MATHEMATICAL MODELS FOR NATIONAL ECONOMIC PLANNING IN UNDERDEVELOPED COUNTRIES

AN EMPIRICAL STUDY FOR THE IRAQI ECONOMY

by

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S Y N O P S I S

This study is concerned with the use of mathematical models for development planning. It proposes a procedure for building quantitative national economic planning models with special attention given to the investment decisions. The unifying thread running through the various alternatives considered here is the proposition that economic development implies interconnected processes of economic and social change. 'The ultimate aim of development planning is to raise the standard of living and to increase employment opportunities in the shortest possible time. Rapid and sustained growth can only be ensured through a continuous stream of high-rate investments over a long period of time. In underdeveloped countries, where the level of capital accumulation is relatively low and where prices in an imperfect market situation are no adequate guide for rational investment decisions, this necessitates varying degrees of state intervention in the economic activities to ensure both a rapid rate of growth and efficient allocation of resources'.

The study proposes a multi-sectoral model with special application to the Iraqi economy for determining optimal structures of output, investment and other economic variables which maximise a social welfare function subject to the structural and other relations restricting the possibilities of economic development. In introducing a distinction between competitive and complementary imports, the same exercises also serve to explore the scope for import substitutions. The study sheds light on the problem of investment criteria and illustrates the use of

integer-programming-type models for taking investment decisions on a project level in relation to planning on a macro- and sectoral level.

As the Iraqi economy has special features distinct from those generally prevailing in underdeveloped countries, particularly with regard to its endowment with crude oil resources, the application of the model shows how in practice the theoretical concepts can be utilised. By using parametric programming the multi-sectoral model explores the welfare implications of alternative policies in the case of Iraq. In view of the economic structure and potentialities, the pattern of recent growth, planning experience and the available statistical data, a model for development planning is here elaborated for the Iraqi economy. The results and conclusions offer evidence that unless the present economic policies are changed, the development of the Iraqi economy will be restricted.

In this respect it is hoped that this study will serve the purpose set out, i.e. to introduce the subject of mathematical models to the field of national economic planning in Iraq and advocate in a practical manner the approaches by which economic problems can be treated.

A C K N O W L E D G E M E N T S

In the course of preparation of this study many people have contributed in various direct and indirect ways. Most of all, however, I would like to express my gratitude to my supervisor, Dr. A. R. G. Heesterman of the Department of Econometrics and Social Statistics at the University of Birmingham, for his help and kind attention. His stimulating suggestions, constructive criticism, and constant efforts to set me on the right track proved invaluable. I would also like to thank Mr. A. C. McKay of the Department of Mathematical Economics at the University of Birmingham, who was most helpful in my difficulties, particularly those concerning computer programming.

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Without the study leave, some four years in all, granted to me by the Iraqi Ministry of Planning, this study could never have been completed.

Finally, my deepest thanks must go to my wife, whose contribution to this study was at every stage invaluable, and whose patience and understanding made it possible.

ABBREVIATIONS

BPC	Basrah Petroleum Company
CPB	Central Planning Bureau
CSO	Central Statistical Organisation - formerly Central Bureau of Statistics, CBS
DB	Development Board
ED	Economic Department
EPB	Economic Planning Board
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GNP	Gross National Product
IBRD	International Bank for Reconstruction and Development
ICOR	Incremental Capital Output Ratio
INOC	Iraqi National Oil Company
INMC	Iraqi National Mineral Company
IPC	Iraq Petroleum Company
ID	Iraqi Dinar
ISIC	International Standard Industrial Classification of all Economic Activities
LOR	Labour Output Ratio
MPC	Mosul Petroleum Company
NI	National Income
SAM	Social Accounting Matrix

SMP	Social Marginal Productivity
UN	United Nations
UN/SF	United Nations/Special Fund Project in Iraq

C O N T E N T S

SYNOPSIS

ACKNOWLEDGEMENTS

ABBREVIATIONS

CONTENTS

LIST OF TABLES

LIST OF FIGURES

PAGE NO.

INTRODUCTION i ix

PART I

CHAPTER I THE ECONOMICS OF UNDERDEVELOPED COUNTRIES 1

1.1 Definition and measurements of underdevelopment 2
1.2 Qualitative analysis of the main features of underdeveloped countries 6
1.3 Vicious circles - causes and effects 15
1.4 A general growth model for economic development 16

CHAPTER II ON THE THEORY OF NATIONAL ECONOMIC PLANNING 22

2.1 The concept of economic efficiency 22b
2.2 Economic planning and economic efficiency 24
2.3 Different approaches to economic planning 25
2.3.1 Economic planning from the private entrepreneur's point of view 27
2.3.2 The command economy 32
2.3.3 Centralisation and decentralisation in decision-making 38

		PAGE NO.
CHAPTER II	ON THE THEORY OF NATIONAL ECONOMIC PLANNING (continued)	
	2.4 National economic planning in underdeveloped countries	43
	2.4.1 The targets of national economic planning	47
	2.4.2 Types of economic plans	48
	2.4.3 Process of formulating a national economic plan	50
CHAPTER III	MATHEMATICAL MODELS FOR NATIONAL ECONOMIC PLANNING	53
	3.1 The general scope of the mathematical models	54
	3.2 Quantitative planning technique: input-output analysis	55
	3.2.1 The input-output production model	56
	3.2.2 The validity of the input-output model	61
	3.3 Social accounting matrix: a framework of national economic plan	62
	3.4 Economic models of linear programming type	65
	3.4.1 The general linear programming problem	67
	3.4.2 Economic efficiency and linear programming	70
	3.5 An advanced information system of national economic planning	71
	3.5.1 Dantzig and Wolf's decomposition scheme	71
	3.5.2 Kornai and Liptak's model of two level of planning	73
CHAPTER IV	PROJECT EVALUATION - THEORETICAL AND OPERATIONAL CRITERIA	75
	4.1 General introduction	75
	4.2 Efficiency prices - tools for project's appraisal	79
	4.3 Investment criteria in under-developed countries	87
	4.3.1 Low level versus capital intensive criteria	88
	4.3.2 Balance of payments effects criterion	89
	4.3.3 Employment criterion	90
	4.3.4 Social marginal productivity criterion	91

		PAGE NO.
CHAPTER V	TWO STAGE MODEL OF NATIONAL ECONOMIC PLANNING	93
	5.1 Some economic and technical assumptions of the model	94
	5.2 The formulation of the model	97
	5.2.1 The multi-sectoral model	97
	5.2.2 The sectoral model	108
	5.3 Two stage of planning	109
	5.4 The mathematical structure of the model	111
	5.5 The dynamic model: multi-period plan	116
	5.6 Some general remarks on the model	119
	5.7 The structure of national economic planning organisation	120
	PART II	
CHAPTER VI	THE STRUCTURE AND RECENT DEVELOPMENT OF THE IRAQI ECONOMY	121
	6.1 General introduction	121
	6.2 Recent growth and economic performance - quantitative assessment	124
	6.2.1 Gross national product and income	
	6.2.2 The development of national expenditures	128
	6.2.3 The contribution of the public sector to economic development	130a
	6.2.4 The development of the trade balance	132
	6.2.5 The stability of domestic prices	137
	6.3 Oil and the economy	139
	6.4 The state and problems of the development of agriculture	141
	6.5 The state of industrial development	145
	6.6 Population and employment in Iraq	148
	6.6.1 Population	148
	6.6.2 Employment and unemployment	150
	6.7 The financial resources	151

PAGE NO.

CHAPTER VII — RECENT EXPERIENCE WITH DEVELOPMENT PLANNING-EVALUATION OF APPROACH AND PERFORMANCE 154

7.1 General introduction 156
7.2 The strategy of economic development 157
7.2.1 The strategic factor of Iraqi development 157
7.2.2 The balanced versus unbalanced growth 158
7.3 The development programmes 1951-58 162
7.3.1 The main aspects of the Development Board Programmes 165
7.3.2 The achievements of the Development Board programmes 167
7.4 Economic planning during 1958-63 169
7.4.1 The Provisional Economic Plan 1959/60-1962/63 170
7.4.2 The Detailed Economic Plan 1961/62-1965/66 173
7.5 National economic planning after 1965 177
7.5.1 The Five Year Economic Plan 1965/66-1969/70 177
7.5.2 The National Development Plan 1969-74 190
7.6 The institutional framework and planning mechanism 197

CHAPTER VIII — AN OPTIMISATION ALLOCATION MODEL FOR THE IRAQI ECONOMY 200

8.1 Classification of the Iraqi economic activities 200
8.2 Assumptions relevant to the economic structure of the Iraqi economy 202
8.2.1 Crude oil sector 202
8.2.2 Mining and quarrying - sulphur 205
8.2.3 Private consumption 206
8.3 Variants of the model 207
8.4 The structure of the model 208
8.4.1 Notations and definitions 208
8.4.2 The equations of the model 211
8.5 Computational arrangements 216

		PAGE NO.
CHAPTER IX	PROJECT EVALUATION - CASE STUDIES	218
	9.1 Classification of costs and returns of the plan's projects	220
	9.2 Shadow prices of the principal resources	224
	9.3 Calculation of social economic benefit of the proposed projects	226
	9.3.1 The concept of present worth value	226
	9.3.2 A standard formula for evaluating social economic benefit of the plan's projects	227
	9.4 Case studies	229
	9.4.1 Present experience of the project's appraisal	230
	9.4.2 Case study No. 1; Electrical Bulb Factory	232
	9.4.3 Case study No. 2; Expansion of Mosul Sugar Factory	234
	9.4.4 Case study No. 3; Sugar Factory at Sulaimaniya	235
	9.4.5 Case study No. 4; Wool textile in Nassiriya	236
	9.5 Project versus sectoral and overall analysis	336
CHAPTER X	STATISTICAL SOURCES - METHODS OF ESTIMATIONS AND PROJECTIONS	239
	10.1 Inter-industry flows of the Iraqi economy	239
	10.1.1 Characteristics of the available input-output tables	239
	10.1.2 The technology input-output matrix for 1969-74	242
	10.2 Projection of the sectoral final demand for the basic year 1969	247
	10.2.1 Gross fixed domestic capital formation	247
	10.2.2 Imports	251
	10.2.3 Exports	253
	10.2.4 Private consumption	253
	10.2.5 Government consumption	254
	10.3 Projections of the endogenous variables for the period 1970-74	256

PAGE NO.

CHAPTER X STATISTICAL SOURCES - METHODS OF ESTIMATIONS AND PROJECTIONS (continued)

10.3.1 Exports level during the period 1970-74 257
10.3.2 Government consumption 259
10.3.3 The financial capacity for investment 261
10.3.4 Total employment during 1970-74 263
10.3.5 Population growth 264
10.4 Estimation of the gross incremental capital-output ratios 265
10.4.1 The theoretical framework 265
10.4.2 On the defence of using the gross incremental capital-output ratios 267
10.4.3 Statistical sources and assumptions 268
10.5 Estimation of labour-output ratios 272
10.5.1 Statistical sources and assumptions 273

CHAPTER XI RESULTS AND CONCLUSIONS 277

11.1 The growth of the Iraqi economy 1969-74 279
11.2 Investment policy 1969-74 282
11.2.1 Investment levels 283
11.2.2 Investment allocation 285
11.3 The development of consumption expenditures 1969-74 288
11.4 Analysis of foreign trade 1969-74 292
11.5 Employment level in 1974 296
11.6 The structural changes of the Iraqi economy 1969-74 299
11.6.1 The effects of technical changes 299
11.6.2 Changes in capital formation composition 303
11.6.3 Changes in the composition of gross output 1969-74 305
11.7 Development strategy for Iraq 308

BIBLIOGRAPHY 322

APPENDIX I: Computer programmes 332

APPENDIX II: Statistical Data 336

LIST OF TABLES

Table No.		Page No.
1	National and per capita income of Iraq, 1953-69	126
2	Summary of foreign trade of Iraq 1953-69	135-136
3	Iraq's revenues from oil since 1931	140a
4	Expenditures outlined in the development programmes of Iraq (1951/52-1960/61)	163-164
5	Revenues outlined in the development programmes of Iraq (1951/52-1960/61)	164
6	The annual anticipated and actual revenues and investment expenditures of the DB programmes	168-169
7	Expenditures outlined in the Provisional Economic Plan (1959/60-1962/63)	172
8	Total anticipated revenues and planned expenditures of the Detailed Economic Plan (1961/62-1965/66)	174-175
9	Production targets of the Five Year Economic Plan classified by sectors	179
10	Financial resources and investment allocation of the Five Year Economic Plan (1964/65-1969/70)	185
11	The anticipated increase of value added by sectors of the National Development Plan (1969-74)	194
12	The Balance of Payments as anticipated by the NDP	195
13	Investment allocation of the NDP, 1969-74	196
14	Project evaluation - case studies - summary of the results	238
15	The aggregated input-output matrix of the Iraqi economy, 1969-74	246

Table No.		Page No.
16	The investment coefficient matrix	249
17	The sectoral ICOR matrix	250
18	Final demand by sectors at the base year 1969	255
19	Government consumption by sectors in 1974	260
20	Employment and unemployment projections during 1970-74	264
21	Population in employment distributed by Economic Sectors (1960-69)	274
22	Investment Allocation in 1974 at 1969 current prices (maximum exports and government consumption growth rates - Variant A)	286
23	Investment allocation in 1974 at 1969 current prices (minimum exports and government consumption growth rates - Variant B)	287
24	Private consumption by sectors in 1974 at 1969 current prices (maximum exports and government consumption growth rates - Variant A)	290
25	Private consumption by sectors in 1974 at 1969 current prices (minimum exports and government consumption growth rates - Variant B)	291
26	Projected Iraqi imports in 1974	293
27	Balance of payments in 1974	294
28	Employment in 1974 (alternatives of Variant A)	297
29	Employment in 1974 (alternatives of Variant B)	298
30	The effects of the technical adjustments of the input-output coefficients on the level of intermediate demand and output at 1969	300-302

Table No.		Page No.
31	The composition of gross fixed capital formation in 1974	304
32	The sectoral composition of gross output in 1974 (maximum exports and government consumption - Variant A)	306
33	The sectoral composition of gross output in 1974 (minimum exports and government consumption - Variant B)	307
34	Summary of the results - I	311
35	Summary of the results - IIq	312
36	Summary of the results - III	313
37	Summary of the results - IV	314
38	Summary of the results - V	315-320
39	A multi-sectoral model for the Iraqi economy - Variant 1B	321
40	GNP and NI of Iraq by industrial origin, 1953-69 (at current prices)	336-337
41	GNP and NI of Iraq by industrial origin, 1953-69 (at constant prices)	338-339
42	GFCF of different sectors of the Iraqi economy, 1953-69 (at current prices)	340-342
43	GFCF of different sectors of the Iraqi economy, 1953-69 (at constant prices)	343-344
44	Classification of GFCF by type of assets, 1953-69 (at current prices)	345
45	The input-output technology matrix of the Iraqi economy (of 47 sectors)	346-351
46	Growth of population, labour force and employment, 1960-69.	352
47	Nominal capitals of Iraqi companies and total of foreign capitals therein and percentage at the end of 1968	353

LIST OF FIGURES

FIGURE NO.		PAGE NO.
1	The main vicious circles of underdevelopment	15a
2	Social Accounting Matrix	64a
3	Interrelationships between the economic activities in a planned economy	109a
4	The Organisations of National Economic Planning	120a
5	Change of GNP in relation to different levels of investment	284a
6	Development of GFCF, 1953-69	304a
7	Linear approximation of investment (different alternatives) path over the planned period, 1969--74	304a

I N T R O D U C T I O N

The need for well-defined approaches to the problems is as acute as the problems confronting the underdeveloped countries. The various actors in the state of the underdeveloped countries - the politicians, the economists, the administrators and the sociologists - have attempted to see the problems concerned in their own way. It is the aim of this econometric study to use mathematical models in the context of the national economic planning for the underdeveloped countries with particular reference to Iraq. The study consists of two parts: The first part outlines the general problems and the planning approach in the underdeveloped countries with a general proposal for a development planning model. The second part is an empirical study applying the model to Iraq. It is for this purpose that different aspects of the Iraqi economy are extensively investigated.

Throughout the study two main problems arise. Firstly, in view of the diversity of the economic, social and political conditions among the underdeveloped countries, the propositions advanced in Part I must of necessity be of a general nature. However, in Part II, the empirical study of the Iraqi economy serves to elaborate and particularise these generalisations. Secondly, the requisite data are usually not available in suitable forms, and thus much effort has been spent in deriving and arranging them according to the requirements of the models.

PART I

The disparities that exist among the rich and poor countries in the relative degree of economic and social progress, has called the attention of economists, particularly during the last two decades, to investigate the underlying problems that caused the retardation in the development of the poor countries which comprise the world's two-thid population. Economists like P. N. Rosentein-Roden,(1) R. Nurske,(2) A. Lewis,(3) P. Bauer and B. Yamey,(4) G. Meier, G. and R. Baldwin,(5) H. Chenery,(6) J. Tinbergen,(7) and others, have propounded different theories of and approaches to these problems and some of them have also developed new techniques to deal with such problems.

Economic development springs from demand for necessities and ever-increasing human wants in relation to the scarcity of the available resources. The gravity of this problem is becoming a serious concern for all countries, but in the case of underdeveloped countries, the task is much more difficult even in terms of offering a theoretical solution, because of the multi-phenomenon dimension of the problem. Growth calls for high levels of investment and rational allocation of the available resources, with due consideration for the existing social and economic structure and the prevailing political conditions of the country concerned. It is for this reason that a far-reaching structural change conduicive to bring about the social and economic

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(1) Rosentein-Roden, P. N. [110]
(2) Nurkse, R. [106]
(3) Lewis, A. [97]
(4) Bauer, P. and Yamey, B. [10]
(5) Meier, G. and Baldwin, R. [102]
(6) Chenery, H. [20]
(7) Tinbergen, J. [120]

progress in underdeveloped countries has to be effected. In this context the term "underdeveloped countries" has to be clarified and defined on account of the relative and arbitrary use of the term in the literature. This is the main theme of Chapter I, but due to the diversified characteristics of different underdeveloped countries, this Chapter had to be written in general terms.

In Chapter I attention is called to the low level of saving (investment), particularly private investment, the inefficient allocation and the under-utilisation of available resources, market imperfections and the unfavourable general social and political conditions in the underdeveloped countries and hence the need for state intervention in economic activities to accelerate the growth rate so as to provide a high level of employment and to raise the standard of living. State intervention presupposes the following conditions:

(i) An efficient control of the instruments by which all economic activities are directed via incentives to ensure that the behaviour of all economic units is consistent with the government economic policy.

(ii) Suitable and efficient techniques should guide the economic policy-makers in their decisions.

The above conditions and the associated problems are normally discussed in the context of national economic planning framework. The targets of national economic planning are usually economic growth, efficient allocation of resources and equitable income distribution.

As for the underdeveloped countries, the task of national economic planning should not only be the projection of the economic targets, but also a direct and indirect action by the state to mobilise and channel efficiently the disposable resources for the fulfilment of the targets. This has been generally accepted by almost every underdeveloped country, and this has given rise to different forms of national economic planning. To adopt a particular approach of national economic planning warrants a careful study of the existing conditions of the country concerned. Attention to this is focussed in the second part of the study, but in Chapter II we attempt to underline the theoretical and practical problems surrounding the adoption of the existing two different extreme approaches to national economic planning. The study reveals that in the context of existing conditions of the underdeveloped countries planning based on market mechanism reflects the private entrepreneurial point of view where the profit stimulates the growth rate and the prices determine the resource allocation would not perform the tasks of achieving the overall targets of development planning. On the other hand, the planning mechanism of the highly centralised "socialist" system does not determine the extent to which consumption and investment criteria set up by the top planning authorities achieves economic efficiency.

In Chapter II, an attempt is made to reconcile both the national point of view and the private entrepreneurial point of view to present an efficient and appropriate -- centralisation and decentralisation -- approach to national economic planning in the underdeveloped countries.

Theoretically a national economic plan has to be feasible, consistent and efficient, and this could only be achieved by quantitative analysis. Here, the input/output analysis despite its limitation, provides the planner with a comprehensive framework showing the transaction flows among the various sectors of the economy. This analysis recognised explicitly the interdependence of economic activities. The magnitudes of the direct and indirect effects of the whole inter-industry system created by increasing one unit of the final demand could also be quantitatively estimated. This is briefly discussed in Chapter III. The basic principles of linear programming techniques are also outlined to show how this technique could be used to work out rational alternatives to the policy-maker in achieving the targets under given conditions. Introduction of these techniques help to present a model of linear programming type based on input/output analysis which is capable of dealing with the problems of growth and efficient allocation of resources. Here the scheme of Heesterman's comprehensive optimal planning, Dantzig and Wolf's decomposition and Kornia and Liptak's model as advanced information systems of planning are considered also. In Chapter IV a general theoretical treatment to the criteria of investment decisions on project level is given.

In the light of the theoretical propositions of the first chapters and the quantitative techniques presented in Chapter IV, a mathematical comprehensive model for national economic planning in underdeveloped countries is being elaborated in Chapter V. The objectives of the model are:- to maximise the growth of the economy; to allocate scarce resources, capital and foreign exchange; to determine production level; and to ensure a minimum level of employment. Also the model permits the possible substitution of competitive imports by domestic output. At the sectoral level, an integer programming model is designed to select projects of the plan within the allocation framework at the macro- and sectoral level, and on the basis of certain investment criteria. It is a two-stages model; the first stage is concerned with allocating resources and achieving the targets and selecting projects; the second stage will consider the impacts of the investments on the whole system by modifying the input/output coefficients and other parameters. The model does not approach the problem of optimal planning from the point of view of the private entrepreneur, but instead it tackles the problem from the national point of view by ascertaining the role of state in the national economic development. The activities of the private entrepreneur, however, may be made to follow the policy of the state by a system of incentives or disincentives. The model in its general form is flexible enough to be modified for particular application if necessary.

