those papers indicated a need for stronger capabilities in the respective countries for evaluating and selecting among alternative technologies.
NOTES — CHAPTER II


2. Some authors have preferred to use the term "perspective" for the reason that in Kuhn's terms generally speaking the social sciences are "pre-paradigmatic", only approximating a "normal science". However, we prefer paradigm for these two approaches, because they have differing constellations of beliefs, conceptual assumptions, they rely on different classical treatments, and employ different methodologies (Kuhn, 1970; Foster-Carter, 1976).


4. The root of a specifically "peripheral" theory of economic development could be found in the 1930's Great Depression. The key figure of this theory is Raul Prebisch, who from 1935 to 1943 was Director-General of Banco Central in Argentina. Argentina was most severely hit by the depression. The idea of a center-periphery structure in the world-economy could be traced back in Prebisch's early writings in which inward-directed development and industrialization were seen as the remedy (Love, 1980:54).

There are other opinions on the origin of the dependency paradigm. Hettne (1983) argues that it is possible to trace the dependency approach back to the formation of the New World Group in 1962 in Georgetown, Guyana and to its journal, "The New World Quarterly", (NWQ) which later moved to Kingston, Jamaica (Hettne, 1983); Minocha (1970) stresses "the similarity between the 'drain theory' of Naoroji and the Prebisch thesis" (Minocha 1970:37). The thrust of Dadabhai Naoroji's argument was that Britain secured a yearly "tribute" of enormous proportions from India, and this unjust transfer of capital robbed India of her development potential in terms of infrastructure, education, etc.

Hettne (1983) indicates, implicitly, that since the major example of Baran was India, and he had quoted contemporaries to Naoroji, might have been under his influence.

5. The rationale for the import substitution strategy of ECLA in 1950, was provided from experiences of industrialized countries, the United States in the mid 19th century, Russia in the late
19th century, Eastern and Southeastern Europe in the inter-war period, and Brazil, Chile, Argentina and Mexico in the 30's and 40's. The idea goes back to F. List and the German reaction to Britain as the workshop of the world.

6. For an account on influential writers and their works see Jose' J. Villamil, 1979; Palma, 1978; Chilcote, 1974.

7. The Cuban Revolution took place in contrast to the orthodox Communist point of view, according to which the Latin American society was still "feudal", therefore mobilization of the proletariat was premature. In other words, it was the historical feudal-imperialist alliance—a task in which the proletariat was to participate. Only then was a socialist revolution possible. It was after this event and resulting changes in political situation in Latin America that the interest in dependency was increased.

8. See Note 6.


10. The basic differences between classical Marxists thought and neo-Marxism are: (a) For neo-Marxists, unlike orthodox Marxists, the problematic is underdevelopment within the world capitalist system; (b) The neo-Marxists challenge the assumption, in the classical Marxist thought, that the spread of capitalism into the underdeveloped world was an historically progressive or modernizing force. Avineri (1969) goes so far to argue that unlike his evolutionary categories for Western development—ancient, feudal and bourgeois—Marx's category for non-Western society—the Asian mode of production—is a simplistic, static, geographical concept. He concludes, then, Marx is an early and powerful "modernization" theorist.

The neo-Marxists acknowledge their debt to the classical Marxism and have defended their Marxism in the face of orthodox critics.

11. The differences between corporatists writing in the 1930's and neo-corporatists writing after the Second World War, are in emphasis and approach. While in the 1930's corporatists did not have to demonstrate the failure of the world capitalist system, because in a world in depression, failure was everywhere present, neo-corporatists try to demonstrate the superiority of corporatist solutions to the crisis of liberal capitalism. They argue that unlike previous crisis in the world system, which spread from the center of the system, the current crisis manifests itself in the periphery. The political reason for the difference between corporatism, and neo-corporatism stems from the negative connotation of the term corporatism after European
Corporatism evolved into fascism, destruction and consequent repudiation of fascism. It should come of no surprise that neo-corporatists dissociate themselves from traditional corporatist thought. For neo-corporatists, corporatism is the natural path to the solution of Latin America's developmental problems (see Wiarda 1977; Pike and Stritch, 1974).

12. For a skeptical view on the origin of dependency paradigm see note 4.

13. A succinct review of some of the case studies on Latin America could be found in Chilcote 1974.


15. For a detailed discussion of these crises see S. Amin et al. Dynamics of Global Crisis.

16. The concept of self-reliance carries a very definite message with strong political and emotive overtones. It means to rely on oneself, including one's own economic factors; that is, natural resources, energy, capital, labor, research and organization, for one's own development. It stands for autonomy, self-rule, being master over oneself, but not for autarchy. Self-reliance is a way of fighting dependency, of counteracting the power of others (normative and punitive powers) over oneself. It, thus, is self-respect together with self-sufficiency and fearlessness.

Another approach views self-reliance as autonomy together with equity and self-rule, or self-management combined with equitable relations with others so that they also can benefit from self-reliance. It is a way of combatting dependence and building a pattern of interdependence. The hope is that in a world practicing the economics of self-reliance the production forces everywhere would be much better developed. Exchange of the center-periphery variety would decrease, and total world exchange would be redirected and be differently composed (Galtung, J., et al., 1982).

17. For basic concepts and a criticism of this approach, see Hoadley, J. S., "The Rise and Fall of the Basic Needs Approach," Cooperation and Conflict, XVI, 1981:149-164.

18. E. F. Schumacher criticizes the fragmentary nature and methodological narrowness of modern economics, the way they put...
the accent on the short-term perspective, excluding all "free goods", judging commodities solely from the point of view of their market value, ignoring human's dependence on the natural world. Schumacher calls for the economics of permanence which involves a fundamental reorientation of science and technology towards the organic, the gentle, the non-violent, the beautiful, proposing methods and equipment that are easily understandable and obtainable by everybody, adapted to small-scale applications, allowing for human creativity. The central theme in Schumacher's work is "Humanization of Work." Drawing on Buddhist thinking, Schumacher discusses the threefold function of humanized work:

1. Work should give humans a chance to develop his faculties and to become creative;
2. Work should allow humans to come out of his/her isolation and collaborate in a given task with others;
3. Work should bring forth goods and services that are truly needed by human beings rather than by a profit-hungry system (Galtung, et al., 1982).

19. In answer to such criticisms and doubt on the possibility of small-scale industries, or in general intermediate or alternative technology, followers of Schumacher have seriously attempted to prove the possibility and usefulness of small-scale industries for LIC's. One of these attempts is George McRorie's "Small is Possible," a factual account about who is doing what, where, to put into practice the ideas expressed in E. F. Schumacher's "Small is Beautiful."

20. "Modernity" has been criticized for its inbuilt tendency to overshoot, to overgrow, and to result in overcentralization, over-planning, and overdevelopment. People, surrounded by ever bigger political, social and economic institutions, become alienated from the societal texture in which they live; they are administered humans who barely establish a link between the anonymous city, economy, or democracy and themselves. Politics are too removed from their daily lives, economics too abstract, cities too impersonal for people to relate meaningfully to them (Galtung, et al., 1982).

21. In 1975 the Dag Hammarskjold Foundation confronted the seventh Special Session of the General Assembly with a study entitled, "What Now: Another Development," which contained a critique of the old framework and elements of a new framework aimed at satisfying the fundamental needs of the masses of the LIC's. In Africa, the United National Institute for Economic Development Planning (IDEP) has presented alternative scenarios for self-reliant development in Africa. In Asia, the United Nation's Asian Development Institute (UNADI) has offered an alternative strategy for Asia. In Latin America, a team sponsored by the
Bariloche Foundation, has refuted the "limits of growth" thesis and propounded a "Latin American World Model." In Europe, number of individuals and groups has contributed to conceptualization and operationalization of the idea. All these works are based on studies of the historical realities, rather than a priori theorizing.

For a comparison, the predominant or old framework, and Another Development or new framework could be schematized as:

I. Old Framework
Objectives: Economic growth plus redistributive justice
Process: (1) Top-down planning*, plus participation.
(2) Modernization, industrialization and urbanization
(3) Capital input and allocation
(4) Foreign aid and transfer of technology
Global Structure: One world plus the New International Economic Order
(*Reinforced by parliamentary democracy, the concept of managerial efficiency and the technocratic approach; supported at micro level by the conventional project cycle and cost-benefit analysis; and resulting in an essentially market oriented product mix)

II. Another Development (New Framework)
Objectives: 1. Fulfilment of men/women in terms of:
   (a) finer values
   (b) economic aspiration
2. Release of creative energies
3. Self-reliance
4. Cooperation
5. De-alienation
6. Participation

Process: Structural transformation and mobilization
1. Shift of decision power:
   (a) planning in the small
   (b) planning the large
2. Village as the focal point of development
3. Education:
   (a) raising mass consciousness
   (b) remoulding of elites
4. Total mobilization*:
   (a) transforming labour into means of production
   (b) use of local resources
   (c) development of appropriate technology

Global Structure: De-linking and re-linking for the new global order
(*Reinforced by participatory democracy, supported at the micro level by new principles of project design and evaluation; a
dual approach R & D and action research; and resulting in a needs-based product mix) (Wignaraja, 1977).

22. The major approach from Eastern Europe comes from the Soviet scholars', "Non-Capitalist Path to Development. Perhaps, it is the dominant development strategy for former colonies and semicolonial countries among Soviet writers publishing on development. The possibility of the transition to socialism without passing through the capitalist stage of development, or by experiencing a considerably shorter capitalist stage than the developed countries, under particular historical conditions, first suggested by Marx and Engles, and later further developed by Lenin. The non-capitalist path of development is a specific revolutionary process by which the material and productive, socioeconomic, and political conditions are created for the transition to socialist development in countries characterized by great socio-economic backwardness. This strategy makes it possible for a country to avoid, substantially shorten, or even interrupt the capitalist stage of development. During the transition period a national front of progressive, revolutionary democratic forces, including, besides the workers, the peasants, and the urban petit bourgeois strata—even patriotic circles of the national bourgeoisie carries out anti-imperialist and antifeudal socioeconomic transformations, laying the foundation for the country’s subsequent development toward socialism.

The period of non-capitalist development is not a socio-economic formation and cannot be regarded as a "third path" distinct from the capitalist and socialist paths of development. It is part of the worldwide process of transition to socialism. However, it is a transition not from mature capitalism but primarily from a backward society, in which precapitalist or early capitalist relations prevail.

The non-capitalist path cannot be followed spontaneously without class struggles. Its success is guaranteed by the influence of the world socialist system and by the activity of the working class, the masses, and all progressive and democratic forces in the countries that have chosen this path (Solodovnikov, and Bogoslovsky, 1975).

Number of countries have proclaimed programs of non-capitalist development, including Algeria, Egypt, the Republic of Guinea, Iraq, Syria, Tanzania...

23. See Note 21.

24. Some of the ideas in this section are drawn on Ragin (1983).
1. The reason for referring to the science-technology in question as "Western" is that:

Regardless of the roots that may be said to be universal, the technologies we are discussing have been developed mainly in the West and have spread from the West to other parts of the world with or without modifications. By 'West' we refer not so much to a geographic as to a civilizational area. (Galtung, 1979:283)

2. The "transfer of technology" is an inappropriate description because technology is being traded like other commodities, although in different terms. It is called "transfer of" perhaps because it has mainly been traded by only one party to the other, and in disguise. That is the transfer has been from MICs to LICs.


4. One example of import--enclaves are those factories in the periphery that manufacture products with imported components. Green and Seidman provide an extreme example of this deceptive industrialization. They mention the factories in Asia and Africa which make electric bulbs using only one local component: the vacuum (Green and Seidman, 1968:69).

5. There was, of course, disagreement between missionaries and administrators on the content and direction of education policy. While administrators would urge vocational training, missionaries preferred moral education (for more in this see Altbach, P.O., and Kelly, G. P. "Introduction", 1-49, in Altbach and Kelly [eds.] *Education and Colonialism*.

6. A. Memmi has an excellent account of such effects that create an imbalance and strange personality leading to internal colonialism. See *The Colonizer and the Colonized*.