The model partly owes its origin to the pioneering empirical work of J. Sandee,[8] H. B. Chenery,[9] M. Bruno,[10] and to the theoretical work of A. R. G. Heesterman on optimal planning.[11] In addition Tinbergen's approach of planning by stages[12] and Dantzig's work on planning by iterative procedures underlines some other aspects of the study.

PART II

Iraq, as most underdeveloped countries, is characterised by a low level of per capita income, low level of productivity, high level of unemployment, a high proportion of population in agriculture. However, unlike most of these countries Iraq is endowed with capital and has excellent economic opportunities for development with no population problem. In particular, Iraq has no acute foreign exchange problem as have most underdeveloped countries. The favourable balance of payments due to the high level of crude oil exports enables Iraq to import capital goods required for economic development. Thus Iraq during the period 1952-69 had a remarkable growth rate of about 6.7% annually. Nevertheless the quantitative investigation in the structure and development of the economy shows that although Iraq has

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(8) Sandee, J. [112]

(9) Chanery, H. B. [21]

(10) Bruno, M. [16]

(11) Heesterman, A.R.G. [49]

(12) Tinbergen, J. [121]

(13) Dantzig, G. [25]

a relatively high rate of growth this may not be continued in the future unless the investment policy is changed. The development expenditures (the development programmes and economic plans) failed to generate saving and investment capable of creating a growing self-sustained balanced economy. In recent years the development of the economy has been characterised by a low level of capital accumulation, the explosive upwards trend of imports, the absolute and relative deterioration of non-oil exports, the uncontrolled conditions surrounding crude oil exports and production which are grave problems and are necessary to be dealt with. The investigation in these problems shows while Iraq is still dependent on crude oil exports the available resources, especially oil revenues, have not been rationally utilised.

With the growing dominant government influence in economic development, the working of the Iraqi economic system depends to a large extent on the mechanism of resource allocation regulated by the government. Thus the prospects of development have been judged by the way in which economic decisions on different levels are taken by planning authorities. In this respect the study reveals that many improvements in the technique of investment planning are needed.

In Chapter VI an examination of the structure of the economy and the recent economic performance has been attempted in order to lay down the foundations for future development. Many propositions given in this Chapter underline the qualitative features upon which the multi-sectoral model has been based. In Chapter VII the economic

development of Iraq represented by various investment programmes and development economic plans has been thoroughly examined. In dealing with the related issues we have emphasised on the economic efficiency criteria rather than the political factors or the administrative side in delaying the execution of development projects. This Chapter shows that the government policy regarding the desired rate of growth, reducing the dependence on oil and other problems, is of little practical value in the absence of well-defined quantitative methods of defiving and formulating these objectives on the basis of economic efficiency.

The propositions given in Chapters V, VI and VII furnished the possibility of utilising programming and input/output techniques so as to introduce and establish in planning practice a theoretically efficient and self-consistent model. This step, in the case of Iraq, is, however, prior to any attempt for the "best" formula of an economic model accepted in practice and considered as realistic. On the overall and sectoral level the model aims to deal with the growth pattern of output, investment, private consumption, competitive and complementary imports on alternative assumptions about exports, government consumption, capital and foreign exchange availability. This is demonstrated in Chapter VII. In Chapter VIII four case studies on project evaluation are undertaken in order to establish practical criteria for investment. The link between the project and overall analysis is also demonstrated.

In Iraq the available data are not readily adaptable for the purpose of applying the model. Various steps had to be pursued in adjusting the available data before utilising them. The first step was to compile all available statistical data useful for the purpose. This endeavour, however, was time-consuming. The second step was to define and classify these data in an orderly form suitable for the quantitative analysis. This is the theme of Chapter X. In Chapter XI the results obtained and conclusions arrived at show that the proposed model bridges the gap, in an efficient and practical way, between the present state of the Iraqi economy and the tasks of planning.

Finally, it is hoped that this study will contribute to the efforts endeavouring for better understanding of development planning problems in Iraq. By introducing and applying such a quantitative approach in the field of national economic planning - where no progress is made neither in practice nor in academic research - the study presents the methods and the statistical sources required for economic analysis and decisions concerning development problems in Iraq.

PART I



CHAPTER I THE ECONOMICS OF UNDERDEVELOPED COUNTRIES

To outline the scope of this study and to focus attention on a particular economy in its own social and political setting, it is necessary to state what the concept "underdeveloped countries" implies. This task is rather a difficult one.(1) It requires the establishment of certain criteria of "underdevelopment" which are then to be applied to the economy in question. Such criteria are supposed to be derived from the basic and commonly observed features of the economic, social and political structure of the countries concerned. Within one economy such an approach of analysis may be possible, but for comparative purposes, especially when the field of "underdevelopment" is exceedingly broad and many related issues are still debatable, the aim is hard to achieve. However, in dealing with this problem one could derive a very general but satisfactory outline of the concept "underdeveloped countries" through a brief discussion of different criteria and problems of economic development.

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(1) In a report on measures for economic development of underdeveloped countries, a group of United Nations experts have confessed: "We have had some difficulty in interpreting the term 'underdeveloped countries'". U.N.[130] p.3. Literature on the economics of development of the underdeveloped countries is generally beset by such a difficulty. See for example Viner, J., "The Economics of Development", in Agrawala, A. N. and Singh, S. P. (ed.) [3] pp. 9-31, Singh, D. B.[116] , Bauer, P. T. and Yamey, B. S. [10] and Alpert, P. [7]

1.1 DEFINITION AND MEASUREMENTS OF UNDERDEVELOPMENT

Very broadly economic development is a concept relative in time and space. Fundamentally it implies processes of economic and social changes creating new productive capacity and demand.(2) It is a complex historical process in which economic and non-economic factors are closely interwoven. The ultimate aim of this desired change is to raise the standard of living and to increase employment opportunities in the shortest possible period. In the last two centuries some countries have had considerable increase in the level of output per head as a result of increases in productive capacity, whereas in other countries, this level has either relatively declined or remained stagnant during this period.(3) According to the gap of disparities of that "level" it may be possible to rank all countries and distinguish between "developed" countries and "underdeveloped" ones, assuming arbitrarily a certain level as a dividing line.

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(2) Changes in supply are mainly due to the discovery of additional natural resources or population growth, capital accumulation, introduction of new higher level of production technology and improvement in productivity. Changes on the demand side are mainly due to the level and distribution of income, the size and composition of population and tastes. /See Meier, G. and Baldwin, R. [102] pp. 2-3.

(3) "Economic development is so far simply the object of economic history which in turn is merely a part of universal history, only separated from the rest for purposes of exposition. Because of this fundamental dependence of the economic aspect of things on everything else, it is not possible to explain economic change by previous economic conditions alone". Schumpeter, J. [113] p. 58.

At a first glance it seems reasonable to choose the level of per capita real income as a criterion of "development", hence a certain level of per capita income is to be selected to distinguish between "developed" and "underdeveloped" countries. More specifically by this criterion the underdeveloped countries are defined as countries with low level of per capita real income in comparison with the developed countries.(4) The justification of the use of this criterion is provided by the fact that per capita real income in the final analysis expresses the level of both productive capacity and effective demand. The classifying of countries according to this criterion is therefore of a technical nature and presumably has not implications about the level of civilisation and cultural or spiritual values.(5) However, even if we exclude extreme

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(4) A group of United Nations experts define the term of "underdeveloped countries" as follows ". . . we use it to mean countries in which per capita real income is low when compared with the per capita real incomes of the United States of America, Canada, Australasia and Western Europe. In this sense, an adequate synonym would be "poor countries" , see U.N. [130] p. 3, Meier, G. and Baldwin, R.[102] p. 8, Nurkse, R.[106] p. 1,. Professor B. Higgins would like to add to this criterion a condition that is "if its government considers development a 'problem' in a way which calls for positive policy". Higgins, B.[51], p.6 See also Bhagwati, J. [13]pp. 12-16 (Bhagwati has some reservations concerning the computations of national account).

(5) Higgins, B.[51] p. 7.

cases,[6] the level of per capita real income is not reliable enough to be the only criterion of development. Because in addition to the practical difficulties arising from the estimation of per capita real income, there is no clear-cut definition for every item of the concept "national income" to be followed, and therefore the estimations of national income in any country are surrounded by conceptual and practical difficulties which renders it difficult to make a significant comparison between countries.[7]

Another criterion might be given for measuring "underdevelopment"; that is the scarcity of natural resources in certain countries. It is of course economically important to have potential prospects for using more economic resources to improve the economic well-being of the people and, as a matter of fact, this is one of the problems

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(6) It is not reasonable to consider, for example, Kuwait and some of the Sheikdoms and Emirates of the Arabian Gulf which enjoy a very high level of per capita real income (and per capita consumption too) as developed countries where the infrastructure of those countries is not established yet. Nor is it reasonable on the other hand to consider the Soviet Union until the 50's as an underdeveloped country because it had a low level of per capita income. Other examples can be given, such as Venezuela and Argentina (underdeveloped countries) which have a higher per capita income than the Netherlands and Austria (developed countries).

(7) These difficulties are associated with the problems attached to the availability and accuracy of the statistical data which make the comparison between different levels, practically unreliable as the only criterion of development. On the problems of national income measurements, see Bauer, P. T. and Yamey, B. S. [10] pp. 16-24.

of the underdeveloped countries. It should be realised, however, that many of the underdeveloped countries are rich in capital, labour and natural resources.(8) Other measures may also be suggested as criteria for "underdevelopment", such as a high level of unemployment, low level of productivity, high percentage of agricultural output in total national output, continuing unfavourable trade balance, etc. But for the very simple fact that there are many exceptions, each criterion is not sufficient to be the only one by which the concept of "underdeveloped countries" can be defined.(9) Such difficulties impede the possibility of deriving a very precise common definition of the concept. However, an underdeveloped country may be generally defined as a country which due to lack of capital goods and to the low level of

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(8) A study on the evaluation of stocks of the available natural resources on a per capita basis in 60 selected different countries showed that some underdeveloped countries such as Kuwaiti, Qatar, Colombia, Venezuela, Cuba, Iraq, Peru and Chile came prior to some of developed countries such as Denmark, Finland, Japan and Italy. See Meier, R. L. [103] pp. 13-17, (table No. 1). Professor A. Lewis also stressed this point and stated ". . . thus it is obvious that poverty of natural resources sets sharp limits to the growth of output per head, and that a considerable part of differences in wealth between different countries has to be explained in terms of richness of resources. But it is also clear that there are great differences in development between countries which seem to have roughly equal resources". Lewis, W. A. [97] p. 11.

(9) For example, Lebanon and Chile - which are usually classified as underdeveloped countries - have a smaller ratio of agriculture output to national output compared with some advanced countries like New Zealand and Finland.

knowledge and technical ability of the bulk of its population is unable to provide productive employment for all those who are otherwise able and willing to work. Except when such a country is endowed with exceptionally valuable natural resources, such a state will also result in a low standard of living.(10) This general definition would have no analytical value unless the main economic, social and political characteristics of these underdeveloped countries are to be identified.

1.2 QUALITATIVE ANALYSIS OF THE MAIN FEATURES OF UNDERDEVELOPED COUNTRIES

The definition of the concept "underdeveloped countries", as outlined in the previous section, does not contain an economic analysis of development problems. It shows nothing else but a very general framework of some aspects of underdevelopment. Thus, an investigation into the nature of the problem is required, not only to further clarify the concept and its dimensions, but more importantly to explore the causes and effects of underdevelopment. Such investigation is necessary to highlight the main causes of underdevelopment in order to provide the possibility of elaborating a suitable general economic growth model based on generally realistic

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(10) The definition of the term standard of living given by Bhagwati is sufficient in this context. He writes: "it refers not only to that part of it (income) which is allocated to current consumption; it also refers to certain extra dimensions such as the expectancy of life, the availability of doctora per capita, conditions of employment and similar indicators of the way in which human existence is conditioned and enriched". Bhagwati, J. [13] p. 23.

assumption about the underdeveloped countries. This aim may be achieved through an examination of the main economic, social and political features of the underdeveloped countries.(11)

On this subject many authoritative economists like Leibenstein, H.[93] Meier, G. and Baldwin, R. [101], Higgins, B.[51], Bauer, P. T. and Yamey, B. S.[10], Bhagwati, J.[13], United Nations experts[129] and others in Agarwala and Singh (ed.)[3] have suggested a comprehensive and detailed discussion of the main widespread and distinctive features of underdeveloped countries. In the following brief discussion, these features are being analysed as causes and effects of underdevelopment.

(i) The level of per capita real income and production structure; with few exceptions, all the underdeveloped countries are characterised by a very low level of per capita real income. This implies both the low levels of consumption and saving (investment) and consequently total national output remains at its low level. In underdeveloped countries the low level of national output and per capita income in particular is to be therefore considered both as an "effect" resulting from the absence or weakness of all other factors and conditions which contribute to economic development, and at the same time as a

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(11) "Examination of statistics and descriptive information pertaining to underdeveloped countries reveals that there is indeed a correlation between national poverty and other features of the country's economic and social organisation". Higgins, B.[51] p. 11.

"cause" of the other features of underdevelopment.

The structure of production which is mainly oriented towards primary production[12] reveals some other characteristics which in turn deepend economic underdevelopment. The low proportion of industrial activities in the national output in comparison to the high proportion of agriculture and other primary production sectors reflects the weakness of the production structure. The agricultural sector, for example, is the dominant one due to the interrelationships of various factors - low level of capital formation, low level of technology, the social structure, the political system, low level of labour and land productivity or even climatic conditions. This phenonmenon, however, affects the level of national output (per capita income) and it does contribute to a considerable extent to the peculiar structure of foreign trade in underdeveloped countries.

(ii) The level of capital formation; it is a commonplace proposition that capital formation is one of the main factors necessary to create new productive capacity required to accelerate the economic growth overtime. The level of capital formation in the final analysis reflects the level of economic development and is therefore to be considered as a measure of development. It has been

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(12) "Raw material and foodstuff dominate the structure of production in "poor countries"". Higgin, B.[51] p. 294.

proved that the level of capital per head is different between countries and wherever the other "underdevelopment" features are in existence this level is comparatively low,(13) that is to say low capital per head is one of the economic characteristics of an underdeveloped country.(14) However, to put the matter in this manner is rather misleading, because it can be argued that this low level of capital formation should also be considered as a consequence of the other underdevelopment features. To use this level as a measure of development should not be separated from other conditions of economic development. The historical experiences of the present advanced economies show that at the early stage of development this level, relatively speaking, was low.(15) Therefore the scarcity of capital - although it is a limiting factor of development - should not be considered as an absolutely insuperable obstacle to growth.

(iii) The availability and utilisation level of natural, human and financial resources; the value of any economic resource depends both

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(13) "In most countries when rapid economic progress is occurring, net capital formation at home is at least 10 per cent of the national income even when foreign investment is included". U.N.[130] p. 35.

(14) Professor H. Leibenstein has stated "Very little capital per head is one of the main characteristics of underdeveloped areas". Leibenstein, H.[93] p. 40.

(15) "All countries which today are economically and technically advanced began as countries which were as poor as some of the underdeveloped countries are today. Yet internal capital accumulation took place as part of a process of economic development and change". Bauer, P. T. and Yamey, B. S.[10] p. 131-132.

on its usage in producing goods and services to satisfy the demand, and on the values of other resources. The existence of such interdependence of all economic resources emphasises the necessity of considering all types of resources (natural, human and financial) as there exist many possibilities of substituting between them - provided it is technologically applicable - in economic activities. This does not mean that the scarcity of some resources has no effect on the level of economic development and its prospects. On the contrary, it has an effect which could be rectified through foreign trade.(16)

The utilisation level of the resources depends on different conditions such as demand conditions and the level of technology. However, it has been proved that many of the underdeveloped countries are rich in natural resources such as land ready for cultivation - water for irrigation and minerals.

In this respect the problem is not the existence of such resources but the conditions for their utilisation, i.e. the state of technology and the demand conditions which reflect the general level of economic development.

In the sphere of human (population) resources the existence of a high level of unemployment is the most important aspect of the

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(16) Trade opens up the possibility of breaking through the constraints imposed by natural resources, see Bhagwati, J. [13] p.9-12.

underdeveloped countries. This feature must be considered in the light of the following:-

(a) there exist sparsely and densely populated countries and it is not realistic to state that the underdeveloped countries are characterised by a high rate of population growth;(17)

(b) "there is no correlation between unemployment rates and density of population".(18)

Unemployment reflects the insufficiency of one or more co-operating factors of production needed to create new employment opportunities. This insufficiency is due to the low level of per capita income. High levels of unemployment reflect the inability of the economy to employ the available supply of labour. All underdeveloped countries suffer from widespread disguised unemployment,(19) particularly within the

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(17) Higgins, B. [51] pp. 17-18.

(18) U.N. [131] p. 8.

(19) Four categories of unemployment could be distinguished; cyclical, seasonal, technological and disguised. The first type is mainly associated with advanced economies rather than underdeveloped economies. Seasonal unemployment is usually widespread in the agricultural sector mainly because of the natural and climatic environments. The technological type is associated with the necessity of establishing new technology displacing old technology. Disguised unemployment is the widespread type in the underdeveloped countries. See U.N. [131] p. 5.

agricultural sector. This leads to a low level of productivity. High level of unemployment is also associated with serious social and political problems which need to be considered by any development policy. The only remedy of disguised unemployment is to achieve a rapid and high level of growth, but over a short period of time this problem must be dealt with in association with the social and political problem.

Another serious problem facing most of the underdeveloped countries is the scarcity of available financial resources required to finance the desired level of investment. The internal resources are not sufficient due to the low level of national income (per capita income). Thus it is necessary to turn to different foreign financial sources. This policy however has economic and political implications and it is to be decided in accordance with the domestic economic, social and political environment.

(iv) The level of technology; it is a well-known fact that there exists a strong relation between general level of productivity and the level of technology. The latter, therefore, could be considered as one of the measures of development. In countries where many of the "underdevelopment" features are prevailing, the level of technology used in all sectors of the economy is

low[20] and this would affect negatively the general level of economic development. The utilisation of new technology depends mainly on the available capital (investment) and at the same time it has a connection with technological type of unemployment and the social structure.

(v) The unfavourable balance of foreign trade; to secure a certain level of imports essential for economic development, it is of great importance to achieve a certain level of output devoted to exports. The structure of exports plays an important role in maintaining the required level of imports. The size and structure of foreign trade is relatively low and exports consist mainly of a few types of goods. The size reflects the domestic level of output, and the limited diversification of goods reflects the inability of the domestic capacity to adjust for unfavourable changes which might occur either in the foreign markets or in the internal circumstances. Most underdeveloped countries are characterised by the fact that they export only foodstuffs and raw materials,

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(20) This low level of technology might be reflected as in most underdeveloped countries in terms of the following:-

1. "Low yields per acre;
2. no training facilities or inadequate facilities for the training of technicians, engineers, etc.;
3. inadequate and crude communication and transportation facilities, especially in the rural areas;
4. crude technology".

See Leibenstein, H. [93] p. 41.

(vi) The existence of growth retarding socio-political features; in underdeveloped countries the existence of such socio-political features as semi-feudal institutions, weak government, inadequate education, poor health and the religious values retards to a considerable extent the general process of development. As G. Meier and R. Baldwin have stated: "The pattern of investment, for example, is a function of political, cultural, and religious, as well as economic values and motivations".(21) It is for this reason economists nowadays believe that economic development in underdeveloped countries requires institutional as well as economic change.

(vii) The market imperfections; the economic, social and political aspects of underdevelopment have contributed to the existence of the market imperfections. These imperfections are reflected in the ignorance of the entrepreneur of profit opportunities, the lack of transportation and the immobility of the factors of production. As a result the prices (wages, rate of interest, rent and profit) are no longer a reliable guide for the efficient allocation of the available resources. The price system

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(21) Meier, G. and Baldwin, R. [102] p. 355.

does not function so as to produce full employment of the available labour and natural resources.(22) This, however, requires suitable modification in order to achieve a workable and efficient mechanism. The removal or to be more realistic the alleviation of market imperfections is necessary in order to increase the productivity level by stimulating the movement of factors of production to the more productive form of employment in the country and to stimulate investments activities.