7. In preceding sections the researcher indicated that there were different types of colonial schools. Besides the differences in structures to what schools taught and the degree to which colonial governments standardized what was taught in missionary, private and public schools, the degree of this standardization also varied by colonial governments. For example, in French colonies all education, text selection, teacher training and certification, examinations, ...after 1903 was centralized under government control. Of course an imitation of the colonizer's
pattern. In British colonies, most schools were missionary, and the missionaries sometimes were not English, such as the Swiss Basel missionaries who operated a number of schools in the area of what is now Ghana. These missionaries could teach what they wanted as long as their activities were confined to geographical boundaries acceptable to the colonial government, and under her supervision, mainly due to her financial support of missionaries. For detailed discussion on this see David Abernathy, The Political Dilemma of Popular Education, 1963. Stanford: Stanford University Press.


9. See Note 8.


11. See Note 10.

12. Quoted by J. Annerstedt and Gustavsson, 1975:29 (See Bibliography).

13. Ireland is a notable example in Europe. By granting fifteen years of no taxation on profits from exports or from capital investment to foreign companies, no restrictions on import and export of capital and profit, the payment of half of the companies costs on fixed investments, refunding the training costs for the personnel, renting factory building on good terms and finally financing half of the companies research and development, the government of Ireland has made the country one of the most attractive areas for foreign investments in Western Europe. Between 1960 and 1973, 496 factories, representing investment capital of 218 million pounds, have been built by foreign companies. See Swan, J. B., "Self-Help: Ireland's Recipe for Development", Industrial Research and Development News, Vol. VII, No. 1, (November) 1973.

14. See J. B. Swan (Note 13).

15. See Note 14.

17. These issues have been discussed in detail in the second chapter.

18. Author's own experience, which seems to be validated by other LICs experiences.

19. See the rest of the page 335 for hardly believable excuses from London, and the embarrassment inflicted upon the professor, itself an important subject in the instructor's credibility and faculty-student relationship.

20. Author's personal observation in the course of Iranian people struggle against the Shah.

21. For a detailed discussion on advantages and disadvantages of these developments see Wolkmer, R., "Megachip", Omni, July 1984:74.

22. Different figures have been reported on the characteristics of ENIAC, see for example, King, A., 1982:37; and the heart of Shurkin's "History of Computer" which is the story of ENIAC's development.

23. The optic fiber was created by C. V. Boyes, who in 1877, shot molten glass out of a crossbow, creating fibers one hundred to two hundred feet long. Boyes saw little use for this fiber at that time, but the long, thin, fiber of glass, now, permits messages to be transmitted directly by light rather than by the flow of electricity in traditional copper cables.

24. As a comparison, two wrist-sized copper cables can carry only 20,000 telephone calls.

25. The concentration of knowledge-information industries in MICs, usually operates in three directions: (1) the vertical and horizontal integration of companies connected with knowledge-information; (2) the involvement of companies expanding into knowledge-information. For example, there are airline companies, automobile manufacturers, mining companies and so on involved in publishing, computer production, film and video production and other related activities; (3) their merging of various knowledge-information industries into conglomerates (O'Brien and Helleiner, 1983).

27. Mort Rosenblum is a former editor of the International Herald Tribune and Correspondent for the Associated Press.


Which regions of the world and what subjects get more coverage by the major private news agencies? Phil Harris conducted a study for UNESCO based on a review of 4,139 stories sent out in the course of one month by Reuters, AFP and UPI, broken down into regions and subject areas. The following tables show the results:

<table>
<thead>
<tr>
<th>Region</th>
<th>Reuters No.</th>
<th>Reuters Percent</th>
<th>AFP No.</th>
<th>AFP Percent</th>
<th>UPI No.</th>
<th>UPI Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Europe</td>
<td>705</td>
<td>40.9</td>
<td>540</td>
<td>38.7</td>
<td>99</td>
<td>9.6</td>
</tr>
<tr>
<td>Northern Europe</td>
<td>241</td>
<td>14.0</td>
<td>155</td>
<td>11.1</td>
<td>727</td>
<td>71.2</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>32</td>
<td>1.9</td>
<td>9</td>
<td>0.7</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>The Levant</td>
<td>42</td>
<td>2.4</td>
<td>20</td>
<td>1.4</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>Middle East</td>
<td>141</td>
<td>8.2</td>
<td>107</td>
<td>7.7</td>
<td>31</td>
<td>3.0</td>
</tr>
<tr>
<td>USSR/Eastern Europe</td>
<td>70</td>
<td>4.1</td>
<td>49</td>
<td>3.5</td>
<td>15</td>
<td>1.5</td>
</tr>
<tr>
<td>Africa</td>
<td>160</td>
<td>9.3</td>
<td>184</td>
<td>13.2</td>
<td>18</td>
<td>1.8</td>
</tr>
<tr>
<td>Latin America</td>
<td>87</td>
<td>5.0</td>
<td>71</td>
<td>5.1</td>
<td>33</td>
<td>3.2</td>
</tr>
<tr>
<td>Indian Sub Continent</td>
<td>92</td>
<td>5.3</td>
<td>38</td>
<td>2.7</td>
<td>16</td>
<td>1.6</td>
</tr>
<tr>
<td>Far East</td>
<td>38</td>
<td>2.2</td>
<td>109</td>
<td>7.8</td>
<td>18</td>
<td>1.8</td>
</tr>
<tr>
<td>Asia</td>
<td>70</td>
<td>4.1</td>
<td>79</td>
<td>5.7</td>
<td>26</td>
<td>2.5</td>
</tr>
<tr>
<td>Other</td>
<td>44</td>
<td>2.6</td>
<td>33</td>
<td>2.4</td>
<td>35</td>
<td>3.4</td>
</tr>
</tbody>
</table>

1722 100.0  1394 100.0  1022 100.0
Table 31
A Thematic Analysis of Five Major Subject Areas

<table>
<thead>
<tr>
<th>Reuters Story Type</th>
<th>No.</th>
<th>Per Cent</th>
<th>Reuters Story Type</th>
<th>No.</th>
<th>Per Cent</th>
<th>AFF Story Type</th>
<th>No.</th>
<th>Per Cent</th>
<th>AFF Story Type</th>
<th>No.</th>
<th>Per Cent</th>
<th>UPI Story Type</th>
<th>No.</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politics: Foreign</td>
<td>483</td>
<td>22.6</td>
<td>Politics: Foreign</td>
<td>446</td>
<td>25.7</td>
<td>Crime</td>
<td>248</td>
<td>19.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Politics: Domestic</td>
<td>426</td>
<td>19.9</td>
<td>Politics: Domestic</td>
<td>202</td>
<td>15.9</td>
<td>Politics: Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crime</td>
<td>300</td>
<td>14.1</td>
<td>Politics: Domestic</td>
<td>220</td>
<td>12.7</td>
<td>Economics: Domestic</td>
<td>190</td>
<td>14.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sport</td>
<td>229</td>
<td>10.7</td>
<td>Economics: Foreign</td>
<td>164</td>
<td>9.5</td>
<td>Politics: Foreign</td>
<td>128</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military</td>
<td>156</td>
<td>7.3</td>
<td>Crime</td>
<td>152</td>
<td>8.8</td>
<td>Human Interest</td>
<td>124</td>
<td>9.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quoted by A. Smith, 1980:91-92.

Following the demand of the group 77 for a New International Economic Order in 1974—initiated by Boumedian, President of Algeria—there has been a demand by LICs for an end to the one-way direction of information flow from MICs. The major criticisms of LICs, that have been addressed from platform of UNESCO and have been accepted by almost all UN member nations except the U.S.A. and Britain (note the U.S. and Britain pressure on UNESCO and their threats to cut their contributions to that organization for becoming political, and dominated by LICs—read, fulfilling its expected functions) are dependence, objectivity, and distortion. For more on this issue see for example M. Masmoudi, 1977, "The New World Information Order", Journal of Communication 29, 2 (Spring):172-79.


30. For a brief critical review of populism see Roxburgh, 1979.
31. For more on this subject, see G. K. Helleiner, World Market Imperfections and the Developing Countries, Overseas Development Council, Occasional Paper No. 11, May 1978, pages 11-62.

32. O'Brien and Helleiner do not use knowledge-information. Their use of information seems to be limited to information technology as related to electronic devices.


34. The current developments in the knowledge-information industry are:

- The cost reductions achievable through miniaturization based on microprocess;
- The increased volume and specificity of improved computer system;
- The enhanced speed of global transmission through new telecommunication systems based on optical fibers and the use of satellites (Dretske, 1983).

35. For more on this issue see O'Brien and Helleiner 1983, p. 18.


37. On the importance of "a person-to-person process" in the transfer of scientific-technological knowledge see Nathan Rosenberg, "Economic Development and the Transfer of Technology," Technology and Culture, 11 (October, 1970) pp. 550-575 and for a more detailed discussion on various views on the differences between information and knowledge, see Machlup, 1980, p. 8, Vol I.
NOTES — CHAPTER IV

1. Machlup (1980), in order to give a definition of science that would reflect a polyglot consensus, takes "account of the characteristics of science specified in the most authoritative dictionaries, encyclopedia, and philosophic treatises in languages other than English," and formulates "a definition of science that reflects the broadest international consensus: science is a body of coherent, systematic knowledge of any subject, formal or empirical, natural or cultural, arrived at by any method whatever, provided it (1) is based on hard, honest and serious study and research and reaches insights not available to laymen or superficial observers and (2) is designed for either intellectual or general-pragmatic purposes, but not for immediate practical application in a concrete case or situation.

Technology has been used to mean variety of phenomena. According to Muller (1979) technology is one of the most loosely defined concepts in use. Knutsson (1979:9) writes on the necessity to sub-divide "the nebula of technology into terminologically more manageable terms." Some scholars have used technology in a very comprehensive sense to include management, organization of work, and other elements of social organization. Others have distinguished between "technique" and "technology". For them the former denotes tools, implements, instruments and machines that are produced by humans. And still some others have called the techniques, which consist of many interdependent and complementary elements, such as machines, instruments, etc. as technical systems, like railways (Edquist and Edquist, 1979).

In the absence of a precise definition of technology, many have preferred to use technology in a more vague and comprehensive sense, including techniques and immaterial aspects, such as technical know-how, management, organization of work, etc. Here, however, science and technology are not used separately for two reasons: first, there are convincing arguments which attribute the origin of modern science to the craftsmen's experience (e.g. A. Clegg [1982]); second, some authors (Vucinich, 1984; Shinkaruk, 1978) view science and technology as relation of production and force of production, respectively, and therefore in a dialectical relation.
According to Vucinich (1984:275):

While previously science was guided by and responded to the needs of technology, now [during the scientific-technological revolution, beginning at the turn of the twentieth century] technology is guided by and reflects the achievements of science.

And according to Shinkaruk (1978:41):

Technology and science grew, as a rule, in two separate spheres—one in the sphere of direct material production and the other in the sphere of non-material culture. The revolution in science began to be a scientific and technological revolution only when the application of science became the most important factor in the development of material production, when science began to be transformed into a direct productive force and when material production became a technological application of science.

According to a standard definition by UNESCO, the concept of "science and technology" applies to the following activities:

1. scientific and technological research (R) or the study, experimentation, conceptualization and theory-testing involved in making discoveries or developing new applications;

2. developmental development (D), which consists in the processes of adaptation, testing and refinement which lead to practical applicability;

3. scientific-technological services (STS) representing a mixed group of activities crucial to the progress of research and to the practical application of science and technology. These services collect, process and disseminate the scientific and technological information needed for such purposes;

4. innovation or the development of a new product or process with a view to ensuring that fresh ideas and inventions are used effectively in the national economy.

And finally, see Nikhil Bhattacharya's (1983) "Scientific Knowledge in Vico and Marx" for a brief discussion on the pereferability of the S-M-C model of scientific knowledge.

2. For more on this subject see L. Winner, 1977, *Autonomous Technology: Technics-out-of-control as a theme in political thought*.

3. See Note 2.

4. See Note 2.


6. See Note 2 for a critical overview of technicism.

7. In traditional trade theories, technology has been viewed as one part of "capital" with a tendency to flow from capital-rich to capital-poor countries, thus promoting "factor-price equalization". This view of technology has been criticized by the critical trade theorists, who emphasize the fact that in the process of technology transfer, the capital-rich countries become richer while the capital-poor countries experience uneven-development. This, therefore, aggravates the existing disparities in capital endowments.