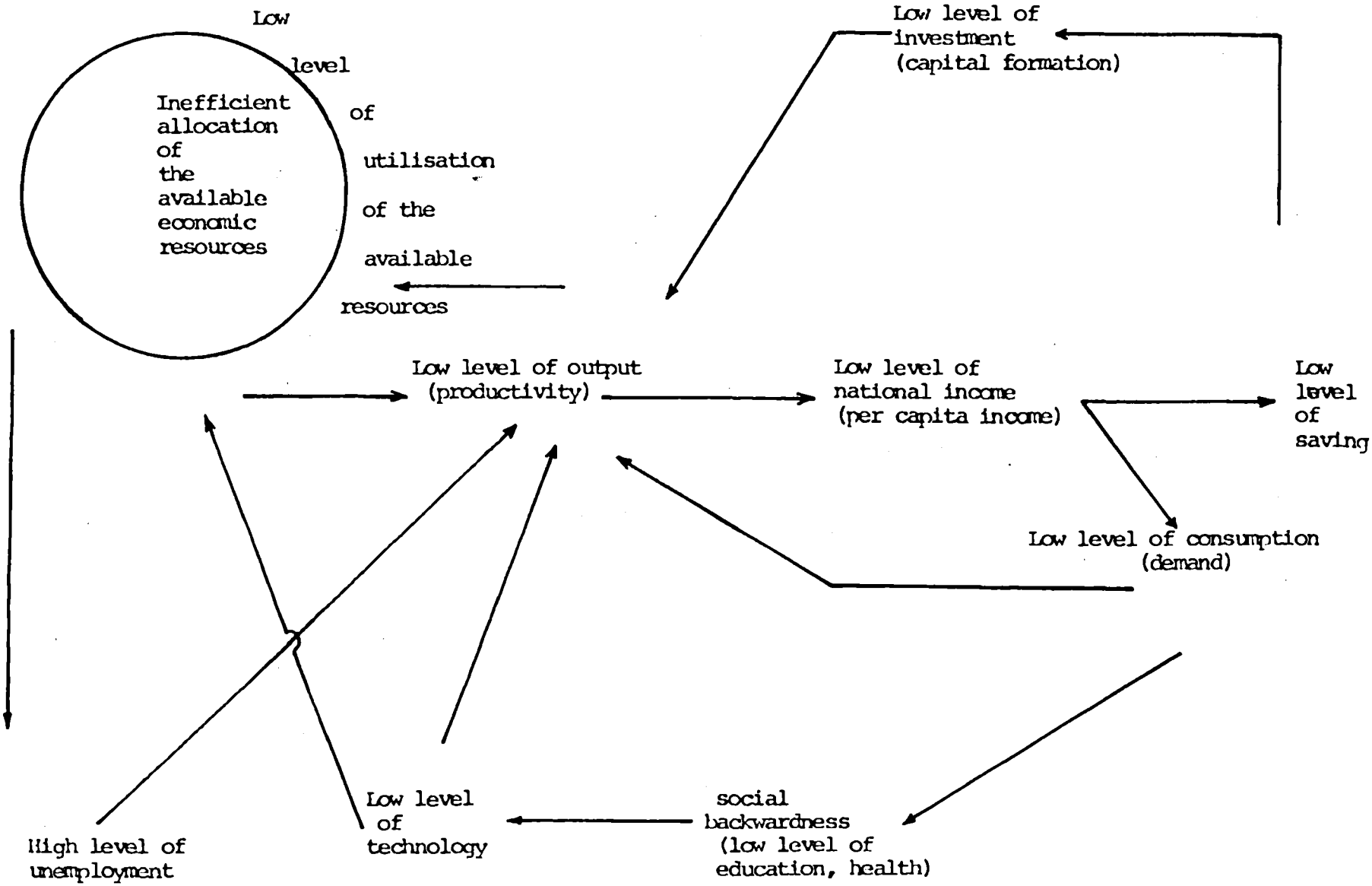
1.3 THE VICIOUS CIRCLES - CAUSES AND EFFECTS

The complexity of the economic situation as reflected by the interrelations of different economic and non-economic features of the underdeveloped countries may be simplified by the following approach of analysis; the low level of per capita income means low level of saving, i.e. low level of investment (capital formation) which is one of the causes of low level of productivity. The low level of investments leads to low level of national output and per capita income. This is a vicious circle. From the supply side of production the low levels of utilisation of economic resources with the inefficient allocation of resources causes - under low level of technology - the low level of productivity which in turn leads to low level of national income. Another vicious circle arises

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(22) This important conclusion being ascertained by authors like Chenery, H. B. and Clark, P. G.[22] p. 280.

FIGURE 1: The Main Vicious Circles of Underdevelopment



as the low level of per capita income means low level of consumption which affects the level of output directly and sustains the social backwardness (e.g. the level of education, health, etc.). Social backwardness in turn affects the level of technology which in turn affects the level of productivity and this leads to low level of national income.

1.4 A GENERAL GROWTH MODEL FOR ECONOMIC DEVELOPMENT

The vicious circles with their causal relations briefly presented in the previous section reflect in general the main problems of economic development and implicitly suggest broadly the means by which they are to be overcome. However, to break down these vicious circles and then to advocate suitable measures for removing or alleviating these obstacles, it is necessary to determine first the key problems, i.e. to start with the most important circular relationships. By doing so, we in fact underline the fundamental basis for the strategy of economic development in the underdeveloped countries.

Generally, the level of production is a function of capital (investment), labour, level of technology and land; capital or investment is the decisive factor among them.(23) Since the supply of land is limited, the supply of labour - the population rate of growth - depends on the general economic and social conditions and labour productivity /which depends on the technological

(23) The economic development problem lies basically in the problem of achieving a high level of capital accumulation. Nurkse, R. See among others: Baldwin, R & Meier, G. [102] and Lewis, A. [97] [106]

progress in particular, where technological progress is the function of investment. The investment level is a function of profit, i.e. profit is the incentive to investment upon which the entrepreneur takes his investment decisions. The level of technology is also a function of investment,(24) i.e. if the entrepreneur finds it profitable to increase the level of output then this will induce him to seek technological improvement.(25) This implies that the level of demand on capital depends on the incentive to invest.(26) With

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(24) Following Higgins, B.[51] the following functions show the similarities among the classical, Maxist, Schumpeter, Harrod and Hansen model of economic growth.

The production function	$O = f(L, K, Q, T)$
The technical progress function	$T = T(I)$
The investment function	$I = f(Q) = I(R)$
Two identities for output	$O = C + I$
	$O = R + W$

Where O = output, Q = capital, I = investment
L = land, T = technological level, C = consumption
K = labour, R = profit, W = wages

See Higgins, B.[51] p. 200.

(25) "Leaving aside the engineering aspect of capital formation, we shall proceed on the assumption - a quite realistic assumption for the less developed countries - that there a great fund of technical knowledge in the world which could be applied advantageously to the productive process if only the economic resources were available to make use of it". Nurkse, R. [106] p. 3.

(26) On the demand side of capital, Professor R. Nurkse emphasised on the size of the domestic market as a limiting factor of economic development. He stated that "the inducement to investment is limited by the size of the market". Nurkse, R. [106] p. 16. But one may argue that the market is small in relation to the volume and type of capital equipment which is being available to the developed countries, i.e. if we ensure a high level of output (income) and create favourable conditions for foreign trade then the problem of the size of the market will be alleviated.

respect to the supply side of capital the problem lies in the low level of saving (investment) which is due to the low level of per capita income. The latter is due to the low level of productivity because of the lack of capital equipment. This implies that the supply of capital depends on the incentives to save. Thus to achieve growth it is necessary,firstly, to increase the rate of real saving (investment) or to reduce consumption. Secondly, it is necessary to invest the available saving in order to produce more capital goods. Thirdly, associated with the existing distribution of the low level of investment, the present structure of the economy with its prevailing underdeveloped features, particularly market imperfections, creates the situation where the present allocation of labour, capital and other resources is far from the best one. This requires a re-allocation of these resources in such a way as to make full and efficient of them which would in turn increase the level of all economic activities. Thus the problem of resource allocation which basically involves certain criteria (criterion) for investment appraisals, is essential and it should be considered with great attention. To ensure high rate of saving and productive investment and to attain an efficient allocation of the available resources, different economic policies and techniques are to be considered.

More specifically, unlike the developed countries the crucial problem facing the underdeveloped countries is to accelerate the expansion of productive capacity by increasing the level of

investment and efficiently allocating it. In the advanced countries problems of unemployment can be dealt with by adopting suitable fiscal and monetary policies by which an adequate effective demand is to be achieved. Such policies would ensure a high level of employment. The problem of efficient allocation of investment is carried out - in the advanced economies - through the market mechanism when prices are more or less accurate reflections of opportunity costs to be used as a guide for investment decisions.(27)

Whereas in the underdeveloped countries the problem is to ensure a full utilisation of the existing productive capacity and expand it and increase its efficiency so as to raise the level of production in order to achieve a substantial improvement in the standard of living. The policy of increasing the value of investment in the underdeveloped countries will encounter the following serious problems:-

(a) Because of the low level of national output (per capita income) private investment is not high enough to ensure the required rate of growth. Add to this the existence of the market imperfections then the role private sector is unable to achieve the desired high rate of

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(27) This, however, does not mean that the market prices in advanced countries are very perfect as a guide for resource allocation and investment decisions; in fact there are many problems surrounding the market mechanism, (see chapter II). But relatively speaking this is not a chronic problem as it is in the underdeveloped countries.

growth over the shortest possible time. In underdeveloped countries "for many years, opportunities have been open to the private entrepreneurial in these countries, but it has not been seized".(28) The alleviation or the removal of the market imperfections is necessary but it is not sufficient to increase the productivity level by allowing the factors of production to flow to the more productive forms of employment within the country. The market-imperfection problem considerably contributes to the inadequacy of the price system.

(b) The implementation of any investment policy would not be possible unless a substantial volume (value) of capital goods were to be imported. This, however, puts a heavy pressure on the balance of payments. In such a situation policies of expanding exports or reducing imports of unessentials are to be followed.

(c) The implementation of the investment policies would create an inflationary pressure because of the limited supply of food and other necessary consumer products. It is, therefore, necessary to ensure that the supply of such goods should be equal to the demand - taking into account its new expansion resulting from the increase of national income.

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(28) Wallich, H. C., "Some Notes towards Theory of Derived Development", in Agrawala, A. N. and Singh, SP. (ed.) [3]

The above ~~two~~ three problems implicitly suggest that, in view of the prevailing economic, social and political conditions, the government should take the necessary measures in order to provide the required amount of capital goods (investment), and to act against the unfavourable balance of payments, and inflationary pressures with their negative consequences. As Professor R. Nurkse stated: "capital is a necessary but not a sufficient condition of press" and the economic development "has much to do with human endowments, social attitudes, political conditions - and historical accidents".(29) More specifically the pattern of investment is a function of social and political, as well as economic values and motivations. Problems such as the high level of unemployment (real or disguised) should not be dealt with apart from the social and political conditions. It is of course economically true that by only creating new productive capacity the problem of unemployment can be alleviated, but it is also unrealistic to ignore the social and political implications of not ensuring a certain level of employment regardless of the productivity level.

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(29) Nurkse, R. [106] p. 1.

In general, to accelerate the economic growth in underdeveloped countries two ways are possible; firstly, to increase the productivity, of the resources in use by re-allocating them in more efficient manner, i.e. to minimise the waste of these resources. Secondly, to create new productive capacity by utilising the idle as well as new productive resources. The first is a reform of the economic structure whereas the second is a capital accumulation process. And while the former does not necessarily require new capital, the latter needs additional capital. Thus it is preferable to raise the existing level of production by achieving more efficient allocation of the available resources. However, the efficient allocation of resources is not sufficient to achieve the targets of economic development since this process would stabilise at a certain level of economic activities whereas economic development implies a continuous process of growth over time. However, both processes, i.e. the creation of new productive capacity and the efficient allocation of resources are essential in the process of economic development.

CHAPTER II ON THE THEORY OF NATIONAL ECONOMIC PLANNING

The importance of national economic planning is being recognised by almost every country in the world,[29a] and parallel with this widespready adoption of the concept, its targets and contents have been given a multitude of interpretations in theory and in practive.[29b] The approach to, and methods of planning inevitable vary from country to country due to differences stemming from various experiences of different individual countries at different stages of economic, social

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(29a) See, for example, U.N. [131] p. 1 and Waterstone, A. [145] pp. 38-42

(29b) Some authors like Professor A. Waterstone regard the problem of giving a definition to national economic planning as rather difficult and that there exists various definitions in accordance with the objectives and experiences of different countries. See Waterstone, A. [145] pp. 20-22. Other economists, like Professor A. Lewis, give the definition "economic planning" to any intentional action taken by the state, the private sector, or both, to influence economic activities. See Lewis, A. [96] . United Nations experts outlined the meaning of economic planning by "where economic decisions with major social or long range implications have to be taken, planning is an invaluable policy. In providing for explicit analysis and evaluation of the realistic alternatives that confront individual countries, and in setting forth the implications of alternative policies, planning greatly assists the process of decision-making. Its contribution in this regard has been particularly evident where the dominant economic problems confronting policy-makers have required structural changes for this solution. This has been generally true irrespective of the particular political and social system prevailing in individual countries". U.N. [130] p. 1.

and political development. The scope of planning in the market economies is basically different from that in centrally planned (socialist) economies or mixed economies. Differences also exist among the underdeveloped countries.

Here, however, attention will mainly be drawn to fundamental factors and problems that present themselves to most planners and to clarify why a particular approach of national economic planning for the underdeveloped countries is favoured. In this respect three main points are to be raised; firstly, there are the various economic and technical reasons of why it is desirable that "someone" should make an attempt at conscious anticipation of the future and make an economic plan accordingly. Secondly, that this "someone" should be the government and not private /enterprise or both of them. Thirdly, there are different types, processes and techniques of economic development planning. In this chapter an attempt is made to discuss the economic theoretical aspects of these problems.

2.1 THE CONCEPT OF ECONOMIC EFFICIENCY

As all other matters of economic theory, the concept of "economic efficiency" originates from the basic problem of economics, i.e. the

scarcity of the producible goods and services in relation to the unlimited human needs. Scarcity gives rise to the problem of choice. Hence the need for "efficient" decisions to choose, under a certain state of technology, between different available alternatives in determining the level and types of production and its distribution among the individuals of the society in such a way as to maximise the level of community satisfaction, i.e. to get as much as possible out of given resources. Thus "economic efficiency" is related with the following problems.

(i) The problem of the allocation of scarce resources, i.e. to determine what types of goods are to be produced with the given disposable resources. This implies the need for criteria of investment decisions (or the choice of investment projects). The basis of such decisions is therefore to be established.

(ii) The problem of economic growth: This introduces a time dimension into the problem of allocation of resources. In other words, present economic decisions must be made in such a way as to maximise future growth rates, some compromises being made to satisfy current needs.

(iii) Problems associated with the distribution of output (goods and services) among the individuals of the society (i.e. problems of income distribution).

Therefore it is always necessary to achieve economic efficiency regardless of the kind of economic and social system prevailing, and the controversial issue in this context lies in the theoretical reasoning and practical difficulties of any proposed economic model for achieving economic efficiency.

2.2 ECONOMIC PLANNING AND ECONOMIC EFFICIENCY

In practice the real economic challenge to all societies is to set up a certain economic mechanism within a certain institutional framework which will generate pressures or secrete incentives to achieve economic efficiency. Economic efficiency is a common problem and is encountered by all types of social and economic systems at different stages of development. This statement does in fact summarise the essence of the concept of economic planning. A plan must comprise two essential ingredients:-

(a) certain aims and targets;

(b) certain measures to be taken which are necessary in order to achieve the targets; this implies the application of different techniques for constructing the sub-target and any other necessary economic policies and institutional procedures.

In other words economic planning means a performance of mutually consistent actions aimed at achieving efficient solutions to the problems of growth, allocation of resources and distribution of output (income) under the prevailing state of technology and all other

economic, social and political conditions. Therefore economic planning has several dimensions reflecting the dimensions of the problems associated with the production, income distribution and economic growth. Theoretically, the planning body should have such a wide knowledge and power which enables it to assess and control the effects of every factor and variable affecting economic efficiency. However, neither the present theoretical knowledge nor the available practical experiences on the part of any planning organisation could deal successfully with the problem of economic efficiency. Economic, social and political constraints that determine in practice the boundaries of the area to which economic planning can be effectively applied. These constraints create the existing different forms of national economic planning in different countries. It is for this reason that the priority criteria used in selecting a certain set of targets and in determining the movement of economic variables are to be justified in terms of the economic model deemed to be suitable for the particular economy concerned.

2.3 DIFFERENT APPROACHES TO ECONOMIC PLANNING

On the basis of theoretical principles and to a certain extent in the light of the practical experience of different countries, one might distinguish first between two main approaches of economic planning. Each approach reflects a different point of view, i.e. that of the individual consumer, the government as a consumer or as an

investor, and of the businessmen. From the private entrepreneur's point of view, economic efficiency and in turn economic planning is to be considered within the framework of the ideal perfect competition of the market system where the private entrepreneur plays his role freely in response to the consumers' behaviour. Through this mechanism economic efficiency is automatically achieved. On the extreme opposite side another approach based on the abolition of the private ownership of the means of production (capital goods) considers the problem of economic efficiency from the state's point of view as it is assumed to reflect the attitude of all individuals of the society. While in countries adopting the second approach there is a separate body for organising and channelling the information between different levels of the economic hierarchy, in those adopting the first approach such a comprehensive framework does not exist in the form of a particular planning body.(30)

As an attempt either to overcome the shortcoming of the two approaches or to make use of the advantages of both, a third approach to economic planning is to be distinguished. However, to choose either one of these approaches is a matter closely related to the existing

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(30) This explains to some extent the absence of the term "national economic planning" in the literature of the western economies until the Second World War.

economic, political and social features of the society under consideration. In this respect the positive approach is to consider the facts as they are not as they might be.(31) The general theoretical assumptions are briefly given in the following sections and the justifications of our proposed approach for underdeveloped countries are to be emphasised through the general examination of these assumptions.

2.3.1 Economic planning from the private entrepreneur's point of view; within the context of private ownership of the means of production the basic idea of this approach lies in the main assumption of the existence of the perfect free market.* In such a system prices reflect not only the importance of the products (goods and services) to the consumers and to the producer, but also when in free-market equilibrium they would maximise both the consumers' utility as well as the producers' profit. The consumers' decisions interact with the producers' decisions and as a result a certain pattern of resource allocation as well as income distribution is settled. Prices would be equal to the marginal utility of the consumer as well as the marginal productivity (cost) of the corresponding factors of production. The growth of the economy will continue as long as the trend of investment always goes up, because more profit leads to a

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(31) It is of course not our aim to claim that the proposed approach of economic planning is applicable in any underdeveloped country. This is due to the fact that there exists no universally accepted concept of "underdeveloped countries" (see chapter 1.1). However, the proposed general approach is coincident with the general model for underdeveloped countries being suggested earlier (see chapter 1.3).

high level of technical progress and high level of investment which will channel resources into the production of new capital goods, thus acting as a motivator of growth. This implies that economic efficiency is to be achieved within the framework of the perfect market competition and any attempt to interfere with this mechanism will only prevent the system from reaching the optimum state.(32) This approach therefore emphasises only the role of the private entrepreneur in leading the economy to a state of efficiency. Hence the accurate calculations by the private entrepreneur - his advisers, the manager or the financial account - of the cost and profit would therefore be the only practical difficulties impeding the achievement of economic efficiency.(33) Practically to deal with such a problem the private entrepreneur should establish such an efficient model (using suitable techniques) covering all his economic activities in order to maximise his profit under the prevailing economic and technology restrictions. The prices of the free market are the only basis for calculating the cost and the profit of the private entrepreneur.

The objections against this approach are not directed against the logic of the theoretical principles underlying it, but rather against its

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(32) See previous footnote.

(33) This also means that the miscalculations of any private investment decisions would be reflected by its situation in the market which may force the whole project to leave the market.

assumptions in relation to reality, especially that of the underdeveloped countries. In the context of the underdeveloped countries without a number of realistic modifications this approach has no practical value.(34) The necessity of such modification emerges from the following serious problems.

(a) Income distribution problem: although there is no general acceptable answer to the issue, it is generally agreed that great differences between the standard of living of different classes of people in the society are not desirable.(35) For social and political reasons some income policy has to be followed.(36) The usual way of implementing this policy is through a certain taxation (subsidies) system. All forms of this policy are in fact a sort of interference in the mechanism of the perfect market. That is to say this policy would affect and change indirect the price relations (between prices of goods and the prices of factors of production) which therefore would not maintain the state of economic efficiency and therefore prevent efficient allocation of labour or any other resource.

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(34) Even in the United States of America such an ideal framework of perfect market system is not in existence.

(35) Regarding underdeveloped countries, see Lewis, W. A. [96], pp. 26-38

(36) "Even in the United States only a few years ago, that fifth of all families with lowest incomes received only 5 per cent of total income, the richest fifth received 43 per cent of the total". Köhler, H. [83], p. 56.

(b) The existence of monopolistic elements and other factors of market imperfections like imperfect knowledge about the market conditions and prices, all contribute to the nullifacation of perfect market conditions especially in underdeveloped countries.(37)

(c) It is possible to have underemployment on the macro- level, i.e. supply does not create its own demand (Keynes). This requires government intervention in order to restore the new level of equilibrium of full employment.

(d) External economies, diseconomies and economies of scale: the fact that in any economy there exist external economies and diseconomies which give rise to the difference between private cost and social cost on the one hand and on the other the question of private benefit and social benefit.(38) The private entrepreneur does not consider such problems and the prices which he uses in his calculations reflect only on the cost and profit of his own activity. Also in highly organised industries economies of scale lead to lower costs compared with other industries. This creates the favourable conditions for the monopolistic industries which in turn contributes to the nullification of the ideal condition of the free-market.

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(37) In fact in the market system the competitors themselves follow consciously policies to mislead the others (producers and consumers) about the real prevailing prices.

(38) Baumol, W. J.[11] pp. 368-371.