Both theories have also been criticized for considering capital as a homogenous goods; and for ignoring the significance of the element of "monopoly power" present in the transfer of resources, by building market mechanism, in the market for capital goods, based on models of competition.

A new approach, built from what is called "product cycle theory", by Constantine Vaitos and others in the early 1970s, however, argues that technology transfer takes place through a market process which involves three aspects: (1) technology is rarely transferred by itself, but is usually sold in "packages," that is, the recipient companies in LIC's are forced to buy other factors and services from MIC's and transnational corporations, when they seek to obtain a particular technology; (2) the mechanisms for transfer are intended to preserve monopolistic returns--consisting of two stages, "technological monopoly" and "institutional monopoly", or before and after standardization; in the first stage the newly invented or discovered product or process remains in the domains of the firm in which it was originated, in the second stage, the initial firm becomes involved in direct investment.
activities, joint ventures, or licensing agreements depending on
the prevailing circumstances; (3) technology is transferred as
an independent "economic entity" whose transfer has become
commercialized like other commodities.

8. Among such theories one could cite theories of direct private
investments, the international "product cycle", the "technology
gap", industrial location, and "technological dualism". For a
bibliography of these theories see H. Hveem, "Selective
Dissociation in the Technology Sector", p. 276; in J. G. Ruggie
Welfare and the International Division of Labor", New York:
Columbia University Press.

9. For more on this see Holly Sklar (ed.), "Trilateralism: The
Trilateral Commission and Elite Planning for World Management,

10. Thomas A. Callaghan, Jr., "U.S. European Economic Cooperation in
Military and Civilian Technology," lecture at Georgetown
University, September, 1975. Quoted in H. Hveem "Selective
Dissociation in Technology", p. 278.


12. See Note 11.


14. The importance of dealing with the issue of scientific-
technological dependence/domination is, perhaps, relevant to a
wide range of studies such as international inequality, regional
cooperation, social change, and so on, for decades to come,
because of its substantial revolutionary potentials.

15. See Note 11.

16. For a critical evaluation of "Green Revolution" see H. M.
Clearer, "The Contradictions of the Green Revolution" in C. K.
Wilber (ed.), 1979, The Political Economy of Development and

17. See Ernst, 1980.


20. See Note 19.


23. For an example, see the case of India in A. Chitale, 1973, Foreign Technology in India", New Delhi: Economic and Scientific Research Council of India.

24. See Note 19.


27. Corrective maintenance is defined as including all measures to counteract abrasion and wear of components. Abrasion is a normal part of a component's life cycle, the extent of it depends on its age and the way it is used.... The wear of a single component usually has little influence on the proper functioning of the equipment, but if a number of components showing wear are combined, they may cause technical changes in the plant as a whole, resulting, inter alia, in:

-- variations in the product quality;
-- increased consumption of energy or raw materials;
-- increased refuse;
-- increased security of the working place.

Corrective maintenance is a highly complicated matter and demands perfect knowledge of the process used.... [it has been shown that] when the training and maintenance personnel is provided, contracts invariably exclude corrective maintenance.... (Ernst, 1980:63)

For more information on this issue see S. Bennaceur "Role and Importance of Maintenance for Economic Independence," Paris, 1978 (Unpublished manuscript), and a series of UNIDO publications.

28. See Note 17.
29. Woodward (1965) has outlined a model where technology determines organizational structure of enterprises; Aldrich (1972) has tested and confirmed some of the postulated links.


32. See Germani, 1981.

33. Rahman, A. (1980), in this article and other articles cited in this study discusses the negative impacts of scientific-technological dependency on different aspects of LIC's social structure with emphasis.

34. See Note 33.


36. See Note 33.

37. See Note 35.
NOTES — CHAPTER V


2. The Median state arose in the northwest corner of the Iranian plateau around 673-72 B.C.; the Sassanid state was founded in A.D. 224 and collapsed in 1722.


5. To avoid citing numerous resources on which Chapters VI and VII are based, in the text, they are cited in "Note" section of each chapter.


8. For a brief discussion on the characteristics of the institutions of landholding in Islamic Iran, see Ann Lambton, "The Evolution of the Iqta in Medieval Iran," in Iran (Journal of the British Institute of Persian Studies), v:41-56 (1967).

9. See, for example, E. Abrahamian, "European Feudalism and Middle Eastern Despotism," Science and Society, 1975 (Summer) 39(2): 129-156.

10. The issue of the obstacles to the development of an Iranian bourgeoisie has generated numerous debates. For example, Ahmad Ashraf in his "Historical Obstacles to the Development of a Bourgeoisie in Iran" considers the nature and role of traditional capitalism in Iran; H. Katouzian (1981:19) argues that "the most important 'obstacle' [was] the weakness and discontinuity of all forms of private wealth and property."

11. See M. Ravendi, Tarikh-e Ejtema-ye Iran (Social History of Iran), vols. 1-3, Tehran, 1969.

12. Baghdad (part of Iran at the time) and Nishapur were the two most famous of such centers. Among well-known scientists whose works had been taught in European universities for centuries (from the 11th to the 12th centuries) one may name "al-Razi" and "Avicenna" on medicine, "Omar Khayyam" and Nasir-al-Din al-Tusi on mathematics, astronomy. For more on this see A. J. Arbery,

14. H. Katouzian rightfully writes "the entire course of Iranian history, and the existing chronicles of its events, are crowded with examples of this state of insecurity and unpredictability, too numerous, and somewhat embarrassing to cite. And Persian literature abounds with subtle and indirect social and ontological evidence for it." See his examples in Notes 19 and 20, page 24-25.

15. See H. Katouzian, 1981.


17. See Note 16.

18. In the nineteenth century Iran, we notice a relative rapid rise in population from about 6 - 7 million at the beginning of the century to something around 8 - 9 million at the end of it, most of the increase occurring over the last few decades (Issawi, 1971). Whether this rise in population was due to the improvement of socio-economic conditions of the country or other factors becomes clear later.