(e) The assumption of consumer's "sovereignty" is rather an unrealistic one and therefore his decisions will not always maximise his utility function. As Professor R. W. Davis stated "while consumer 'choice' exists, advertising, imperfect knowledge, and the power of initiative of the large firm mean that consumer 'sovereignty' is quite restricted.[39] In addition to that one should not ignore that in real life the state may impose such restrictions which more or less affect the consumer's freedom of choice.[40]

Taking such problems into account it is necessary to modify the theoretical framework and its practical implications in accordance with their importance as far as economic efficiency is concerned. Thus even in the developed capitalist countries some governments have elaborated plans to co-ordinate income, wage, price and other public policies and enlisting private support for the achievement of common social aims.[41]

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(39) Davies, R. W. [27] p. 2.

(40) The prohibition, or at least the control of consuming alcohol, gambling and prostitution in some countries - especially those with highly religious beliefs and tradition - and (from the other direction) the compulsory education, health services are examples of such restrictions.

(41) Waterstone, A. [145] pp. 38-42.

2.3.2 The command economy; in contrast to the laissez-faire point of view where economic efficiency is assumed to be achieved by approaching the problem from the micro- level under certain economic assumptions, this approach tackles the problem of optimal planning from the extreme opposite direction, i.e. from the national point of view. The economic justification of this approach is that the concept of economic efficiency has its social, political as well as its economic dimensions, and it is not conceivable unless the prevailing non-economic factors are to be taken into account. In practice this takes the form of abolition of private ownership of the means of production and the abolition of the freedom of consumer choice.

Economic planning by this approach could be carried out by the state - which is supposed to reflect the national point of view - and its advisers, the econometrician experts, to draw up a uniform national plan, by which certain economic, social and even political targets (state preference) are to be achieved.(42) This of course needs a full investigation of the available national resources and the existing technical and economic conditions at different levels. One may assume that under these basic assumptions, economic planning takes the form of an applied multi-sectoral economic model being used to formulate a national plan where all th e existing economic conditions and relations are considered and a certain state (National)

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(42) The concept of the consumers' demand is meaningless, i.e. no consumers' preference.

objective function is to be set up accordingly. Also a certain criterion or criteria for investment are to be established consistent with the state preference function.(43) This approach to economic planning gives rise to a very important question which is in fact the core of economic efficiency problems. The question is to what extent the consumption and investment criteria derived from the macro- level are sufficient to achieve economic efficiency. Also if income distribution as a social and political problem is to be solved by the nationalisation of the means of production then what about production efficiency, the efficient criteria of investment and the decisions concerning the private consumption in the absence of prices as an index of alternatives.

The theoretical justification given to answer such questions is that, although there is no freedom of choice in consumption and labour occupation, the efficient allocation of resources can be directed by the Central Planning Board (CPB) instead of consumers'

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(43) Actual planning processes in the U.S.S.R. at present may be summarised in the following quotation from Professor R. W. Davis: "Each enterprise receives a set of output targets and input allocations with which to fulfil them; at the same time its monetary expenditures are controlled by financial or costs plans, which are less important to it than its output plan, but which come into operation if the pressure from above for higher output leads the enterprise to increase its money expenditures excessively." Davis, R. W. [28] pp. 55-56.

preferences through a method of "trial and error".(44) The prices calculated by CPB will perform the task of the prices in the market economy. In fact the question whether the "central decisions" are efficient or not has no theoretical or practical positive answer.** Since the means of production are nationalised, i.e. there is no market for exchange of capital goods, therefore there are no prices of capital goods and hence no "index of alternatives" available in the sphere of capital goods. Because the supply of consumers' goods is predetermined without considering the consumers' preferences, there is no way of reflecting its relative scarcity.(46) The implication of this is that neither the determination of the overall rate of growth nor the allocation of the national disposable resources are efficient. For it is of course possible to achieve a certain rate of growth regardless of the accuracy of the economic calculations of this rate, but what matters is the "efficiency" of such a decision.(47)

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(44) Lange, O. and Taylor, F. M. [90]

(46) One may argue that consumers' preference may be channelled through the political party machines to inform the top authorities. This, however, gives rise to the problem of the bureaucracy which is still unsolved in the U.S.S.R. for example.

(47) Unlike the market economies where profit and technical progress are the motives of growth and guarantee its continuity, this approach deals with the problem of growth by the evaluation of industrial production and its growth potential; hence it is difficult to test its economic efficiency despite the fact that the decision may be "technically" efficient. This is still a problem in Soviet planning. Bernard, P. J. [12] pp. 95-101.

The validity of efficiency is also questionable with regard to the problems of the allocation of the available resources for two reasons:-

(i) on the macro- level the calculated prices which are being constructed by CPB may not reflect the relative scarcity of capital, labour and other resources;

(ii) on the micro- level the calculated prices may not reflect on the cost of production on the enterprise level. The entrepreneurial decisions, therefore, may not be based on the minimum cost of production.

More specifically, investment criteria as being adopted in the Soviet Union are more or less based on technical rather than economic considerations. The only criterion being used is to concentrate on obtaining the greatest possible increase in production capacity with the minimum of investment (capital). Again the question which needs to be answered is whether it is possible to achieve better results (in terms of a rate of productivity) from a similar value of investment?(48) Two main practical problems are also to be raised in this respect which have a negative effect on the economic efficiency, these are:-

(i) when the control is highly centralised, initiative at the micro- level (firms or even workers) is restrained;

(ii) when a wrong technological choice decision is made by the central authorities then the cost - in terms of wasted resources - is proportionately heavy.(49)

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(48) Bernard, P. J. [12] pp. 247-253.

(49) Davies, R. W. [28] p. 66 and Bernard, P. J. [12] pp. 233-236.

An attempt is being made by the well-known economist Oscar Lange to answer such questions and to establish a certain theoretical mechanism through which to justify the idea that the efficient allocation of resources is possible in the socialist system and the calculated prices of CPB are workable in achieving this target. In Lange's opinion prices which are fixed by CPB could substitute for the functions of prices as determined in the market-type system,(50) and that "any mistake made by the Central Planning Board in fixing prices would announce itself in a very objective way - by a physical shortage or surplus of the quantity of the commodity or resources in question - and would have to be corrected in order to keep production running smoothly."(51) Lange's model(52) may be very briefly outlined as the following; the CPB is to determine the rate - not the direction - of investment in accordance with the

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(50) Lange, O. & Taylor, F. M. [90], pp. 55-142.

(51) Lange, O. & Taylor, F. M. [90], p. 82.

(52) Although Lange has distinguished between:-
(a) the socialist system where there exists a market for consumers' goods and for the services of labour but there is no market for capital goods and productive resources of labour (competitive socialism); and

(b) the socialist system where there is no market for both capital goods and labour, and there is no freedom of choice by the consumers.

But Lange on the role of prices ascertained that his method of "trial and error" can be applied for both types to achieve economic efficienty. Lange, O. & Taylor, F. M. [90], pp. 57-141.

desired rate of growth and with the given prices - of output and inputs - firms are to produce at lowest possible cost for any given volume of output, i.e. the output level is determined where profit is maximised.

The prices are to be adjusted by trial and error until demand equals supply in all goods. Although there is no market where capital goods are actually exchanged, i.e. there are no prices reflecting their relative scarcity (in both cases "competitive socialism" or "Soviet type")[53] the efficient allocation of capital goods and other available resources is ultimately determined by the technical possibility of transformation of one commodity into another, i.e. through the production function.[54] Such an attempt does not solve the problem of optimal (efficient) allocation of resources because if prices are to be an "index of alternatives", they should reflect the degree of scarcity and the actual cost of production of various commodities. By this approach the supply of capital goods (and labour) is predetermined and therefore only demand is elastic in relation to the prices. In addition to this the assumption that CPB is capable to taking the initiative and making efficient investment decisions is difficult to accept, because such decisions usually involve risks for they are based not

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(53) See footnote above.

(54) Lange, O. & Taylor, F. M. [90], p. 61.

only on the given prices, but also on the expected conditions; hence this restrains the CPB. On the firm level "how is one to keep manager from cheating on the rules of the game? To put it differently, how is one to control and reward them?"((55)

2.3.3 Centralisation and decentralisation in decision-making; section 2.3.1 shows that in practice the market-type system gives rise to many serious problems which justify the government intervention in economic life, i.e. the necessity of central decisions, which reflect the national point of view, in order to help to achieve economic efficiency. This implies that the central economic decisions should aim to reconcile the interest of both the private entrepreneur - to maximise his profit - and the national interests. In practice different experience of economic planning in Western European countries and in many of the underdeveloped countries reflects in varying degrees such a realistic modification to the planning approach being considered in section 2.3.1.

Authors like, Chenery, H. B.[21] , Cigno, A. [24]

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(55) Köhler, H.[83] p. 79. On the general evolution of Central Planning and pattern of decentralisation, see Waterstone, A.[145]

In more technical terms see Zaubermann, A.[149] pp. 46-61.

Dorfman, Samuelson and Solow [29] , Heesterman, A. R. G.[48] Lange, O. [90] *, Waterstone, A.[145], Tinbergen, J.[120] and Kronsjö, T. O. M.[86] have suggested different forms of centralisation and decentralisation as an approach of planning. This approach has two main features:

(a) A certain degree of centralisation in making economic decisions. This means that at the macro- level economic decisions may be taken by the Central Planning authorities (governments) in order to influence indirectly the investment decisions of the private producers or maybe the consumers' decisions. This influence will be limited only to ensuring the solution of certain national economic problems, e.g. the improvement of the balance of payments and employment problems, which may be associated with the problem of achieving certain rates of growth.

(b) Generally the economic decisions of the Central Planning authorities - which take the form of national plan and the implementation of different instruments of the economic policy - are to be taken in collaboration with the decisions of the private sector for purposes of co-ordination.

The extent of government intervention (centralised decisions)** and the role of the private entrepreneur (decentralised decisions) is a matter related to the stage and pattern of economic, social

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* We have outlined Lange's approach in the previous section.

** The degree of the control by government on the private economic activities.

and political environments.(56) This problem is a controversial one, not because there is no general agreement on the role of the state(57) (central decisions) or because there exists no theoretical reasoning to prove that economic efficiency is possible by co-ordinating central and private decisions,(58) but because of the extent of such a role.

To clarify this point and then to develop the argument, the examination of Mr. Cigno's model [24] for production, distribution and growth would be of help. Cigno assumes that profit maximisation will induce the entrepreneur (leading firms) to play his decisive role in the process of development by his initiative for innovation, and the faster the diffusions of innovations the quicker the reduction in unit profit; but total profits might be greater because more and more firms are using the new process, and therefore making more profit. This would ensure the growth of the economy and at the same time would force the other inefficient firms - with low level of profit - either to modify their production plans or to go out of business. This would ensure efficient investment

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(56) United Nations [126] p. 3.

(57) Lewis, W. A. [96] p. 18, U.N. [126] pp. 1-5, Waterstone, A. [145] p. 16.

(58) The theoretical reasoning is given later on when discussing the proposed model (see chapters IV and V).

decisions.(59) Shadow prices are being used by the firm so as to ensure that the model considers the relative scarcity of the available resources or the efficient allocation of these resources in relation to his main objective. On these basic assumptions a macro- model is being constructed as an aggregated model of firm profit-maximisation.(60) However, in the underdeveloped countries, contrary to Mr. Cigno's assumption, the private entrepreneur plays a very limited role in the course of economic development,(61)

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(59) The entrepreneur is assumed to have complete knowledge about the changes of prices (even the shadow prices - opportunity cost), technology, consumers' preferences and the required supply of factors of production. It is also assumed that there exists only one or few leading firms in the industry which make up with other industries the structure of the whole economy. Cigno, A. [24] in Gossling, W. F.(ed.)[36] p. 58,

(60) On the micro- level linear programming is being used to ensure the efficient allocation of the available resources in relation to the objective function which is to maximise the firm profit. The micro- model then is developed to an aggregated at industry level, dynamic activity analysis model. The solution of the macro- model is not necessarily the aggregated solutions of the micro- model. Ibid. p. 58.
The model can then be used "to forecast the effects of alternative fiscal policies" implemented by the government. Ibid. p. 79.

(61) The ignorance of the entrepreneur of the profit opportunities in the market in addition to the low level of private saving devoted for investment against the urgent need for improving the standard of living (see chapter I, sections 1.1, 1.2 and 2.1.3)

whereas the government does play the decisive role toward achieving the economic efficiency. To put the argument in different words, we may state that it is necessary to distinguish between;

(a) planning aiming to increase demand (in terms of output and full employment) within the prevailing economic and social institutional framework where price system works efficiently as a mechanism to allocate economic resources and private sector (entrepreneur) is well developed and ready to exploit the opportunities which lead to new level of progress;

(b) planning aiming to increase the level of output and efficient allocation of resources with such unhealthy structure of prices, mechanism, the ignorance of entrepreneur and inefficient institutional framework and measures.(62)

Cigno's model is thus more relevant to the first type of planning, the so-called indicative, than the second type of the so-called development planning.

More specifically, within the basic features of this approach, national economic planning in underdeveloped countries - using abstract terms - is a process of making decisions which must be implemented in order to achieve certain targets in an efficient way

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(62) Backward economic, social and political features of the underdeveloped countries impose the need to give more attention to the role of government decisions rather than to the private entrepreneurial decisions. Waterstone, A. [145] pp. 14-21 and Lewis, W. A. [96] pp. 18-20.

in the future. It is a process in the sense that decisions are subject to any possible modifications. The implementation of these decisions is essential and it should be decentralised. Its targets are based on social benefit criteria and the national point of view, but this does not mean that the private economic criteria (on the production or consumption side) are ignored. The conclusive decisions are those taken by the state, whereas the private entrepreneur's decision is less effective in the course of achieving the targets.

2.4 NATIONAL ECONOMIC PLANNING IN UNDERDEVELOPED COUNTRIES

To set up an approach of national economic planning in the underdeveloped countries, the following basic points are to be considered. Firstly, the price mechanism of the market economy is not efficient enough to lead the economy towards the frontiers of efficiency. The fact that economic calculations of the cost and profit are not perfect, is due to many causes associated with the existence of certain economic, social and political features. Secondly, the mechanism of the "calculated" prices of the command economy system, from both the theoretical and the practical point of view, does not solve the problems of economic efficiency. The nationalisation of the means of production creates the

difficulty of achieving both the efficient allocation of reserves, and national decisions regarding the required rate of growth. Thirdly, following the first two points the mechanism of and the growth pattern of the underdeveloped countries are different from both the first two types of economic mechanism. Fourthly, in underdeveloped countries development requires rapid and far reaching structural adaptations of the existing economic, social and even political features, e.g. the mobilisation of private and public saving for development, changing the social values and institutions, to influence the economic behaviour. Such changes cannot be carried out by the market prices alone, hence the government has to play a leading role in the economic and social progress.

Authors like Chenery, H. B.(63), Lewis, A.(64), Tinbergen, J.(65), Waterstone, A.(66), Meier and Baldwin(67), and United Nations experts(68) have ascertained the inadequacy of the market prices for economic decisions in the underdeveloped countries. It is also generally accepted that structural economic and social changes are required as pre-conditions for development. For these reasons, the state has to play an important role and in particular with regard to the process

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(63) See Chenery, H. B. [20] and Chenery, H. B. and Clarke, R. G. [22]

(64) See Lewis, A. [96]

(65) See Tinbergen, J. [120], p. 39 and [123]

(66) See Waterstone, A. [145] pp. 15-20

(67) Meier, G. M. and Baldwin, R. [102] pp. 316-318

(68) United Nations, [131]

of the capital formation. In this respect the important thing is to determine the roles of the state and the private sector. This is the dilemma which the underdeveloped countries face, i.e. what roles should both the state and the private sector play in performing the tasks of national economic planning. Obviously the concrete answer to this question must be given after fully considering the economic, social and political framework of the country concerned. However, it is generally accepted that public and private activities have to be regarded as complementary and interrelated rather than mutually exclusive.(69) The state should take the necessary measures and actions (in terms of providing the required level of investment, controlling the process of capital formation, influencing the level of private consumption) against the existing low level of per capita income, per capita saving, market imperfection and in general the unbalanced structure of the economy. State intervention and actions should not be limited only to promoting the private activities, but should also influence the spontaneous development of the economy and stimulate all economic activities in such a way as to increase the national and individual benefits and reduce the cost of the economic development process. On the other hand the role of the

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(69) See United Nations [126] p. 4, and Lewis, A. [96] p. 17.

private sector becomes less important due to the low level of per capita income, lack of knowledge and all market imperfections. However, effective planning requires the participation of both the private and state activities.

For the planning body the tasks of planning are to prepare different alternatives for decision-making in order to achieve certain given targets within the prevailing institutional economic, social and political framework. The targets and the institutional framework are supposed to be coincident with the qualitative model suitable for that particular economy at a particular stage of development. The task of the planner as such is of a consultative nature and he has to consider the facts as they are known and not as they ought to be. Making decisions is beyond the planner's tasks. The income distribution problem, for example, is one of the problems that national economic planning should tackle and in practice the planner could deal with the subject by means of increasing the employment level, expanding the social and welfare services and extending local development, but to advocate "revolutionary" changes such as nationalisation, for example, is completely beyond the planner's task. Such serious decisions are entrusted to the political authorities which deal with the economic, social and political implications of their decisions.

2.4.1 The targets of national economic planning; taking the above consideration into account we relate the economic efficiency, as outlined in section 1, to the general growth model of the underdeveloped countries as being outlined in chapter I, section 3, in order to determine the general main interrelated targets for national economic planning in the underdeveloped countries as follows;

(a) To raise the general standard of living. Basically this implies:-

(i) to increase the real per capita income or, from a different angle, to ensure a certain rate of overall economic growth. This means that any economic policy must secure a certain level of investment to achieve the required rate of growth, and in this respect such policy requires both efficient allocation of the available economic resources and efficient investment decisions.

(ii) To extend the social services so as to satisfy the social and political pre-conditions of economic progress. This target is closely associated with income distribution problem.

(b) To raise the employment level, i.e. every adult should be able to earn a secure income by means of his labour. This implies the following:-

to increase the level of investment (capital goods) by which the labour surplus (unemployment) could be absorbed, and as in the first target this implies the necessity of achieving rational allocation of resources in order to make sure that there exists no idle capacity and to establish certain criteria for taking efficient investment decisions.

In the final analysis increasing the level of employment leads to a rise in the level of output and ~~alleviation~~ to the alleviation a certain extent of the income distribution problem.

(c) Both (a) and (b) lead to an increase in the quantity of consumer and capital goods, and because of the limited level of existing domestic capacity the amount of foreign exchange available becomes a limiting factor in accelerating the rate of growth. However, to shape the balance of payments so as to reduce the dependence on the foreign countries in meeting basic requirements it is necessary to ensure:-

(i) the required supply of foodstuff and raw materials from domestic industries, i.e. to apply import - substitution policies as a remedy for balance of payments problems for the underdeveloped countries;

(ii) the diversification of export goods, expansion of existing market and penetrating into new foreign markets, especially that of the other underdeveloped countries themselves.

2.4.2 Types of economic plans; a plan is a programme consisting of targets, means and measures. It provides - within a certain period of time - guide lines for policy by the translation of the planning tasks into quantitative terms and specified tasks for particular economic and social activities. It refers to the future and requires a co-ordination of the means of economic policy so as to carry out the planning process and finally to achieve its targets. The availability of the resources and the efficiency of the implementation apparatus basically determines the contents of this programme.

Corresponding to the different stages of development and planning experiences, two main types of plans can be distinguished in practice. Firstly, project and sectoral plans or partial plans. These are essentially a collection of unrelated projects and where the data are available the analysis is done on a sectoral basis.(70) Secondly, the aggregate overall plans. This type consists of general treatment of the activities of whole sectors of the economy. While the latter provides a comprehensive and consistent framework of both the targets and the disposable resources, the former is inferior, both in terms of targets and assumptions. The partial plan has a serious deficiency in comparison to the former.(71)

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(70) These types of plans have been implemented by Iraq (development programmes 1952-58), India (first five-year plan for 1951-56, Pakistan (the six-year development programme for 1951-57), Egypt (the first industrialisation programme for 1957-60), Turkey (development programmes during the 50's).

(71) As an example explaining how partial plans can create serious problems Albert Waterstone said as he examined the case of Turkey's development programmes during the 50's:

"During the 1950's public investment in that country proceeded on a project by product basis and output in some sectors reached high levels. But the lack of intersectoral co-ordination created serious imbalances and the failure to relate investment expenditure to resources released inflationary forces which ultimately had a depressing effect on the economy". Waterstone, A. [145] pp. 62-63.

Since the targets of the partial plans are not integrated or tested within the framework of an overall plan they might not be feasible. At present, although some experiences have shown that a premature adaptation of the overall planning may involve high costs, it seems that this type of planning is the one being generally accepted and advocated for the underdeveloped countries.(72) This judgement is generally justified by the fact that the investment effectiveness should be conditioned by the intersectoral co-ordinations.

2.4.3. Process of formulating a national economic plan; in formulating a national economic plan one of three approaches - as type of procedures - may be followed. Firstly planning by stages (Tinbergen approach).(73) Secondly, planning by constructing a consistent and comprehensive model or Frisch approach.(74) Thirdly, a compromise approach between the first two. Following the first approach the processes of constructing a plan is distributed over three successive stages:- (i) aggregate or macro- stage;

(ii) sectoral (and could be regional) stage;

(iii) the project appraisal stage.

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(72) United Nations experts do generally advocate the adoption of comprehensive or overall planning for all underdeveloped countries. United Nations

(73) Originally established by Professor J. Tinbergen;

(74) Originally established by Professor R. Frisch;

At the first stage the pace of development can be laid down, in terms of the macro-economic variables, depending on the assumptions and the preferences at this level. Taking into account the results of the first stage, the values of the economic variables at the sectoral (or regional) level are to be determined within the "sectoral" assumptions. At the last stage it is essential to set up investment criteria in order to weight the contributions to the targets (preferences) of the economic policy and the use made of the country's scarce resources. Through iterative processes of trial and error it may be possible to achieve a consistent and feasible plan. This approach, in practice, has many advantages, namely it is more appropriate to convince the government to adopt the plan as the results come out from their different stages. Moreover by following this approach it will be possible to introduce new preferences in the model when we go through its successive stages.

The second approach assumes that certain preferences and assumptions are to be introduced right from the beginning, and by using a mathematical model, it is possible to formulate an efficient, consistent, and feasible plan. Obviously the accuracy of the results is therefore strongly related to adequacy of the assumptions being made. Theoretically the consistency, efficiency, and feasibility of the plan can be secured by adopting


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this approach, but in practice it has many difficulties, namely it is difficult to deduce the influence of the assumptions in the final results. Moreover, the use of untested models contribute an additional risk.

Although the first approach is more satisfactory from a practical point of view, the second one is theoretically much more preferable. However, a compromise between the first two approaches may be possible which makes use of the advantages of both in an adaptation to the underdeveloped countries. Formulating a plan is a time-consuming process, and it has to adapt to the political institutions. Also this process - for more than one reason - should be flexible enough to allow the adjustments of the assumptions and the preferences.

CHAPTER III MATHEMATICAL MODELS FOR NATIONAL ECONOMIC PLANNING

It has been pointed out in Chapter II that the function of economic plans is to set up economic and social targets, and it invariably presupposes a qualitative growth model of the economy, as being demonstrated in Chapter I. Chapter II also shows that an economic plan should be consistent, efficient, and feasible. A useful plan not only prepares a single set of economic projections but also provides the policy-makers with alternatives in order that they may make a choice among them. Technically quantitative analysis is necessary to ensure consistency, efficiency and the feasibility of the plan. This is basically what the formal mathematical model does serve, and this is why considerable attention has been given - since the 1950's - to use of applied mathematical models in formulating quantitative economic plans.(75)

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(75) In exploratory studies, mathematical models (of econometrics type) have tested alternative development policies in South Italy, Israel and Argentina. The main features of these models are summarised in Chenery, H. B. [20], in Ward [147] pp. 31-44. Mathematical models (of the optimisation type) are also proposed for development planning in South Italy by Chenery, H. B. and Kretschmer [23] ; for planning in India see Ghosh, A. [35] ; for planning in Egypt an attempt has been made by Frisch, R. [33] ; for planning in Syria a model has been suggested by Shair, K. [114].

3.1 GENERAL SCOPE OF THE MATHEMATICAL MODELS

For our purpose a mathematical model may be defined as a system of mathematical functions which reflect economic reality with sufficient accuracy. Such a system is useful for describing the interdependence of economic variables and to explore changes occurring under certain assumptions. Generally two major groups of economic models can be distinguished; theoretical and applied models. Both of these models are useful in deducting any change in specified variables in response to a particular policy, but unlike the theoretical model the applied models can determine the magnitude of these changes by estimating quantitatively the structural relations involved.(76) A model is a simplified description of reality and in practice its variables and relations need careful specification.

To construct an applied economic model it is required first to state clearly the economic problem and the aims of the model. Given an exact formulation of the problem it becomes possible to choose an

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(76) A model consists of (i) variables (ii) relations and (iii) coefficients. The variables are of exogenous and endogenous type. The values (exogenous) are to be determined outside the model whereas the endogenous values are to be determined by the model. The relations of the model are those which reflect as accurately as possible the economic phenomenon. The coefficients are simply the weight of the corresponding variables and are to be estimated from statistical data. These terminologies are pioneered by Tinbergen, J. 122 , and then being followed by econometricians, such as Heesterman, A. R. G. 48 According to their area dimension economic models are usually classified into macro- model, multi-sectoral models, and micro- models. According to their time dimension, they are classified into short-term, medium-term and long-term models.

appropriate type of model.(77) The second step is to consider the available relevant statistical data and to check the possibility of getting and estimating the coefficients (parameters) of different economic variables (relations) and also of predicting specified changes of economic variables. In constructing a model it is usually required to reconcile between two conflicting requirements, i.e. the model should adequately reflect the reality and at the same time it should be relatively simple. A reasonable compromise must be reached.

3.2 QUANTITATIVE PLANNING TECHNIQUE - INPUT OUTPUT ANALYSIS

Input-output analysis is a quantitative approach to the problem of general equilibrium. Its distinguishing feature is that it gives explicit recognition to the existing interdependence among various production branches of the national economy. The equilibrium state does exist when the level of total output of the whole production sectors is equal to the total demand on commodities - final and intermediate uses. The propositions of input-output analysis like the macro-economics propositions are of general and simple character. But unlike the macro-economics which is mainly concerned with the macro-aggregated level of economic activities, i.e. "horizontal" equilibrium propositions, the input-output analysis deals with not only the macro-aggregated level but also , and more fundamentally, with the disaggregated industries, sectors and branches of production,

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(77) Having finished the investigation of the aims and the statistical requirements of the model, then the general theoretical framework, i.e. to choose a general versus partial and static versus dynamic model is to be determined. Comprehensive theoretical studies on mathematical models of economic growth - under different assumptions - have been proposed by Tinbergen, J. and Bos, H. C. [12] ; Heesterman, A.R.G. [49] Tinbergen, J. [122] , Chakravarty, S. [18] , and others.

i.e. "vertical" propositions. Specifically input-output analysis is concerned with the transactions (flows) among different sectors of the economy and it shows how the output of each industry is distributed among other industries and sectors of the economy. Simultaneously it shows the input of each industry from other industries or activities. Thus it is different from the partial equilibrium analysis which is basically concerned with the reaction behaviour of producers and consumers of a particular commodity.

3.2.1. The input-output production model*: basically, the model states that production level of each economic activity can be expressed as a linear and homogenous function of demand, part of which goes to the other industries and the rest satisfies the final demand. The model classifies each stream of products in the economy according to its origin and destinations, and specifically it expresses that at any period of time the level of output of each industry must be enough to supply the input requirements of other industries and also to

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* As an applied branch of economics, input-output analysis has been established and developed by its pioneer Wassily Leontief who applied his famous input-output model to empirical studies in the 1930's, Leontief, W. W.[94][95]. Since then the technique has been developed and its analytical application has ranged over such fields as formulating economic plans or programmes, revealing the likely changes in the structure of the economy and for economic forecasting purposes.

This section is based liberally on standard input-output literature, especially of Dorfman, Samuelson and Solow [30] Stone, R. [118], Chenery, H. B. and Clark, P. G. [22] Leontief, W. W. [94], Heesterman, A. R. G. [48], and Lange, O. [89]. The justification of elaborating the basic concepts of input-output analysis is to show its analytical application in planning the Iraqi economy.

meet the final demand.[78] Mathematically, this can be written as follows:

$$X_i = \sum_{j=1}^{n} x_{ij} + f_i \qquad (i = 1, 2, \ldots, n) \qquad \ldots \text{(III-1)}$$

where

X_i is the level of output of the i-th industry;

x_{ij} is the amount of good i (from industry i) required by industry j;

f_i total amount of good i (from industry i) needed to meet the final demand;

i refer to the i-th industry (sector).

There are altogether i, ..., n industries in the economy. By making the following assumptions; (i) constant return to scales; (ii) joint production non-existent; (iii) each input x_{ij} is required in fixed proportion to X_j, then the production function relating the output X_j to its input x_{ij} can be mathematically expressed as follows;

$$x_{ij} = a_{ij} X_j$$

$$\text{or} \quad a_{ij} = \frac{x_{ij}}{X_j} \qquad (i, j = 1, 2, \ldots, n) \qquad \ldots \text{(III-2)}$$

where each coefficient a_{ij} should be non-negative and $\sum_{i=1} a_{ij}$ for each j-th sector should not be larger than 1.

The coefficient a_{ij}'s express the amounts of output of the i-th industry which are required as inputs for one unit of output of the j-th industry.

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(78) In primitive economies most commodities are produced for direct consumption, i.e. $X_i = f_i$.

These coefficients are of a technical nature since the transformation of inputs into outputs is determined by the technique prevailing in the industry.

Substituting (III-2) into (III-1) we derive;

$$X_i = \sum_{j=1}^{n} a_{ij}X_j + f_i \qquad (i = 1,\ldots,n) \qquad \ldots \text{(III-3)}$$

The total direct and indirect demand could be obtained from relation (III-3) as follows:

$$\underline{X} = (I - A)^{-1}\underline{f} \; * \qquad \ldots \text{(III-4)}$$

where

$\underline{X}$ column vector of output of order n;

$\underline{f}$ column vector of final demand of order n;

A technology square matrix of order n by n whose elements are the a_{ij};

n number of the industries (economic activities) in the economy.

Given matrix A relation (III-4) states that the output of each industry is a linear and homogenous function of the final demand, and the level of X_i is uniquely determined by this relation. The analytical

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* The relation is valid only if the inverse of (I - A) matrix exists, i.e. the matrix is not singular or the determinants $|I - A| = 0$. The economic interpretation of that $|I - A|$ should be greater than 0 is that for each industry total direct and indirect inputs should not exceed the output of that industry, i.e. the production is not viable. This condition is called Hawkins-Simon condition. See Dorfman, Samuelson and Solow [30], p. 315.

significance of model (III-4) is that it relates two basic sets of variables in the economic system, namely the disaggregated production level and the corresponding disaggregated final demand level. The empirical significance could be derived from the fact that the matrix multiplier $(I - A)^{-1}$ represents the total demand of direct and indirect production required as a consequence of meeting the final demand. Therefore, relation (III-4) could be used as a tool for transforming the exogenous final demand into total direct and indirect production or vice versa. Here lies the ultimate significance of the Leontief open-static-input-output model, as it becomes possible to investigate and forecast the effects of any change in the final demand on the output level of the production sectors. However, the basic assumption of the input-output production model is the constancy of the technical conditions; therefore the validity of the model hinges on the stability of input-output coefficients matrix (A). The constancy of the technical coefficients, however, has the following main implications:

(i) constant returns to scale: this assumption may be roughly reasonable for a short time, but not for the long-run. The application aspect of this assumption is that the change in aggregate output is the sum of changes in the production of disaggregated branches regardless of scale;

(ii) the linear production function: the Leontief type of production function, unlike the neoclassical production

function, does not allow the possible substitution between factors of production. This most likely leads to inefficient allocation of the available resource. This also means that joint production by any industry does not exist. If we introduce time dimension to this assumption then this implies that the production technology remains the same over the time period under consideration.

Thus the pattern of allocation of resources which could be achieved by use of the model depends only on the basis of the technical considerations.

So far it is assumed that the final demand categories, i.e. private consumption, government consumption, investment and exports are exogenously given. By examining this assumption, however, in reality it is no longer valid, since the level of income and its use (final demand) depends on the composition of production. This is in fact a question of whether the basic assumption of fixed proportionality could be extended for final demand categories or not. In this respect it is necessary to analyse the effect of the final demand categories to see whether it is realistic or not to derive fixed technical coefficients to express the relation between these economic variables (final demand categories) and the level of different production activities. The levels of exports are usually dependent on factors outside the national economy and government consumption depends heavily on the government social and political

policy which is not in many cases directly related to the production level of each productive sector. Private consumption changes disproportionately for different sectors, i.e. elasticies of demand for different goods are different. Theoretically these elasticies can be derived as the input-output coefficients. For investment it seems quite reasonable to assume that it has fixed technical relation with output.(79) The dynamic version of the model, however, could be constructed by introducing the capital-output coefficient matrix. That is to say the dynamic input-output model expresses final deliveries of capital goods as functions of capital required for capacity creation in various sectors.(80)

3.2.2. The validity of the input-output model; the question of the validity of the input-output model hinges on the constancy of the technical conditions. Technological coefficients are bound to change over time for at least three reasons; firstly, the growth of completely new industry (technology); secondly, the possibility of substituting some inputs by others - which may be economically valid - in the production processes; thirdly, the change of technical knowledge within the existing industries.

It is not, however, justifiable to ignore the practical considerations and evaluate the whole approach from the purely theoretical point of view. The practical restrictions imposed by reality must be considered. A model generally provides only an

(79) This relation to be discussed later on in Chapter X , Section 1.1.
(80) See Chapter V, Section 2.1.

approximate picture of the actual interrelationships among the economic activities which would help shape economic policies. In other words, the question to ask is whether the approximation achieved is accurate enough to be of empirical significance. As Chenery and Clark have stated:

> "Yet it should be clear - though input-output analysts may not always have made it so - that the assumption of constant input ratios can only be a first approximation to the more complex production functions of the real world. Non-proportional inputs, changes in production-mix, input substitutions, and technological changes all do occur, beyond any question. The really important question, therefore, is an empirical one: are the errors involved in using this simplifying assumption satisfactory small?" (80a)

Economists being practical people - at least few of them - are satisfed with these assumptions that lead only to an approximate picture of interrelationships among different economic sectors. However, the test of the applicability can be carried out through the comparison between the results derived by the model and the corresponding statistical data obtained by different ways of estimations.

3.3 SOCIAL ACCOUNTING MATRIX - A FRAMEWORK OF NATIONAL ECONOMIC PLAN

As it is shown in Sections 3.1 and 3.2, the extension of Leontief input-output system or inter-industry analysis provides, among other things, a factual background of the economic structure. This is a useful tool for economic decision-making, hence leads many countries

(80a) Chenery, H. B. & Clark, P. G. [22] p.157

(government agencies and academic bodies) to engage in statistical work of constructing a multi-sectoral accounting matrix or "social accounting matrix". The SAM is closely related to the national accounts system. The structural framework of SAM and the relation between inter-industry and national accounts will be briefly demonstrated in this section.

Consider the following two types of balanced equations:

$$\text{(i)}\quad X_i = \sum_{j=1}^{n} x_{ij} + f_i \qquad (i = 1, 2, \ldots, n) \qquad \ldots \text{(III-5)}$$

by adding up this set of equations, row plus row, we get

$$\sum_{i=1}^{n} X_i = \sum_{i=1}^{n} \sum_{j=1}^{n} x_{ij} + \sum_{i=1}^{n} f_i \qquad \ldots \text{(III-6)}$$

$$\text{(ii)}\quad X_j = \sum_{i=1}^{n} x_{ij} + \sum_{h=n+1}^{s} x_{hj} + M_j \qquad (j = 1, 2, \ldots, n) \qquad \ldots \text{(III-7)}$$

where

M_j imports used by production sector j;

x_{hj} amounts (values) of primary input h used by production sector j.

Relation (III-7) states that total value of production in each sector is equal to the value of inputs purchased from other production sectors plus value added (wages, profit, rent) plus imports in j-th sector. Similarly to the first type of balance relations (i) we add this set of equations, column by column, we then get:

$$\sum_{j=1}^{n} X_j = \sum_{j=1}^{n}\sum_{i=1}^{n} x_{ij} + \sum_{j=1}^{n}\sum_{h=n+1}^{s} x_{hj} + \sum_{j=1}^{n} M_j \qquad \ldots \text{(III-8)}$$

In equilibrium state since total production $\sum_{i=1}^{n} X_i$ is equal to total outlays, (i.e. total inputs $\sum_{j=1}^{n} X_j$) and the intermediate use $\sum_{i=1}^{n}\sum_{j=1}^{n} x_{ij}$ is equal to intermediate purchases $\sum_{j=1}^{n}\sum_{i=1}^{n} x_{ij}$

then from (III-6) and (III-8) the following relations can be obtained

$$\sum_{i=1}^{n} f_i = \sum_{j=1}^{n}\sum_{h=n+1}^{s} X_{hj} + \sum_{j=1}^{n} M_j \qquad \ldots \text{(III-9)}$$

or

$$\sum_{i=1}^{n} f_i - \sum_{j=1}^{n} M_j = \sum_{j=1}^{n}\sum_{h=n+1}^{s} X_{hj} = \sum_{j} v_j ;$$

where,

v_j total gross value added of sector j.

Relation (III)-10) expresses the basic national accounts identities which can be restated as follows on page 65.*

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*Note that inventory is being ignored for the purposes of simplification. Indirect taxes, subsidies and depreciation should also be considered.

FIGURE 2: Social Accounting Matrix.

Purchasing sectors / Producing Sectors	Intermediate Use $j=1, 2, \ldots, n$	Total	Final Demand C_i	Final Demand I_i	Final Demand E_i	Total	Grand Total (Gross Output)
$i=1$	$x_{11}\ x_{12} \cdots x_{1n}$	$\sum_j x_{ij}$	C_1	I_1	E_1	f_1	X_1
2	$x_{21}\ x_{22} \cdots x_{2n}$	$\sum_j x_{1j}$	C_2	I_2	E_2	f_2	X_2
n	$x_{n1}\ x_{n2} \cdots x_{nn}$	$\sum_j x_{nj}$	C_n	I_n	E_n	f_n	X_n
Total inputs	$x_{11}\ x_{12} \cdots x_{ij}$	$\sum_{ij} x_{ij}$ / $\sum_{ij} x_{ij}$	$\sum_i C_i$	$\sum_i I_i$	$\sum_i E_i$	$\sum_i f_i$	
Value added or primary inputs $h=n+1$	$x_{h1}\ x_{h2} \cdots x_{hn}$	$\sum_j x_{h1\ j}$					
$n+2$	$x_{h1}\ x_{h2} \cdots x_{hn}$	$\sum_j x_{h2\ j}$					
S	$x_{s1}\ x_{s2} \cdots x_{sn}$	$\sum_j x_{s\ j}$					
Total Value Added	$V_1\ V_2 \cdots V_n$	$\sum_j V_j$	VC	VI	VE		
Imports	$M_1\ M_2 \cdots M_n$	$\sum_j M_j$					
Grand Total (Gross Output)	$X_1\ X_2 \cdots X_n$						

where,
- VC amount (value) of primary inputs going to consumption
- VI amount (value) of primary inputs going to investment
- VE amount (value) of primary inputs going to exports
- C_i consumption of i-th good (from sector i)
- I_i investment of i-th good (from sector i)
- E_i exports of i-th good (from sector i)

GNP (at market prices) = Investment + consumption + Exports - Imports; GNP (at factor cost) = GNP (at market prices) - Indirect taxes + Subsidies; GNP (at factor cost) = Total value added + Factor of income abroad - Factor of income from abroad

= Total Gross output - Total inputs

= Wages + rents + Interest rates + Dividends + Gross profit - Total inputs.

NI = GNP (at factor cost) - Depreciation.

3.4 ECONOMIC MODELS OF LINEAR PROGRAMMING TYPE

The balanced relations of input-output model implies that each commodity is supplied by a single production sector, thus the model as such is not sufficient to tackle the problem of choice between different production alternatives. Such shortcomings can be dealt with by implementing linear programming techniques. Linear programming as a mathematical technique has common features with input-output model if implemented to develop the latter. These features are:

(i) the linear and homogeneous functions between outputs and inputs - this implies the fixed proportionality assumption. From a mathematical point of view this assumption is necessary in the linear programming technique.

(ii) The non-negativity of the activities (the level of the endogenous economic variables.)

(iii) From the first assumption it follows that there exists no external economies or diseconomies.

Thus in the sphere of economics the concept of linear programming may be considered as a generalisation of the input-output concept. That is to say the standard input-output model is a special case of linear programming .

Generally, linear programming problem is a certain type of optimisation problem[81] where the relations between the variables involved (activities) are linear.[82] Bearing in mind the conditions of building an economic model as being generally outlined - Section 3.1, linear programming can be used to formulate an applied economic model of the type. This implies that the model would optimise the solution of certain economic relations relative to the aims of the model or to particular preference function.

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(81) In decision-making, especially in the field of national economic planning, optimisation is very necessary in order to choose among different available alternatives. By optimisation it is generally meant finding a "best" solution among many feasible alternatives. The word "best" is emphasised because it might happen that more than one optimal solution can be obtained.

(82) The linearity assumption of the economic model is closely related to the fact that although the model should reflect the reality as accurately as possible, it should be relatively simple and practical. In theory it is necessary to consider all the variables and factors affecting the economic phenomenon under consideration which are non-linear relations. Such an approach would only lead to an unreasonably large number of variables of non-linear relations that make it rather impossible to solve. The linearity assumption is valid as long as it reflects with sufficient accuracy the economic reality and gives a good approximation result. On the economic justification of linearity assumptions, see Chakravarty, S.[18] pp. 13-14.