19. See Note 13 and 16.

20. N. Keddie, 1972 gives a brief account of the subject.


22. The major economic concessions included: a maximum five percent customs duty for imported goods. Immunity from road-tolls and internal transit taxes which were collected from Iranian merchants. A comprehensive nationwide monopoly of railway construction, mining and banking was given to a British subject, Baron de Reuter. A concession to Britain to organize the Imperial Bank of Persia with a monopoly in issuing currency. A concession to Russia to establish the Banque de'escompte, an agency of the Russian Ministry of Finance which functioned as a political instrument. A railroad concession from Jolfa to Tabriz, and a Caspian Sea fisheries monopoly to Russia. A tobacco and an oil concession to two British subjects. And because of receiving loans in various forms and with unfavorable conditions, from the two colonial powers (Britain and Tsarist
Russia) the right of capitulation was granted to those powers (see Ashraf, 1971:40).

23. See Note 22.

24. See Note 22.

25. See Note 13.

26. See Note 21.

27. See Note 21.

28. See Note 21.


31. See N. R. Keddie, 1978, "Class structure and political power in Iran since 1796."

32. See Note 20.

33. N. Jacobs, 1971, Modernization without development.


35. Abrahamian (1982) in this regard writes:

The concession-hunting era was inaugurated in 1872 by what Curzon aptly described as an "international bombshell." Baron Julius de Reuter, a British citizen, purchased for $401000 and 60 percent of the profits from a concession on the customs the exclusive right to finance a state bank, farm out the entire customs, exploit all minerals (with the exception of gold, silver, and precious stones), build railways and tramways for seventy years, and establish all future canals, irrigation works, roads, telegraph lines, and industrial factories. "The agreement", Curzon commented, "contained the most complete surrender of the entire resources of a kingdom into foreign hands that has ever been dreamed, much less accomplished, in history". The agreement, however, aroused so much
opposition in Iran and Russia that it had to be canceled. (Abrahamian, 1982:55).


38. See B. Nirumand, 1968.

39. See Note 37.

40. See Note 37.

41. See Note 37.

42. The British support for the revolution was consistent with both their interest and their ideology: by supporting the revolution they were both scoring diplomatic points against the Russian government, on whom the Iranian monarch had become increasingly dependent, and siding with the cause of freedom and democracy, with which they identified the British system (Kesravi, 1954).

43. See Note 37.

44. See Note 37.

45. See Note 37.

46. See Note 37.

47. See Note 37.


49. See Note 48.

50. See Note 48.

51. See Note 48.

52. See Note 48.

53. See Note 48.

54. See Note 48.

55. See Note 48.
56. See Note 48.
57. See Note 11.
58. See Note 11.
60. See Note 59.
61. See Note 59.
62. See Note 59.
63. See Note 59.
64. See Note 59.
65. See Note 59.
66. See Note 59.
67. See Note 13.
68. See Note 13.
69. See Note 59.
70. See Note 13.
71. See F. Fesharaki, 1976, *Development of the Iranian oil industry, international and domestic aspects*.
73. See Note 71.
75. See Note 71.
76. See Note 71.
77. See Note 7.
78. See Note 7.
79. See Note 7.
80. See Note 59.

81. See Note 59.

82. See Note 59.

83. See Note 59.

84. See R. Arasteh, 1964, *Education and social awakening in Iran*.

85. See H. Katouzian, 1981.

86. See Note 84.

87. See Note 85.

88. See Note 85.

89. See Note 85.

90. See Note 85.

91. See Note 85.


93. See Note 92.


95. See Note 94.

96. See A. Banani, 1961, *The Modernization of Iran, 1921-1941*.

97. See Note 96.

98. See Note 85.

99. See Note 85.

100. Mudarris and Musaddiq were the most uncompromising. Mudarris was arrested and imprisoned in 1929, with no legal or judicial procedures, and nine years later was murdered on the direct order of Reza Shah; Musaddiq went into exile in his estate, three years later was arrested, and with intervention of the Crown Prince was pardoned from death and put in house arrest until 1941, the year of abdication and exile of Reza Shah.

101. See Note 59.
102. See Note 59.
103. See Note 59.
104. See Note 96.
105. See Note 74.
106. See Note 74.
107. See Note 96.
108. See Note 85.
109. See Note 85.
110. See Note 85.
111. See Note 85.
112. See Note 59.
113. See Note 59.
114. See Note 59.
115. See Note 59.
116. Reza Shah was influenced by Mustafa Kemal (Ataturk) the leader of Turkey, whom he visited in 1934. Reza Shah outlawed the veil (traditional chador which covered the wearer from head to foot) immediately after his return from Turkey, where Mustafa Kemal was waging a similar campaign (See Note 54).
NOTES -- CHAPTER VI

2. See Note 1.
4. See Note 3.
7. See Note 6.
8. See Note 1.
9. See Note 5.
10. See Note 6.
11. See Note 6.
12. See Note 6.
13. See Note 5.
15. See Note 6.
16. See Note 1.
17. See Note 1.
18. The formula which was suggested by a techno-bureaucratic Anglo-American team, meeting in Washington a few weeks after the passage of the Nationalization Bill, called that (a) Britain should accept the Nationalization Act; (b) she should seek a new agreement with the Iranian government, according to which the AIOC would resume activities as an operating company, on a fifty-fifty profit sharing basis; (d) the U.S. would support Britain in seeking such an agreement, and, if the Iranian government rejected this solution, she should support Britain's case in the United Nations and the International Court at the Hague; (d) the Iranian government should compensate the AIOC for its unilateral abrogation of the 1933 Agreement; and (e) the
U.S. would be ready to grant a loan to Iran for this purpose. (Nirumand, 1966).

19. See Note 6.
21. See Note 20.
22. See Note 5.
23. See Note 5.
24. See Note 1.
26. See Note 6.
27. See Note 5.
28. See Note 6.
29. See Note 6.
30. See Note 5.
31. See Note 5.
32. See Note 5.
33. See Note 1.
34. See Note 1.
35. See Note 1.
36. See Note 1.
37. See Note 1.
38. See Note 1.
39. See Note 5.
40. See Note 5.
41. See Note 6.
42. Among the reasons is the continuous arming and training of the Iranian army by the U.S., the U.S. persistence on the formation of a regional military pact, and the conclusion of a "bilateral" Irano-American defense treaty which would enable the Americans to establish airbases in Iran (Katouzian, 1981).

43. The Soviets, early in 1959, sent a high-level delegation to Tehran to sign a non-aggression treaty with Iran. They were even ready to withdraw Article 6 of the 1921 Irano-Soviet Treaty, according to which Soviet troops could enter the country if Soviet security was threatened by a foreign power operating in Iran. Yet, the Shah, backed down and instead, signed the "mutual" defense pact with the U.S. in return for more military and financial aid (Abrahamian, 1982).

44. See Note 6.
45. See Note 25.
47. See Note 46.
48. See Note 46.
50. See Note 49.
51. See Note 49.
52. See Note 1.
53. See Note 49.
54. See G. Germany, 1981.
55. See Note 1.
56. See Note 1.
57. See F. Kazemi, 1980.
58. See Note 57.
59. See Note 57.
60. See Note 57.
61. See Note 57.
62. See Note 6.
63. See Note 57.
64. See Note 57.
65. See Note 57.
66. See Note 6.
67. See Note 25.
68. See Note 6.
69. See Note 6.
70. See Note 6.
71. See Note 5.
72. See Note 5.
73. See Note 5.
74. See Note 25.
75. See Note 5.
76. Author's personal observation.
77. See Note 6.
78. See Note 6.
79. See Note 6.
80. See Note 6.
81. See Note 57.
82. See R. N. Keddie, 1980.
83. See Note 82.
84. See Note 82.
85. See Note 82.
86. See Note 82.
87. See Note 5.
88. See Note 5.
89. See Note 6.
90. See Note 6.
91. See Note 6.
93. See Note 92.
94. See Note 92.
95. See Note 92.
96. See Note 92.
97. See Note 6.
98. See Note 6.
99. See Note 6.
100. See Note 5.
101. See Note 5.
102. See Note 57.
103. See Note 57.
104. See Note 57.
105. See Note 57.
106. See Note 92.
107. See Note 6.
108. See Note 6.
109. See Note 6.
110. See Note 6.
111. See Note 6.
112. See Note 1.

113. See Note 1.


115. See Note 114.

116. See Note 114.

117. See Note 114.

118. See Stincomb, 1983.


120. See Note 119.

121. See Note 5.


123. See Note 122.

124. See Note 92.

125. See Note 6.

126. See Note 54.

127. See Note 57.

128. See Note 57.

129. See Note 57.

130. No doubt, there were political considerations behind the decision. In part of the Shah one could speculate such considerations that the agreement would:

supply the Soviet Union with cheap natural gas to compensate them for their historical "grievance" of not having a share in Iranian oil; would provide a material basis for good political relations, and their survival in the longer run; would realize the dreams of the Iranian...people, and at the same time pre-empt the likely charge of oppositionist intellectuals in general (and their
pro-Soviet wing, in particular) that Western imperialism had imposed the cost of a "certified lemon" on the poor Iranian people. (H. Katouzian, 1981:278)


132. See Note 131.

133. See Note 57.

134. See Note 57.

135. See Note 57.

136. See Note 131.

137. See Note 119

138. See Charles Cooper and Francisco Sercovitch (1971) for details on these mechanisms. Their diagramatic demonstration of the "direct" and "indirect" mechanisms illustrates the characteristics of both.

139. See G. Salehkhow, 1974.

140. With the exception of a few countries, the general approach in curbing restrictive business practices in patent licenses and transfer agreements is to rely on general legislation. Such reliance is mainly based on the fact that these practices work directly against public interest regardless of whether there is any misuse of patents involved. There exists, however, also another reason for such reliance. The discovery, preclusion, and control of such restrictive business practices require extensive administrative facilities together with highly specialized staff for detection and enforcement of prohibitive measures... (Salehkhow, 1974:131, 134)

141. For definitions and descriptions of these clauses see Chapter V, and for explicit and implicit payments to the transnational corporations according to such contracts see Chapter VI of the same study. The impact of such practices on the total economies of LIC's and their processes of capital accumulation has been discussed in relative detail in earlier chapters of the present study.

142. See Note 131.

143. See Note 131.
144. See Note 131.
145. See Note 131.
147. See Note 146.
148. See Note 146.
150. See Note 149.
151. See Note 57.
152. In the first stage of the original Land Reform Law, 20 percent of peasant householders received land; in the second stage (1964-66) the rest of those peasant households who had been working on the land received the legal possession of the land; in the third and fourth stages (1966-78) the large-scale farm corporations and agri-businesses were created (Kazemi, 1980).
153. See Note 57.
154. See Note 6.
156. See Note 6.
157. See Note 6.
158. See Note 146.
159. See Note 146.
160. See Note 57.
161. See Note 57.
162. See Note 5.
164. See Bank Markazi Iran, Annual Report 1977-8, Table on P. 163.

165. See Bank Markazi Iran, Annual Report 1977-8, Table on P. 165.

166. See Note 165.


169. See Note 165.

170. Author's own observation.

171. See Note 170.


173. See Note 168.

174. See Note 167.


176. See M. G. Tarshis, 1976.

177. See Note 176.

178. See Note 175.

179. See Note 176.

180. See Note 167.

181. See Note 176.

182. See Note 176.

183. See Note 176.


185. See Note 172.

186. "Until the early 20th Century Iran had a medieval, religious educational system. During the Revolution of 1905-11 laws on the creation of a secular system of education and compulsory
elementary education were passed. They were not realized, however, and education in Iran to a considerable extent remained in the hands of the clergy. In 1927 a law was passed on universal free elementary education, and an educational reform was undertaken envisaging the creation of a unified state system of general educational schools. At all levels of study, religion is a compulsory subject. In 1943 a new law was promulgated with the goal of assuring universal elementary education within ten years, but in 1966, 67 percent of the men and 88 percent of the women were illiterate..." (Doroshenko, 1976:393).