For its many advantages linear programming technique is being widely used in dealing with different aspects of economic planning, particularly the multi-sectoral economic growth models. It is being suggested that this should be used for economic development planning in underdeveloped countries by the United Nations experts,(83) and serious attempts of its application have been made in India,(84) Egypt,(85), South Italy,(86), and Syria.(87) Also more advanced theoretical work is being done and vastly developed to tackle different economic problems such as foreign trade,(88) international and interregional economic co-operation.(89)

3.4.1. The general linear programming problem: the general optimisation problem can be stated as follows. Under certain conditions (constraints) and within a given number of possible decisions, it is required to achieve the most efficient (best) solution among several feasible alternatives to meet a certain objective function. Linear programming is concerned with a group of optimisation problems, and it consists of an objective function which is either to be maximised or minimised subject to certain constraints. The relationship between the variables (all non-negative) of both the objective function and the constraints are linear. In a compact form the general linear

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(83) United Nations [125]
(84) Sandee, J. [112] See also Ghosh, A. [35]
(85) Frisch, R. [33] See also Rafel, S. [108]
(86) Chenery, H. B. and Kretschmer, K. [23]
(87) Shair, K. [114]
(88) Kronsjö, T. O. M. [87]
(89) Kronsjö, T. O. M. [86]

programming problem may be stated as follows:

find $\underline{X}$ to maximise (or minimise) $Z = \underline{C}'X$ . . . (III-11-a)

subject to $A\underline{X} \doteq \underline{b}$ . . . (III-11-b)

such that $\underline{X} \geq 0$ . . . (III-11-c)

where

$\underline{X}$ is a column vector of the economic variables (e.g. production sectors);

A is a technology matrix of the inter-industry relations;

$\underline{b}$ is a column vector of the available resources;

$\underline{C}'$ is a row vector of coefficients which reflect the weight of the variables X's.

To solve the above problem we may face one of three situations; firstly, system (III-11-b), as in any system of equations, may have no solution at all. This means that there exists no solution satisfying the constraints of the problem. Secondly, system (III-11-b) has only one unique solution. This situation implies that the objective function (III-11-a) is irrelevant. Thirdly, there is more than one solution to the system (III-11-b). The third situation shows up the advantages of linear programming in economic planning. Moreover system (III-11-b) may be replaced by inequalities (i.e. $A\underline{X} \leq \underline{b}$) by assuming implicitly the existence of the so called slack (or artificial) variables.(90) This would allow for the possibility of non-use of some resources. The significance of having

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(90) In changing system (III-11-b) into inequalities, then the new system must have at least the same number of the existing feasible solutions of the original system.

non-negativity condition (system III-11-c) is of two sorts:-

(i) from the economic point of view it is self-evident that economic reality requires non-negative activities;

(ii) mathematically, the problem might give a trivial solution, i.e. all values of the variables are zeros. In practice if this happens then there must be something wrong with the model, that is to say the specification of either the variables, coefficients, the objective function or the constraints, or both of them, is not accurate and it does not reflect economic reality.

Technically, the set of constraints which have feasible solutions form a convex set having a finite number of extreme points. It can be shown that the optimum level of the objective function is at one extreme point of the set. Many algorithms for finding the optimal solution of the general linear programming problem are based on the simplex procedure.(91)

For every programming problem there exists another problem associated to it. It is called the "dual". The optimal values of the objective function of both the primal and dual is the same. The dual problem has practical as well as theoretical importance. From the theoretical point of view it gives rise to new mathematical properties of the linear programming problem. From the practical point of view it has very significant implications.

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(91) Simplex method is originated by Dantzig, G. [15] on the algorithms for solving linear programming problem, [illegible] Hadley, G. [37]

The dual of the primal problem (III-11) is the following:

to minimise $Z = \underline{b}'y$ . . . (III-12-a)

subject to $A'y \geq \underline{c}$ . . . (III-12-b)

$y \geq 0$ . . . (III-12-c)

where

$\underline{y}$ is column vector of the dual variables.

The economic interpretation of the dual variables can be stated as follows; each variable (say y_1) is a cost of utilising extra one unit of the corresponding limited resources (say b_1) which would contribute the largest possible return to the objective function Z, i.e. the shadow price y_1, reflect the marginal return by increasing one unit of the available limited resources in the course of production. If the arithmetic relations of the constraints (of the primal) is the reverse, i.e. in case it is required to ensure a minimum level of output of each activity, such as $X_i \geq R_i$, then the shadow prices corresponding to this constraint (say V_1) could be interpreted as a penalty which induces the manager to produce up to the minimum level required (planned), otherwise if the (firm) produces an amount (value) of X_1 less than one unit from the required level R_1 then the required return should be $C_1 + V_1$.(92)

3.4.2 Economic efficiency and linear programming: economic efficiency in linear programming type models is to be considered as having a relative meaning in relation to the objective function and

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(92) The economic interpretation of the problem is also given in Chapter IV.

the constraints. It is needless to say that there exist different types of economic relations in different economic models. This means that unless one specifies the economic model with all its relations, the level of economic efficiency cannot be determined. As a technical term "efficiency" as such might be defined - if we consider a special case of models, i.e. a production economic model aiming to maximise total output subjected to certain technical conditions where the resources endowments are fixed. In this case - if there exists a feasible solution which satisfies the constraints - then the solution is called efficient (optimal), if there is no other pattern (allocation) of the activities (variables) which leads to an increased value of the objective function.

3.5 AN ADVANCED INFORMATION SYSTEM OF NATIONAL ECONOMIC PLANNING

3.5.1. Dantzig and Wolf's decomposition scheme:* originally decomposition algorithm of Dantzig and Wolf is being constructed in order to solve a very large size problem of linear programming which has a certain structural property, because of the limitations of the available computational capacity. It may be possible to decompose such a problem into a sequence of small linear programmes whose iterated

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* Dantzig, G. and Wolf, P. [26] and Dantzig, G. [25]

solutions solve the given problem. Within the economic sphere decomposition schemes become useful tools in national economic planning, not only to solve a large economic model of linear programming type such as multi-period plan, but also to be used as an information system through which the central planning authorities could devise a system of prices (or quantieies) which induce separate plans to submit summarised quantity or price proposals which can be combined into better and better overall plans. More specifically, suppose that our national economic planning model is a multi-sectoral model of linear programming type constructed by the Central Planning Bureau which is responsible for its optimisation, and each department responsible for optimising one sector (activities). Having constructed the model, i.e. determining its objective function, constraints and the parameters with all the exogenous variables, the CPB solves the model and issues a set of shadow prices to the economic departments for evaluating their scarce resources. The economic departments or the sectoral planners report back to the CPB stating their requirements of the resources and their optimal solutions. According to this new information the CPB is to modify their plan and again solve the model and send a new set of shadow prices to the economic departments. The ED's use the new set of shadow prices and get new solutions for their plans and report back to the CPB. This iterative procedure is to be continued until the new set of shadow prices derived by the CPB will not be virtually different from the previous one. In this situation the CPB can formulate their quantitative plan. The price paid for this

decomposition is that the problem of the CPB (master problem) and the problems of each ED (sub-problems) may have to be solved several times.

3.5.2. Kornai and Liptak's model of two level of planning*:

As does Dantzig and Wolf's decomposition, this model basically aims to overcome the basic practical difficulties of solving a very large linear programming problem which may represent a model for national economic planning. The mathematical techniques as such are different from that of Dantzig and Wolf, and also it has a different economic interpretation.

Assume that the Central Planning Bureau has constructed a very large problem of linear programming type as a model for national economic planning. The problem may be decomposed into sub-problems which can be solved mutually independently (sectoral models - each economic department responsible for a particular group of products) co-ordinated by the CPB which allocates the resources to the various sectors. The CPB makes a provisional distribution of the available resources and at the same time allocates their output targets. The two level of planning model could be achieved"by setting up a game - theoretical model. The players are on the one hand the Centre, on the other hand the team of sectors. The strategies of the Centre are the feasible allocation patterns, those of the sectors are the feasible shadow prices systems in the duals of the sectors objective functions".(93)

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* Kornai, J. and Liptak, T. H. [84]

(93) Ibid, p. 142.

The CPB chooses an initial allocation of the disposable resources - possibly from traditional solutions - then this initial allocation is to be sent to the sectors. The sectors will then derive their optimal solution by solving their optimisation problem. The -dual objective function can be interpreted as the payoff of the sectors for using the disposable allocated resources. According to the sectors solutions, the CPB then modifies its initial allocations and sends down new sets of allocations to the sectors, the sectors will again evaluate these allocations and report back to the CPB and so on. This iterative procedure continues until a sufficient number of iterations achieve the required degree of accuracy. The efficiency criteria is the level of shadow prices of the sector. A feature which distinguishes this model is that no prices are determined from the dual at the CPB.

CHAPTER IV PROJECT EVALUATION - THEORETICAL AND OPERATIONAL INVESTMENT CRITERIA

4.1 GENERAL INTRODUCTION

Project evaluation, in practice, is the central theme of the problem of optimal allocation of the available economic resources. Economic resources are characterised by scarcity in relation to the increasing human needs and therefore they have a strategic position in any development policy. The utilisation of these scarce resources is in fact the essence of the social and economic development, and therefore only rational investment decisions would sustain the pace of development. This creates the need to establish certain criteria for investment decisions to be applied for both private and public enterprises within the framework of the national plan. The essence of project appraisal consists in choosing among different alternatives, one which realises the most efficient use of economic resources. It is preferable to examine different alternatives of various types of projects to be included in the plan in order to determine the most efficient use of economic resources by which the targets of the plan can be realised.

The present discussion would throw light on the basis upon which the coefficients of the sectoral model (Chapter V) are to be estimated; also this would help in modifying the structure of the sectoral model - if necessary - to reflect more adequately the criterion which the planner has chosen. It is also hoped that the following argument would

help in showing the different methods of dealing with investment decisions in the absence of the efficiency prices, accordingly this would show how the "zero-profit requirement" as an investment criterion differ from those mentioned in this section.

Theoretically the most efficient allocation of economic resources would be realised through the free market competition by achieving from the individual point of view, the highest marginal productivity for each investment unit, or the social marginal productivity from the national point of view. This implies that we rely on the price mechanism to reflect the cost of utilising resources. But as we have stated earlier the market prices in underdeveloped countries are imperfect guides to achieve the optimal allocation of the available resources and therefore we should either modify the existing (market) prices in a suitable way or establish a specific criteria reflecting more accurately the cost of utilising economic resources.(94) Within the main approach of this study the controversial problem of distinguishing between the individual profit and social benefit has also its implication on the investment criteria to be followed. However, for any private entrepreneur it is economically sound and practically acceptable to invest in projects yielding the highest possible level of profit in relation to the amount of capital invested. But from the social point of view the planner

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(94) "Private profitability may be a misleading indicator for the investment decision and also the cost of the factors of production are not from the nation's point of view 'correctly' calculated by the private investor". Kahn, A. E.[79] p. 139, Chenery, H. B.[19] pp. 94-95, Tinbergen, J.[120] pp. 76-78. See also

should consider the problem with respect to social cost benefit rather than private cost and profit. For the private entrepreneur the marginal revenue (productivity) is the most efficient criterion for investment decisions and practically this can be done by estimating the return of the last unit of investment. In underdeveloped countries the profit and cost indicator of the private entrepreneurs may not necessarily reflect the social benefit and cost, and in many cases private economic activities are far from contributing and integrating within the national plan's targets.(95) Therefore, the social point of view is to be emphasised in establishing the investment criteria for project evaluation.

Practical problems related to either the nature of the various investment projects themselves or the nature of the existing different economic problems impose certain restrictions on the planner when applying certain criteria for evaluating each proposed projects of the plan, i.e. there is the necessity of making a choice of one criterion among different alternatives. Such restrictions are important and have practical implications. Those problems are summarised as follows.

(i) Problems related to the economic policy as a whole or the targets of the plan, such as the desired level of output, exports & imports are to be dealt with on a sectoral level as to be suggested later, (Chapter V) when the allocation of available resources among different sectors or the financial resources

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(95) "In underdeveloped areas, it is generally recognised that both private value and private cost may deviate far from social value and social cost". Chenery, H. B. [19] p. 76.

required to maintain certain level of investment are to be determined, i.e. the multi-sectoral model will determine directly the targets for each sector which depends on the technical coefficient and parameters used by the model. Therefore the planner has no choice except to evaluate projects within the framework of the plan and sectoral magnitudes which are to be derived by the multi-sectoral model.(96)

(ii) In the early stages of development where infrastructure projects are of vital importance in economic development, priority should be given to them although it is too difficult to estimate the overall benefit of such projects in practice, especially the indirect benefits. Personal judgement of elementary calculations may be in this respect more suitable than other concrete criteria for investment decisions, e.g. transportations and power plants are necessary regardless of the high cost of investment as compared with other projects.

(iii) Political considerations or matters of national prestige are often out of control of the economic planners and therefore investment decisions in this respect are not subject to any economic criteria.

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(96) See Chapter V. Many different propositions are given to link between the national economy or the sectors with the project analysis. See United Nations [126], Tinbergen, J. [122] and in particular model 20 on investment project appraisal. Heesterman, A. R. G. [49]

(iv) Some projects enjoying subsidies or tariff protections - due to their low level of technology and demand on their products - during the early stages of their operation; hence a suitable calculation method should be applied to tackle their future contribution to the targets of the economic policy; otherwise the elimination of these subsidies - which has a bearing to the process of production - may not help in achieving accurate evaluation.

(v) Indivisible projects due to the nature of production. If project A is associated with project B which has been selected for implementation for its very high benefit, then project A is bound to be selected for execution provided that its costs will not offset or reduce too much the benefit of project B.

To put in practice the idea of modifying the prevailing market prices three alternatives are available:-

firstly, either by an approximate calculation of the opportunity cost of factors of production;

secondly, by deriving the efficiency (shadow) prices of the available economic resources;

thirdly, approximation of the shadow prices of the principle resources is to be applied.

4.2 EFFICIENCY PRICES - TOOLS FOR PROJECT'S APPRAISAL

Prices satisfying the state of economic efficiency may be called efficiency prices. Theoretically the optimal dual solution (the values

of the shadow prices) of an economic model of a linear programming type of a particular objective function could be used as a basis to adjust the current prices of the variables of the actual system. This conclusion is true to the extent that the model reflects exactly the complexity of the economic situation and describes the economic system completely. As a matter of fact, most of the applied economic models do not express ideally the reality. They cover only the decisive economic factors. However, this does not mean that there is no hope in deriving and utilising the dual property of the model, because as long as the primal solution adequately reflects the reality, it may be possible to make use of the shadow prices. The question is whether it is possible to use these efficiency (shadow) prices to adjust directly the market prices of the commodities and to set up - by the top authorities, e.g. CPB - sets of modified exchange prices to be used by both the producers and the consumers. Practically, this is not possible for two reasons;

(i) different types of utility functions of the consumer contribute to the differences between market prices and efficiency (shadow) prices;

(ii) prices are not only measures of efficiency but also income determinants.

However, theoretically the values of efficiency prices are used to help the entrepreneur in taking his investment decision as an integrated part of the national plan.

On the use of shadow prices for investment decisions, economists like Dorfman, Samuelson and Solow , Bergstrom and Zauberman have theoretically suggested that, within a framework of a perfect competition system, the rational investment decisions are those satisfying the "zero-profit" optimal condition. The notion is being elaborated by A. R. G. Heesterman to deal with problems of optimal allocation of the available national resources in such a way as to reflect both the central (national) point of view as well as the role of prices and cost in a free exchange economy. By using the shadow prices as a policy of channelling investment in certain directions leading to the state of economic efficiency may be drawn up. In this Section a theoretical economic interpretation of the proposed concepts as related to the project evaluation are being mathematically treated.

The following is a general linear programming problem which may represent the objective function of a certain firm or enterprise and the constraints restricting its economic activities;

$$\text{Max } Z = f_i x_i \qquad \ldots \quad \text{(IV-1-a)}$$

subject to

$$a_{1i} x_i \lesseqgtr C_1 \qquad \ldots \quad \text{(IV-1-b)}$$

$$x_i \gtreqless 0 \qquad \ldots \quad \text{(IV-1-c)}$$

$$(i = 1,2,\ldots,n)$$

where

subscribed i refer to the number of the n activities;

x_i is a scalar, x is a row vector of the activities (output) level;

f_i is a scalar, f is a row vector of the values of the normal profit or net return of producing (selling) one unit of i-th activity;

C_1 total values (amount) of the available limited resources;

a_{1i} total amounts (values) of the available resource C_1 used by each unit of the corresponding i-th activity;

Z total value of the normal profit yielded from the activities of the firm; and

u_1 the shadow price (dual variable) of the resource C_1.

The dual variable u_1 can be interpreted as a price of utilising extra one unit of the available limited resource C_1 which would contribute the largest possible profit to the objective function Z, i.e. it reflects the marginal profit when increasing one unit of the available limited resources in the production processes. Initially, it is rational to pick up first the largest net contribution to the objective function using one unit amount of the available resource, i.e. the largest profit per unit of the utilised resource a_{1i}. That is to say the most efficient allocation is the largest ratio among $\frac{f_i}{a_{1i}}$ ratios.

Suppose that the largest ratio is $\frac{f_2}{a_{12}}$ (i.e. one unit of x_2 is to be produced),

i.e. $$\frac{f_2}{a_{12}} \geq \frac{f_i}{a_{1i}} \qquad i \neq 2 \qquad \ldots \text{(Iv-2)}$$

Accordingly, the levels of output activities $(x_1, x_2, \ldots, x_n)$ are $(0, \frac{C_1}{a_{12}}, 0, \ldots, 0)$ and the value of Z would be $Z = 0 + \frac{C_1}{a_{12}} f_2 + 0 \ldots + 0$.

The marginal profit of increasing the utilisation level of the available resource C_1 by one unit extra would be then,

$$\frac{f_2}{a_{12}}(C_1 + 1) - \frac{f_2}{a_{12}} C_1 = \frac{f_2}{a_{12}} \qquad \ldots \text{(IV-3)}$$

i.e. max $\dfrac{f_i}{a_{1i}} = \dfrac{f_2}{a_{12}} = \dfrac{\partial Z}{\partial C_1}$ = Marginal Profit

Now, denote λ as an "upnormal profitability indicator" of producing one unit of the corresponding i-th activity.

i.e. $$\lambda_i = f_i - a_{1i}u_1 \qquad \ldots \text{(IV-4)}$$

The term $a_{1i}u_1$ expresses the cost of utilising the amount of a_{1i} with respect to the scarcity of the available resource C_1. Rewrite the above relation into the following;

$$\frac{\lambda_i}{a_{1i}} = \frac{f_i}{a_{1i}} - u_1$$

Explicitly, we have;

$$\begin{aligned}
\frac{\lambda_1}{a_{11}} &= \frac{f_1}{a_{11}} - u_1 \\
\frac{\lambda_2}{a_{12}} &= \frac{f_2}{a_{12}} - u_1 \qquad \ldots \text{(IV-5)} \\
&\vdots \\
\frac{\lambda_n}{a_{1n}} &= \frac{f_n}{a_{1n}} - u_1
\end{aligned}$$

By (IV-2) and (IV-5) we then get;

$$\begin{aligned}
\frac{\lambda_1}{a_{11}} &= \frac{f_1}{a_{11}} - u_1 \lesseqgtr 0 \\
\frac{\lambda_2}{a_{12}} &= \frac{f_2}{a_{12}} - u_1 = 0 \qquad \ldots \text{(IV-6)} \\
&\vdots \\
\frac{\lambda_n}{a_{1n}} &= \frac{f_n}{a_{1n}} - u_1 \lesseqgtr 0
\end{aligned}$$

Relations (IV-6) are of economic significance. It states that for any production unit the most efficient allocation of the available resources in relation to a certain objective function is where profit index $\frac{\lambda_i}{a_{1i}}$ is equal to zero, or in other words the efficient allocation of the resources is to satisfy the "zero-profit" conditions, whereas all less efficient allocations would lead to less "normal" profit. In case that another restriction is to be imposed on the activities, i.e. to ensure a minimum level of output (activities) (say $x_i \gtrless B_i$) then the efficiency prices (dual variables) corresponding to this constraint (denoted by V_i) could be interpreted as an extra profit (upnormal) to be needed if the firm does not satisfy the condition of producing $x_i \gtrless B_i$. In other words this price induces the "manager" to produce up to the minimum level required. Otherwise if the firm produces an amount of x_1 less than one unit from the required level of B_1 then the required profit should be $f_1 + V_1$ and it is quite obvious that, under the perfect competition system, this is impossible to achieve assuming there

is no change in the market prices of the other commodities.

Mathematically, the general problem may be stated as follows;

To maximise $Z = \underline{f}\underline{x}$ . . . (IV-7-a)

subject to $A\underline{x} \leq \underline{C}$ . . . (IV-7-b)

$\underline{x} \leq -\underline{b}$ . . . (IV-7-c)

$\underline{x} \geq 0$ . . . (IV-7-d)

Using the Lagrangean method, the optimality condition is then

$$L = \underline{f}\underline{x} - \underline{u}\,(A\underline{x} - \underline{C}) - \underline{v}(-\underline{x} + \underline{b})$$

$$\frac{\partial L}{\partial \underline{x}} = \underline{f} - \underline{u}A + \underline{v} \leq 0 \qquad \ldots \text{(IV-8)}$$

where $\underline{u}$ and $\underline{v}$ are column vectors of Lagrangean multipliers (dual variables or efficiency prices).

To satisfy the optimality condition (IV-8), then, for the first set of constraints (IV-7-b), u_i has to be either zero or positive. For the second set of constraints (IV-7-c), v_i has to be either zero or if positive then the producer must reduce his normal profit because $f_i + v_i < 0$.

System (IV-7) can be generalised so as to reflect the economic activities of the national economy. Hence, relation (IV-8) can be interpreted as follows. At efficiency (shadow) prices the level of production activities where there exists full employment of production factors, the extra profit should be zero. But if there is no full employment of one or more production factors or the use of loss

causing production processes then we will have negative profit instead of zero-profit. In this conclusion lies the link between the cost calculation of the individual projects or the investment decisions on the micro- level and planning of the production activities and its allocation among different sectors in addition to achieving certain economic targets on the national level on the other hand. That is to say the most efficient allocation of the available resources in relation to a certain objective function, it is necessary to satisfy the "zero-profit requirement" for the economic activities under consideration. Otherwise the "inefficient" production activities would have negative profit (not the normal profit in the commercial sense). In other words these production units (or projects) satisfy "zero-profit" condition are economically the most efficient whereas production activities with less normal profit might leave the market if there exists better alternatives.