187. See Note 167.
188. See Note 167.
189. See Note 167.
190. See Note 167.
191. See Note 167.
192. See Note 167.
194. See Note 167.
195. Author's personal observation.
196. For various types of military service, such as Literacy Corp, Health Corp, and the impact of sending high school graduates to the villages, on the rural communities see Note 6.
197. There are no comprehensive labour force statistics, therefore the desired figures should be extracted from the available data. H. Katouzian writes, in this regard, "that Iranian officials did not publish specific statistics in order to save their embarrassment." He also comments that:

even aggregate figures lack consistency, because of the mystifying tactics used by official technicians and technocrats...in order to cover up the truth. For example, there are some discrepancies in the data given by the same official source which, according to the source's own explanation, are due to statutory changes in the minimum employment age. That may be so. But, even after allowing for the "statutory readjustment", the figure for the employed labour force in 1973, quoted in one of the source's publications, is more than the figure it quotes
for the total labour force in 1973 in a later publication.
(H. Katouzian, 1981:259)

198. See Note 6.
199. See Note 6.
200. See Note 6.
202. See Note 57.
203. See Note 57.
204. See Note 57.
205. "Azimi identifies three levels of calorie intake, which in the
specific conditions of Iran indicate three distinct "poverty
lines". Using an index of minimum calorie requirement
consistent with normal well-being in Iran, he defines Line A for
calorie intakes of between 90 and 99 percent of the minimum
requirement; Line B, for calorie intakes of between 75 and 90
percent of the minimum requirement; and Line C, for intakes at
75 percent, or less, of the minimum requirement." His findings
are summarized in the following table:

<table>
<thead>
<tr>
<th>Minimum Calorie Requirement</th>
<th>Line A</th>
<th>Line B</th>
<th>Line C</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Population</td>
<td>34</td>
<td>28</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Rural Population</td>
<td>12</td>
<td>13</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Total Population</td>
<td>21</td>
<td>20</td>
<td>3</td>
<td>44</td>
</tr>
</tbody>
</table>

Table 32 indicates that 21 percent of the population (most of
them in towns) were undernourished, 20 percent (also mostly in
towns) were severely undernourished, and 3 percent (mostly in
rural areas) were dangerously undernourished.

One of the reasons for the differences between urban and rural
results, Katouzian argues that "the cultivating peasants can at
least partially feed themselves from their own produce; their other subsistence requirements (housing, clothing, bedding material, and so on) are normally supplied by their own household labour, thus enabling them to spend a larger proportion of their income on food; and, while the unemployed landless peasants are more likely to fall into Line C than are unemployed workers in towns, most of those in Lines A and B in the urban centers must themselves be recent immigrants from rural areas, living on the edge of towns, where they are at least partially unemployed and no longer are able to supply some of their own food" (Katouzian, 1981:272).

According to Azimi:

It would require a 10 percent annual average growth rate of real expenditure by undernourished households in order to eradicate this kind of nutritional poverty within eight years in the rural sector and six years in the urban sector. (Quoted by H. Katouzian, 1981:270-72)

206. See Note 6.

207. See Note 6.
NOTES -- CHAPTER VII


2. "Industrial property" is published in England by World Intellectual Property Organization (WIPO). The statistics on patents and trademarks appears in annex to December issue of each year.

3. The estimation is based on data from Bank Markazi Iran's (Central Bank of Iran) Annual Report, 1975-76, Appendix Tables 52 and 53.

4. See Note 3.


6. The export enclave is calculated by the following formula:

\[ C = \sqrt{\frac{1}{n} \sum_{i=1}^{n} \left( \frac{X_i}{X} \right)^2} \]

Where Xi is the value for a commodity grouping and X refers to total exports (Taylor and Jodice, 1983: 230-232).


8. See Note 3.

9. Since a society's need for science-technology should be met, if the endogenous supply is not enough to satisfy the demand, then the society should rely on exogenous science-technology.
NOTES -- CHAPTER VIII


2. See Note 1.


4. See Note 3.

5. See F. Holliday


7. See Note 6.


10. See Kaplinsky, 1980.


12. See Note 11.

13. Morehouse (1982) argues that this policy could be viewed as a strategy of "selective interdependence" or at least at the beginning, "selective dependence". However, whatever it is called, the point is that it is not a goal in and of itself but one means of working toward scientific-technological autonomy, and it should be seen as a transitional strategy, leading to reassociation with the international system in a more autonomous and less dependent relationship. For more detail on these points and other related issues see W. Morehouse (1982).

14. In a report as to benefits Sri Lanka has received from technology relations with the Soviet Union (under the previous government), the Marga Institute cites the following: "(a) a relatively free access to technology, (b) the absence of restrictive conditions in regard to procurement of raw materials and marketing of products abroad, and (c) a genuine concern for creating the local technical capability to run the plant and for establishing research and development facilities at each plant to ensure the growth of technology." Marga Institute, "Transfer

436

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

15. India's S-T capacity includes both the intermediate state of innovation, that is, product design and improving on design, and the advanced stage, that is, the setting up of complete production systems and designing new industrial processes. In over three decades India has been able to build such a capacity, because of the concurrent growth of her knowledge base and the evolution of her productive system (Lall, 1978).

16. Immediately after Iran-Soviet agreement for establishing a steel plant, technical trainings of personnel started under supervision of Soviet experts and collaboration of Iranian engineers, in an educational center, as a part of the plant. The related published materials were translated by Iranian translators. A number of Iranians were sent to the Soviet Union for short and long term training and education at different levels. An additional comment here (although somewhat irrelevant to the subject), the Soviet technicians, experts and advisers had their own community and were not allowed to mingle with their Iranian counterparts outside the workplace. A comparison between the respectful behaviors and simple, separated community of the Soviets and the luxurious, wasteful and disrespectful (and even humiliating) behaviors of the U.S. and some Western European so-called experts and military advisers (well over 50,000, a year before revolution) and the consequent resentment of the majority of the educated Iranians can be counted as part of the reason for, inter alia, the overwhelming and widespread demonstrations of resentment against the U.S. policies since then.
BIBLIOGRAPHY


438


Bank Markazi Iran (Central Bank of Iran), Annual report 1977-78. Tehran: Bank Markazi Iran.


444


Cummings-Bruce, N. (1977). Parts and transports. Middle East Economic Digest, special survey on Iran (February).


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.


Murray, R. (1972). *Underdevelopment, the international firm, and the international division of labor*. Britain: IDS, University of Sussex.


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.