Suppose that the CPB introduces sets of efficiency prices and instruct the corresponding organisations responsible for project evaluation (public and private) to use them. The shadow prices of output and of the limited resources should then be used to modify the market prices of both the values of output and the cost of inputs. After that the economic efficiency of each project can be tested by applying the "zero-profit condition". This approach implies that the CPB is to stimulate the projects which satisfy "zero-profit requirements" and discourage the activities with less normal profit.

Since investment decision has in turn effects on the allocation pattern of resources, the only mechanism by which the shadow prices as tools for project evaluation are workable, in the market system, is by successive planning-iterations, i.e. the effects of investment decisions on the economic system should be considered, and hence new set of shadow prices may be derived. This iterative procedure is to be repeated until a satisfactory approximation is achieved.

4.3 INVESTMENT CRITERIA IN UNDERDEVELOPED COUNTRIES - PRACTICAL APPROACH

The crucial assumption governing the application of the "zero-profit" condition as an investment criterion is that there exists a system of perfect market competition. Unfortunately, because of the economic as well as social and political structure of the underdeveloped countries such a criterion cannot be applied. Hence different practical criteria are suggested for application in project evaluation in underdeveloped countries. From a theoretical point of view these criteria are less satisfactory as compared to the use of shadow prices. In this Section the implications of such criteria are being outlined in order to show, in the next Chapter, how the theoretical and practical considerations can be reconciled in a compromise approach.

Since there exists wide diversifications, be they economic, social or political, among the underdeveloped countries, investment criteria have to be considered within the prevailing conditions of the economy

in question. Hence in this Section the economic justification given in support to either criteria would be analysed in view of the general principles of economic growth in underdeveloped countries as outlined in Chapter I.

4.3.1. Low level versus capital intensive criteria:

At a first glance one may suggest projects using little capital and contributing a high level of national output as having priority among others because of the scarcity of capital in underdeveloped countries, i.e. the most suitable criteria to be used for project evaluation for underdeveloped countries is high ratio of output/capital.[77] Practically, this may be derived by dividing the annual product over capital required. Projects evaluated on this basis should be then ranked accordingly. This criteria implies that the opportunity cost of labour or other factors of production are zero. In some sectors where capital is really scarce and labour supply is non-limited to the degree that the employment of labour in these projects does not affect the value of utilising labour in any projects this criterion may be relevant. But in many cases this criterion is not adequate and suitable and might deviate too much from the social marginal productivity, i.e. it does not contribute much to national welfare. Likewise A. E. Kahn [78] asserted that in each project (technique) a given investment (capital) which is associated with a certain level of real output, may use other

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77) This criterion has been advocated by Buchanan, N. S. and Ellis.

resources with different percentages and therefore make the comparison invalid.(98)

4.3.2. Balance of payments effects criterion:

This criterion is widely used because of the fact that the balance of payments in underdeveloped countries restricts to a considerable extent the implementation of many projects of economic development. Generally there is little scope to reduce imports without causing a larger decrease in GNP, and even if investment is directed to import substitutions, the level of non-competitive imports still has considerable effect on the balance of payments. In underdeveloped countries exports have limited effects because of the unfavourable trend of export prices and the limited diversification of export goods which are mainly agricultural, and thus one serious problem facing most underdeveloped countries is to deal with the risk of chronic unbalance in the foreign exchange accounts.

In analysing the effects of any proposed project on the balance of payments we may distinguish between the effects arising during the investment period which is always negative and the operating effects, which might be positive. Total algebraic effects may be negative, zero or positive. However, as in the first criterion one may suggest that projects yielding either additional exports or import substitution goods and services or both, should be on the top of the priority list. This

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(98) A. E. Kahn rejected this criterion completely on that assumption. Kahn, A. E. [79]

criterion may not be a suitable one in view of the following Kahn propositions.(99)

(1) It is possible for investments to yield the additional products for domestic consumption and to increase real national income without increasing money income available for expenditure on (additional) imports.

(2) It is possible for such investments to yield additional money as well as real income without increasing output.

4.3.3. Employment criterion

In countries suffering from a high level of unemployment like the underdeveloped countries, especially those with a very high rate of increase in population, the effects of projects on the employment level may be considered as a criterion upon which investment decisions are to be taken. Economic development implies a certain level of employment of labour and to a certain extent this would increase the level of consumption, and output which in turn increases the level of development. But to consider the ratio of employment/capital of the proposed project as a criterion upon which the investment decision should be taken is rather misleading for two main reasons. First, the existence of a high level of unemployment is basically due to the lack of capital. Secondly, labour supply is not infinite and it has social cost in most cases; this is very clear in the case where the skilled labour is required. To develop skills, investment (cost) is necessary. Therefore, this

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(99) Kahn, A. E.[79] p. 43.

criterion is not accepted except within the limits of social and political considerations.

4.3.4. Social Marginal Productivity Criterion

In each of the first three criteria, one aspect of national welfare is being considered such as the level of national product, the balance of payment, or the level of employment. Although the application of each of them may be more suitable for certain cases, from the theoretical point of view this may not be satisfactory. Theoretically the most efficient allocation of investment from the social point of view could be achieved by equalising the SMP of capital in its various uses. SMP concept may be defined as the effect of increasing one unit of investment (capital) on several dimensions of the economy as the national balance of payment, distribution of income.* In the ideal free market competition where the rules of supply and demand interact freely, the best efficient allocation of investment is to be achieved automatically without any intervention. But in the absence of such a framework, an appropriate method for deriving SMP is in many cases very necessary in order to be used for investment decisions. Because this criterion views the economy as a whole, it can be applied to projects which are of a general nature and the results obtained from this

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* This definition coincides with Chenery's definition (Chenery, H. B. [19]) whereas in A. E. Kahn [79] the SMP is defined as the marginal unit of investment to national product only. J. Tinbergen in his definition to the national welfare implies the same meaning of our definition. Tinbergen, J. [123] pp. 178-183.

appraisal are economically sound compared to other projects appraised otherwise.(100)

Our conclusion can be summarised as follows. Whilst the SMP criterion is preferable to be followed, no particular criterion should have preference because of many economic and practical problems involved. The economic planner must make compromises among different alternatives the only restrictions which should not be violated are:-

(i) to satisfy the constraints regarding the minimum required level of output, exports and employment (labour);

(ii) to satisfy the constraints regarding the maximum permitted level of imports.

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(100) W. Galenson and H. Leibenstein criticise SMP criterion on the grounds that it is a static criterion and they are point out that different projects may give rise to different rates of capital accumulation in the future, i.e. the influence of a project on the future rate of capital accumulation must be included. Galenson, W. and Leibenstein, H.[34]

CHAPTER V TWO-STAGE MODEL OF NATIONAL ECONOMIC PLANNING

Basically the model follows the approach which emphasises the necessity of the state's intervention in the course of economic development. This intervention is created by the general economic, social and political situation of the underdeveloped countries. Corresponding to the national, sectoral and project level, the model proposes an integrated system consisting of a multi-sectoral model, sectoral models and a suitable criterion to be used for project evaluation. The interrelationships among the sectors and the feedback between the economic variables of the whole system are being considered as well. In one version of the multi-sectoral model the functional equations consist of variables relating to different points of time, and in this sense the model, to some extent, is of a dynamic nature.

The multi-sectoral model is of a linear programming type and it is assumed to be formulated by CPB to reflect the aims and the main constraints restricting the economic activities of that particular underdeveloped country. For the consistency of the plan these constraints should cover the main macro- relations, i.e. the balanced relations of supply and demand, foreign trade, production functions and resources utilisation. On a sectoral level the efficient allocation of the available resources among different projects is performed in terms of investment decisions. These decisions are not separated from the allocation pattern of activities on the sectoral levels, although projects evaluation is to be determined outside the multi-

sectoral model according to a certain criterion. In fact "investment policy is part of the general policy of the government and the selection of investment project cannot be divorced from other decisions".(101) Hence the effect of the investment decisions are being taken into account.

The model is of two stages because it considers the process of the national economic planning as follows. In the first stage the values of the economic variables on the sectoral level are to be determined, and, accordingly, the evaluated projects of the plan are to be chosen on the sectoral level by implementing a sectoral model of integer programming type. In the second stage the effects of the implemented projects should be assessed on the macro- as well as sectoral level.

5.1 SOME ECONOMIC AND TECHNICAL ASSUMPTIONS OF THE MODEL

The model is based on a number of economic and technical assumptions. The economic assumptions are made to accord with the general economic structure of the underdeveloped countries. The technical sssumptions are related to the input-output model and linear programming technique. To make the model as practical as possible rather than purely theoretical, the limitation of the available data is also being considered. Some of these basic assumptions are as follows.

Firstly, capital (investment) is a capacity creating as well as income generating factor and it is the most scarce resource in underdeveloped countries. Likewise foreign exchange is a scarce as well as being a limiting growth factor. Therefore one of the main aims of the model is to allocate efficiently the available capital and foreign exchange among different sectors and projects.

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(101) Tinbergen, J.[120] p. 30.

Secondly, the rate of growth of the labour force is assumed sufficient to maintain the rate of growth of output, and as long as there exists widespread unemployment of different types, i.e. labour supply in excess of what can be employed by the available stock of capital; labour should not be considered as a limiting constraint on development. It is also assumed that a certain level of employment is necessary to be secured despite the labour cost. This assumption would serve both in:-

(a) avoiding the most likely social and political disturbances during the plan's period;

(b) increasing the demand which has a positive effect on the expansion of the economy, provided that consumption should be within certain limits determined by the plan.

Thirdly, the model maintains the general equilibrium between supply and demand through the balance relations among different sectors of the economy, the policy and behaviour relations (i.e. balance of payments, and consumption and investment levels). It is thus assumed that prices during the plan period remain unchanged and all goods are estimated at the prices of the base year.

Fourthly, a simple type of production function (capital/output ratios) is to be used,[102] and a suitable treatment to improve its estimation is suggested. The production technology of the plan's projects and its effects on the inter-industry system is being considered, i.e. new technology of the new projects which is supposed to be implemented during the plan's period is to be taken

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(102) In this respect, in fact, we do accept the stability of the capital/output ratios at least for the medium term.

into account.

Fifthly, the model covers a period of about five years because in underdeveloped countries political considerations necessitate that the projects should bear fruit within a relatively short period of time.(103)

Sixthly, regarding the investment projects of the plan, it is assumed that they will add new capacity in the same period. However, in practice the gestation period of many investment projects might be longer than the plan's period; in this case the new capacity should be considered in the present period as well as the next period. But initially we might assume that the economy is working at full capacity - the main reason for that assumption is most likely the lack of data - but if there are enough data we can consider additional capacity due to implementation of the projects of the previous period.

Seventhly, in introducing a distinction between competitive and complementary imports the model allows the possible substitution of competitive imports by domestic products.

Eightly, income distribution problem is to be dealt with through maintaining a certain level of employment and consumption limits.

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(103) "This limitation is not serious in the typical underdeveloped economy in which capital goods (except for construction) are normally imported, and hence the possibility of achieving given levels of production is practically independent of the sequence of investment". Chenery, H. B. and Kretschmer, K. [23] p. 368.

5.2 THE FORMULATION OF THE MODEL

5.2.1. THE MULTISECTORAL MODEL

Firstly, the objection function.

Initially it is assumed that the objective function of the model is to maximise the national income at the target year of the plan as it is the ultimate aim of economic development, i.e. maximise Y where Y is national income.

$$\text{But } Y = \sum_{i=1}^{n} c_i^p + \sum_{i=1}^{n} c_i^g + \sum_{i=1}^{n} I_i + \sum_{i=1}^{n} E_i - \sum_{i=1}^{n} M_i - \sum_{i=1}^{n} \bar{M}_i \quad \ldots \text{(V-1)}$$

where,

c_i^p is a scalar, c^p is a vector of private consumption of each sector i at the target year;

c_i^g is a scalar, c^g is a vector of government consumption of sector i at the target year;

I_i is a scalar, I is a vector of investment of each sector i at the target year;

E_i is a scalar, E is a vector of exports level of each sector i at the target year;

M_i is a scalar, M is a vector of competitive imports of each sector i at the target year;

$\bar{M}_i$ is a scalar, $\bar{M}$ is a vector of complementary imports of sector i at the target year;

$i = 1,2,3\ldots$ n = total number of the sectors of the economy;

c_i^g and E_i are assumed to be exogeneously determined; therefore the objective function becomes:

$$\text{Maximise } \sum_{i=1}^{n} c_i^p + \sum_{i=1}^{n} I_i - \sum_{i=1}^{n} M_i - \sum_{i=1}^{n} \bar{M}_i \quad \ldots \text{(V-2)}$$

The coefficients of the variables of the objective function are assumed to reflect both the government qualitative policy regarding the desired distribution of the standard of living (per capita consumption) between different social classes, the production structure consequent upon a given allocation of gross capital formulation and imports policy. In practice the coefficients of the preference function can be chosen so as to reflect the politician's point of view.(104) Initially it is assumed that there is no particular qualitative policy regarding these variables. So all the coefficients are assumed to be one. Other economic targets like the necessity of maintaining certain levels of private consumption and investment are to be dealt with by formulating suitable sets of constraints.

Secondly, the constraints.

The constraints are formulated upon different relevant assumptions and related to the following main structural and economic relations.

(i) The balance relations; input-output analysis is used here to ensure that output is uniquely determined as a linear combination of multi-sectoral demands given certain technological coefficients and final demand. This implies that the output of the whole economy must, in equilibrium, be equal to the sum of inter-industry (intermediate) demand for inputs plus the sum of "final demands" for output. In contrast to the open Leontief model where all final demand categories are exogeneously determined outside the model, the closed Leontief model - which we follow -

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(104) Professor Ragnar Frisch [33] believes that a compromise preference function (of different targets) as well as a compromise weight of the coefficients of this function is possible to achieve.

considers private consumption, investment, competitive imports as endogenous variables whereas the other final demand categories; government consumption, exports and net increase of inventory (if available) (105) are exogenously estimated and hence the output required from domestic production sectors plus competitive imports to meet those types of demands is determined endogenously by the model. Mathematically:-

$$X_i + M_i - \sum_{j=1}^{n} a_{ij}X_j - c_i^p - I_i^* = c_i^g + E_i \qquad i = 1,2,\ldots,n \quad \ldots (V\text{-}3)$$

where,

X_i is a scalar, X is a vector of total output of each sector i at the target year;

I_i^* is a scalar, I* is a vector of (endogenous) investment by origin.

The transformation process of investment by destination (I) into investment by origin (I*) is conceivable by multiplying the sector-wise capital-output ratios by the corresponding level of output. Explicitly,

$$I_j = C_j \bar{X}_j \qquad \ldots (V\text{-}4)$$

(V-4)

where,

C_j is a scalar, C is a vector of incremental capital-output ratio of j-th sector;

$\bar{X}_j$ is a scalar, $\bar{X}$ is a vector of net increase of output of j-th sector;

I_j is a scalar, I is a vector of investment (change of capital stocks) held by j-th sector.

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(105) Net change in stock during the plan's period may be assumed to be nil algebraically. At the same time inventory value is generally of no significance in the underdeveloped countries. Thus we omitted inventory from the final demand categories.

But I_j consists of various types of capital goods and if this structure is given then the proportionate distribution of I_j among these capital goods can be assumed.

i.e. $$I_{ij} = \gamma_{ij} I_j \qquad \ldots \text{(V-5)}$$

Clearly, $$\Sigma \gamma_{ij} = 1$$

where,

I_{ij} is the output capital goods of i-th sector held by j-th sector, i.e. investment originated by i-th sector;

By (V-4) and (V-5), we get,

$$I_{ij} = \gamma_{ij} C_j \bar{X}_j \qquad \ldots \text{(V-6)}$$

or

$$h_{ij} = h_{ij} \bar{X}_j \qquad (V-7)$$

where, $$h_{ij} = \gamma_{ij} C_j$$

In a matrix notation relation (V-7) can be rewritten as follows:

$$I^* = H\bar{X} \qquad \ldots \text{(V-8)}$$

where,

H is a matrix of sector-wise incremental capital-output ratios;

$\bar{X}$ is a vector of net increase of output;

I^* is a vector of investment by origin.

Relation (V-3) may, therefore, be rewritten as follows:

$$X_i + M_i - \sum_{i=1}^{n} \sum_{j=1}^{n} a_{ij} X_j - \sum_{i=1}^{n} \sum_{j=1}^{n} h_{ij} \bar{X}_j \geq C_i^P + C_i^G + E_i \qquad \ldots \text{(V-9)}$$

For a certain period of time (say five years) relation (V-9) is of static nature. It implies that investment has to be spent in the target year of

the plan.[106] This is not a very realistic assumption. In this respect a "quasi-static" approach which is being suggested by Mr. Heesterman, is more realistic.[107] It considers the dynamic nature of investment over time by assuming a linear time path for investment over time as proposed by Heesterman, which is as follows.

$$\sum_{t=0}^{f-1} I^*_t = \tfrac{1}{2}(f+1)I^*_0 + \tfrac{1}{2}(f-1)I^*_t \qquad \ldots \text{(V-10)}$$

where,

t refers to the time and f refers to the total plan's period, say five years;

I^*_0 is a vector of investment by origin at the base year of the plan.

By (V-10, (V-8) and (V-3), we derive the following "quasi-static" balance relation:-

$$X_{i,t} + M_{i,t} - \sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij}X_{j,t} - \frac{2}{f-1}\sum_{i=1}^{n}\sum_{j=1}^{n} h_{ij}X_{j,t} - C^p_{i,t}$$

$$\geq C^{p'}_{i,t} + E_{i,t} - \frac{2}{f-1}\sum_{i=1}^{n}\sum_{j=1}^{n} h_{ij}p_{xj} - \frac{f+1}{f-1}I^*_0 \quad \ldots \text{(V-11)}$$

where,

p_{xj} is a scalar px is a vector of output of each sector j at the base year of the plan.

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(106) In relation (V-9) the capacity creating effect of investment is taken into account, and if we are interested only in the change of the variables over two points of time say t → t+1 then, this relation can be considered as a dynamic one.

(107) Heesterman, A. R. G.[48] pp. 91-92.

(ii) Foreign trade; in most underdeveloped countries, the balance of payments imposes a constraint on its investment programmes for development. If imports level decreases, then GNP will accordingly decrease unless investment is directed to import substitutions and to increase exports level. In order to avoid bottlenecks in the economy during the period of the plan and to explore the scope of substituting competitive imports by domestic products, imports are assumed to be of two types; competitive and complementary imports. Competitive imports are assumed to be homogeneous with products of the corresponding domestic sectors and thus it could conceivably be replaced by increasing the level of domestic output. Complementary imports are those required during the period of the plan, and it is not possible to produce them locally. Complementary imports used for government consumption are assumed to be exogenous.

Exports are assumed to be determined exogenously on the basis of:- (i) the trend of exports in previous years; (ii) the demands of the foreign markets and the possible change of prices at foreign markets during the period of the plan; and (iii) the official foreign trade agreements with other governments.

Mathematically:-

(a) the foreign exchange capacity constraint may be written as follows;

$$\sum_{i=1}^{n} g_i M_i + \sum_{i=1}^{n} g_i \bar{M}_i - \sum_{i=1}^{n} e_i E_i \lesseqgtr B \qquad \ldots \text{(V-12)}$$

where,

g_i is a scalar, g is a vector of ratios of import prices to domestic prices in sector i at a given exchange rate, i.e. price index of imports;

e_i is a scalar, e is a vector of ratios of export prices in foreign currency to domestic prices in sector i, i.e. price index of exports;

B is the desired level of net balance of payments.

For the level of B, three cases are possible:-

(i) If $B > 0$, then B is the maximum deficit allowed;

(ii) if $B < 0$, then B is the minimum surplus which must be achieved;

(iii) if $B = 0$, then we have an equilibrium state, i.e. total exports plus net income from abroad and foreign loans is equal to total imports plus net income abroad.

(b) The definition constraint of the non-competitive imports may be written as follows:-

$$\sum_{i=1}^{n} \bar{M}_i + \sum_{i=1}^{n} a_{mi} X_i - \sum_{i=1}^{n} a_{mpi} C_i^p - \sum_{i=1}^{n} a_{mgi} C_i^g = 0 \quad \ldots \text{(V-13)}$$

where,

a_{mi} is value (amount) of complementary imports currently used in producing one unit of output in sector i;

a_{mpi} is value (amount) of complementary imports currently used for private consumption of commodities produced in sector i;

a_{mgi} is value (amount) of complementary imports currently used for government consumption of commodities produced in sector i.

(iii) Employment constraint; one of the main aims of the economic plans in underdeveloped countries is to ensure a certain level of employment. This constraint (objective) may be in some sectors a

binding one because of the necessity to avoid any social or political disturbances resulting from the existence of widespread unemployment (real or disguised). Mathematically:-

$$\sum_{i=1}^{n} w_i X_i \geq L \qquad \ldots \text{(V-14)}$$

where,

w_i labour - output ratios of the i-th sector;

L the minimum level of employment required by all sectors at the target year.

This does not mean that the model considers labour having no social cost, which may be true in some cases, but the approach of the model to the employment problem is to appreciate the social and political conditions for the success of the plan's implementation rather than for purely theoretical consideration.

(iv) Capital requirements; total capital available to finance investment projects of the plan should be exogenously estimated, and its allocation among different sectors is based on sectoral capital-output ratios in addition to the other constraints. Mathematically:-

$$\sum_{i=1}^{n} C_i X_i \leq fc + PCa \qquad \ldots \text{(V-15)}$$

where,

PCa is the existing production capacity (capital stock) at the initial year of the plan;

fc total financial resources (private and government saving plus foreign loans and grants) available for investment (purchasing capital goods) during the plan's period.

i.e. $$fc = s^{p}Y + s^{g}Y + FL \quad \ldots (V\text{-}16)$$

where,

S^p is the propensity to save of private sector;

S^g is the propensity to save of government sector;

FL total foreign loans;

Y is national income.

(v) The definition constraint of investment;

$$I_i = C_i (X_i - PX_i) \quad \ldots (V\text{-}17)$$

and

$$\sum_{i=1}^{n} C_i X_i - \sum_{i=1}^{n} I_i = \sum_{i=1}^{n} C_i PX_i \quad \ldots (V\text{-}18)$$

where,

$$\sum_{i=1}^{n} C_i PX_i = PCa \quad \ldots (V\text{-}19)$$

(vi) The behaviour constraints; the following sets of constraints are related to the minimum level of consumption, investment and output variables during the period of the plan. The economic justification of these constraints is the fact that the present allocation of production and resources in the underdeveloped countries is far from efficient. Thus it is necessary to avoid the possibility of having a situation where the level of these variables at the target year is below their levels at the basic year. This situation would create many economic, social

and political problems.(108)

(a) Private consumption

The level of private consumption of the output of sector i may be considered as a linear function of total private consumption via the elasticity of demand, i.e.

$$C_i^p = \beta_i \Sigma_i C_i^p + a_i \qquad \ldots \text{(V-20)}$$

where,

β_i is the elasticity of demand for output of sector i at certain reference points (per capita consumption of the output of sector i and per capita aggregate consumption);

a_i is a constant at the same reference points corresponding to sector i.

This treatment may make the model very rigid.(109) A more flexible

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(108) This implies a certain qualitative policy where it is possible either to consume in the present and postpone investment later on, or to consume and invest simultaneously. The latter case is being followed and this entails a certain level of saving.

(109) Relation (V-20) is a linear approximation of the following non-linear function;

$$C_i^p = k\left(\frac{C_i}{N}\right)^{\alpha_i}$$

at reference (forecast) point $\left(\frac{\Sigma_i C_{i,o}^p}{N_o}, \frac{C_{o,i}^p}{N_o}\right)$

where,

N is population,

α_i expenditure elasticity for sector i (commodity i) estimated for cross section and time series of consumer behaviour.

See Bruno, M.[16] and Simpson, D.[117]

assumption is to assume that consumption pattern is able to vary within about say 10% of the range on either side of the Engel curves.

i.e. $$C_i \gtrsim 0.90\ (\beta_i \Sigma C_i^{p} + a_i)$$

and $$C_i \lesssim 1.10\ (\beta_i \Sigma C_i^{p} + a_i)$$

(b) Investment

To ensure a certain level of capital accumulation during the period of the plan, it is necessary to determine the lower bound of investment at the target year which should be at least equal to the level of the basic year.

i.e. $$I_i \geq \bar{I}_i \qquad \ldots \text{(V-21)}$$

where,

$\bar{I}_i$ is the minimum level of investment of i-th sector during the plan's period.

This set of constraints is also required to tackle the situation where some amounts (values) of investments are being already implemented as a part of projects cost during the previous period.

(c) Output

Production level of each sector should be at least the same level as the basic year.

i.e. $$X_i \geq \bar{X}_i \qquad \ldots \text{(V-22)}$$

where,

$\bar{X}_i$ the minimum level of output of the i-th sector at the ~~target~~ basic year.

The rate of growth of output however is to be determined endogenously by the model.

5.2.2. THE SECTORAL MODEL

The multi-sectoral model is supplemented by a sectoral model for each sector. The latter is of integer programming type and it is assumed to be used by different economic departments (ED) corresponding to different sectors of the economy in order to select the plan projects from a proposed list. Before applying the sectoral model, each department should evaluate all proposed projects according to a certain investment criterion. This criterion, which is supposed to reflect the definition of "development", is assumed to be set up and approved by the political authorities. In this context social marginal productivity (SMP) is being suggested as a yardstick for evaluating each of the proposed projects in each sector. The values of SMP's are then to be used as the coefficients of the variables of the objective function of the sectoral model which is to be maximised. Each variable of the objective function represents a proposed project.

Different types of constraints are being considered. These are related to the following economic relations.

(i) Total output of the selected projects of each sector of the economy should not exceed total output of the corresponding sectors which is endogenously determined by the multi-sectoral model. Practically such a constraint is not necessary because of the existence of the capital constraints.(110)

(ii) Total imports of the selected projects in each sector of the economy should not exceed a permitted level of imports of the

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(110) This point is being clarified in Section 4.1 (ii)

corresponding sector.

(iii) Total exports of the selected projects in each sector of the economy should be at least equal to the total level of exports of the corresponding sector.

(iv) Total employment of the selected projects in each sector of the economy should be at least equal to the corresponding level of employment which is endogenously determined by the multi-sectoral model.

(v) Total investment (capital of all selected projects should not be more than total investment allocated to the corresponding sector by the multi-sectoral model.)

5.3 TWO-STAGE OF PLANNING

The planning process suggested here is of two stages. In the first stage the multi-sectoral model is to be solved; therefore, the values of output, private consumption, gross capital formation, the number of employers and first approximation of the allocation of the available resources (capital and foreign exchange) among all sectors of the economy are determined. These values represent the desired changes in output, private consumption, investment, imports and employment level, which must be achieved, during the period of the plan. Then, after deriving these values the CPB will instruct the corresponding ED's to use these values as the upper and lower bounds of their corresponding constraints of the sectoral models. In this stage the planning process is carried out not only on the macro- and sectoral level, but also at the project level where the ED's should evaluate each

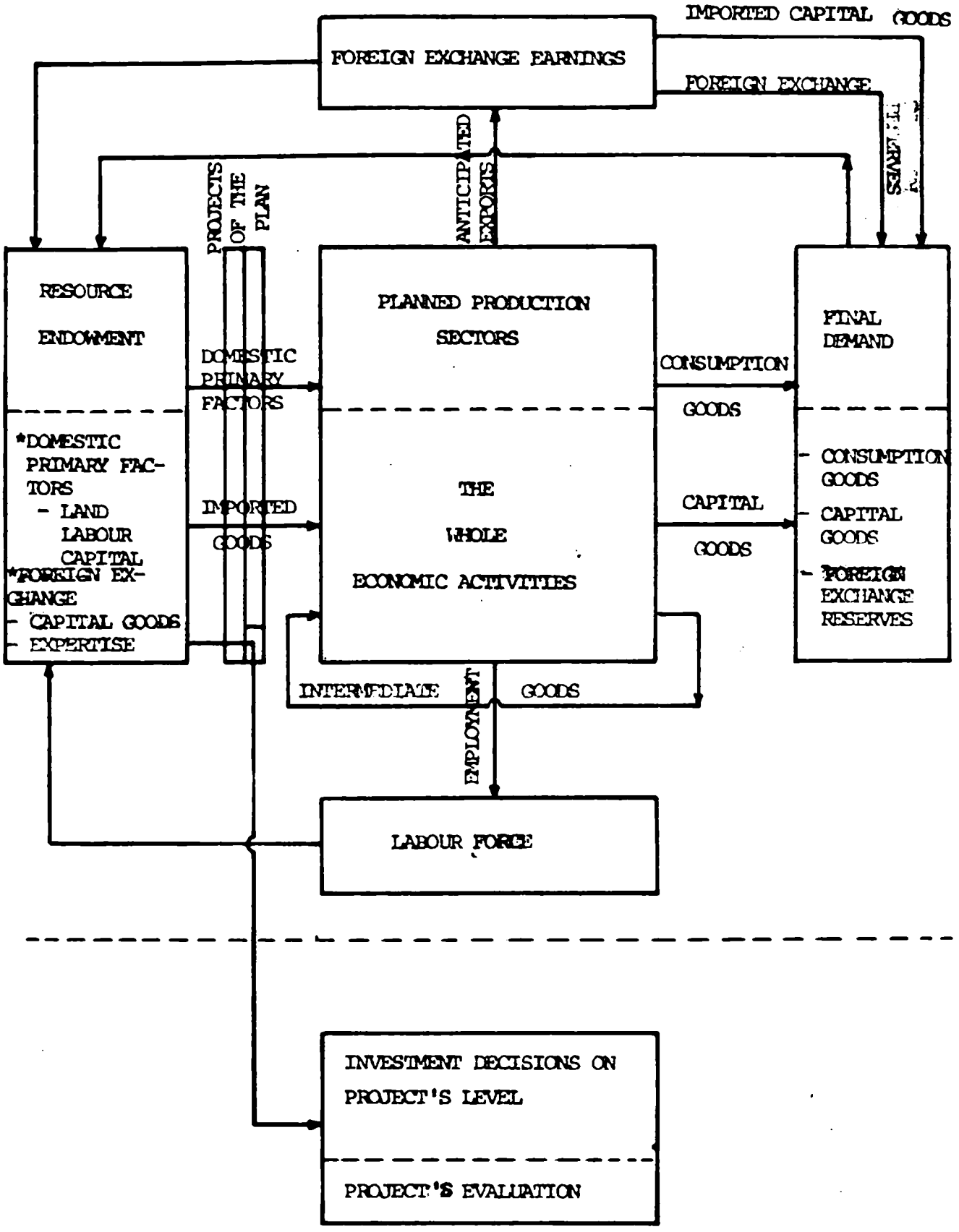


FIGURE 3: Interrelationships between the economic activities in a planned economy.

proposed project according to the SMP criterion.(111) Then the sectoral model can be applied for each sector in order to select a number of projects.

The implementation of each selected project - determined by the final solution of the sectoral model - will affect the path and the rate of growth of the economy. The net increase of output, investment, imports and employment will contribute to the expansion of the economy by affecting the intermediate demand, imports, the level of employment and of course the level of investment and private consumption. So in the second stage the CPB will take all these effects into account and improve the first solution obtained from the multi-sectoral model at the first stage according to the changes due to the implementation of the selected projects during the plan's period. Thus the multi-sectoral model should allow:-

(i) changes in the coefficients of the technology matrix (input-output ratios) by taking into consideration the new technology of the selected projects. This means that the values of the intermediate demand would change as a result of implementing the projects of the plan. Consequently the level of private consumption, total output and its allocation among the corresponding sectors would be changed. This modification makes it possible to take into account the effect of the new technology used by the selected projects.(112)

(ii) The increase of imports and exports obtained from the first stage will affect the values of the economic variables in the second stage as follows.

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(111) Those proposed projects should be first technically feasible and the required inputs must be available and obtainable at the assumed prices and the output capable of absorption by the market. See Chapter IV. & Chapter IX

(112) In case the case selected projects are entirely new, we follow the same approach by either extending the number of sectors or adding them to the existing industries or sectors.

(a) In case of a deficit, if the values of the exports level are greater than the level of imports, the deficit gap will be reduced and this of course would improve the balance of payments. But if the values of imports are greater than exports then the gap becomes wider and this would worsen the balance of payments.

(b) In case of a surplus, i.e. the values of exports are greater than the imports, then the lower limit should be raised into a higher new level and this of course has a positive effect on the balance of payments, whereas if the values of imports are greater than exports, then the new lower limit will be less than the first stage.

(iii) The first approximation of capital-output ratios will be adjusted according to actual figures of output and capital of the selected projects.

5.4 THE MATHEMATICAL STRUCTURE OF THE MODEL

5.4.1. THE FIRST STAGE

5.4(i). The multi-sectoral model: the number of the endogenous variables of the model as it has been stated in the previous Section is greater than the number of total constraints. From a mathematical point of view this means that some of the activities (total number of the variable minus the number of constraints) will have zero value. From the economic point of view this situation may be unrealistic because unless an economic justification is explicitly given, in terms of constraints, all economic activities should be always positive. This situation requires the following mathematical modification, which will reduce the number of the variables without affecting the structure of the model.

Using the definition constraint of the non-competitive imports relation (2), the objective function can be written as follows:

$$\text{Max.} \sum_{i=1}^{n} C_i^p - \sum_{i=1}^{n} I_i - \sum_{i=1}^{n} M_i - \left(\sum_{i=1}^{n} a_{m_i} X_i + \sum_{i=1}^{n} a_{mp_i} C_i^p + \sum_{i=1}^{n} a_{mg_i} C_i^g \right) \quad \ldots \text{(V-23)}$$

It is quite obvious from the above structure that the first objectives of the model are to ensure a certain level of employment, government consumption, exports and of balance of payments.

(ii) The sectoral model: initially, the general formula of the sectoral model at the first stage can be written as follows.

$$\text{Max.} \quad \sum_{j=1}^{r} SMP_{i_j} Pro_{i_j} \quad \ldots \text{(V-24)}$$

$$\text{s.t.} \quad \sum_{j=1}^{r} d_{i_j} Pro_{i_j} \leq X_i \quad \ldots \text{(V-25)}$$

$$\sum_{j=1}^{r} m_{i_j} Pro_{ij} \leq M_i + \bar{M}_i \quad \ldots \text{(V-26)}$$

$$\sum_{j=1}^{r} h_{i_j} Pro_{i_j} \geq L \quad \ldots \text{(V-27)}$$

$$\sum_{j=1}^{r} q_{i_j} Pro_{i_j} \geq \bar{L}_i \quad \ldots \text{(V-28)}$$

$$\sum_{j=1}^{r} k_{i_j} Pro_{i_j} \leq I_i \quad \ldots \text{(V-29)}$$

$$Pro_{i_j} = 0 \text{ or } 1 \qquad i = 1,2,\ldots,n \qquad j = 1,2,\ldots,r$$

where,

SMP_{ij} social marginal productivity of j-th project in the i-th sector;

d_{i_j} output of j-th project in the i-th sector;

m_{i_j} imports (competitive and complementary) of j-th project in i-th sector;

h_{i_j} employment (labour) in terms of wages of the j-th project with sector;

q_{i_j} exports of the j-th project in i-th sector;

k_{i_j} capital requirement for j-th project in i-th sector;

Pro_{i_j} project j-th in the i-th sector;

$i = 1,2,\ldots,n$ total number of all sectors of the economy;

$j = 1,2,\ldots,r$ total number of the proposed projects in each sector.

Practically we may face the situation where to satisfy the optimality conditions of the sectoral model, it might be necessary not to choose a certain proposed project which is more or less near the efficiency frontier as determined by the model itself. This might arise due to two reasons:-

(a) the nature of the integer type problem where most likely some of the available resources would be wasted;

(b) the limited number of the proposed projects.

Both reasons are beyond the planner's control. With regard to the first

one, mathematically, there is no alternative as long as the variables take the integer values of either zero or one. For the second reason, in reality the number of the proposed projects are really limited in underdeveloped countries; in fact in some cases the number of the proposed projects are so few that there is no need even to compare between them looking for the most efficient one. However, to deal with such problems we may change the direction of the constraint related to the sectoral output level. Economically this is justified by the existence of the investment capacity constraint on the sectoral level as well as on the micro- level. Actually there is no harm to produce more output - provided no extra capital is required - or in other words by changing this constraint the model restricts the activities of the total projects of each sector to maintain a minimum level of output. This would be consistent with the behaviour output constraint of the multi-sectoral model. Therefore the constraint of the sectoral model would be:-

$$\sum_{j=1}^{r} d_{i_j} Pro_{i_j} \geq X_i$$

instead of

$$\sum_{j=1}^{r} d_{i_j} Pro_{i_j} \leq X_i \quad i = 1,2,\ldots,n \quad \ldots \text{(V-30)}$$

In contrary to the multi-sectoral model, the exports and imports constraints of the sectoral model are being dealt with separately. The

economic reason for this is the need to maintain a certain level of exports and not to exceed a required level of imports. But as an alternative one may suggest that both constraints could be added into the following:-

$$\sum_{j=1}^{r} (m_{i_j} - q_{i_j}) Pro_{i_j} \leq M_i + \bar{M}_i - E_i \quad . \ . \ . \ (V\text{-}31)$$

Mathematically this may be useful because it reduces the number of the constraints and therefore it would increase the degree of freedom for each variable to take different values.(113) But from the economic point of view the algebraic values of both the exogenous constant, (imports and exports), and the coefficients of the variables ($m_{i_j} - q_{i_j}$) may lead not to satisfying our basic assumptions regarding the desirable levels of exports and imports.

5.4.2. THE SECOND STAGE

5.4.(i) The multi-sectoral model at the second stage: at the second stage the incremental capital-output ratios, input-output coefficients of the inter-industry system and input-output coefficients of the complementary imports are to be adjusted to $\bar{c}_i$, $\bar{a}_{i_j}$ and $\bar{a}_{m_j}$

5.4.(ii) The sectoral model: the general formula of the sectoral model at the second stage is still the same as at the first stage.

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(113) Adding any constraint to the problem may reduce the feasibility area.

5.5 THE DYNAMIC MODEL - MULTI-PERIOD PLAN

The multi-sectoral model of one period could be converted to be a multi-period model which would help in deriving the annual values of the endogenous variables incolced, i.e. to formulate a detailed annual plan. The practical problems are the only restrictions which may prevent the application of the multi-period plan instead of the multi-sectoral "quasi-static" model. These problems can be summarised as follows.

(i) The number of the variables and the constraints will increase five times (in case of the five years' plan) and this may make the task of solving the model rather difficult by the available "computer"capacity.

(ii) The application of the multi-period model requires the annual values of the exogenous variables. This is not really a serious problem /long as as the aggregate values of the exogenous variables are usually derived from the annual estimate.

The multi-period model can be constructed by adding only another set of constraints to link each two successive periods by dynamic relations of investment and the existing capacity during the annual periods of the plan. This dynamic relation can be defined as follows. Total investment at the end of period (t) should be greater than or equal to the level of production capacity at the end of the same period minus production capacity at the end of the previous period, i.e.

$$\sum_i I_i = \sum_i Ca_{i,t} - \sum_i Ca_{i,t-1} \qquad \ldots \text{(V-32)}$$

where,

Ca_i is a scalar, Ca is a vector of production capacity of the i-th sector.

But production capacity $Ca_{i,t} = C_i X_{i(t)}$ . . . (V-33)

where,

C_i is a scalar, C is a vector of capital-output ratio of i-th sector;

$X_{i,t}$ is a scalar, X_t is a vector of output of i-th sector at period t.

Similarly, $Ca_{i,t-1} = C_i X_{i(t-1)}$ . . . (V-34)

By (V-33) and (V-34) we get

$$Ca_{i,t} - Ca_{i,t-1} = C_i \left(X_{i(t)} - X_{i(t-1)}\right) \quad . \quad .$$

or

$$I_{i,t} = C_i \left(X_{i,t} - X_{i,t-1}\right)$$

and

$$\sum_i I_{i,t} = \sum_i C_i \left(X_{i,t} - X_{i,t-1}\right) \quad . \quad . \quad . \quad \text{(V-35)}$$

At time t = 1, we have

$$\sum_i X_{i,t-1} = PCa \quad . \quad . \quad . \quad \text{(V-36)}$$

where,

PCa is the production capacity of the economy at the initial year of the plan.

During the whole period (i.e. t = 1,2,...,5) we have,

$$\sum_i C_i X_{i,t} \leqslant PCa + \sum_{t=1}^{5} fc_t \quad . \quad . \quad . \quad \text{(V-37)}$$

The objective function, balance relation and foreign trade constraints may be mathematically written as follows.

(i) The objective function;

$$\text{to maximise } Z = \sum_{i=1}^{n} C_{i,t}^{p} + \sum_{i=1}^{n} I_{i,t} - \sum_{i=1}^{n} M_{i,t} - \left(\sum_{i=1}^{n} a_{mi} X_{i,t} + \sum_{i=1}^{n} a_{mp_i} C_i^{p} + \sum_{i=1}^{n} a_{mg_i} C_i^{g}\right) \quad t = 1,2,\ldots,5) \quad \ldots \text{(V-38)}$$

(ii) The balanced constraint;

$$M_{i,t} + X_{i,t} - \sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij} X_{j,t} - C_{i,t}^{p} - \sum_{i=1}^{n}\sum_{j=1}^{n} h_{ij} X_{j,t} \geq C_{i,t}^{g} + E_{i,t} \quad \begin{matrix}(i = 1,2,\ldots,n)\\(t = 1,2,\ldots,5)\end{matrix} \quad \ldots \text{(V-39}$$

(iii) Foreign trade constraints;

$$\sum_{i=1}^{n} g_i M_{i,t} + \sum_{i=1}^{n} a_{mi} X_{i,t} \leq B + \sum_{i=1}^{n} a_i E_i + \sum_{i=1}^{n} a_{mp_i} C_{i,t}^{p} + \sum_{i=1}^{n} a_{mg_i} C_{i,t}^{g} \quad (t = 1,2,\ldots,5) \quad \ldots \text{(V-40)}$$

5.6 SOME GENERAL REMARKS ON THE MODEL

Firstly, the linearity assumption among the variables of both the objective function and the constraints may not in some cases reflect the reality when the relations are non-linear. The only justification of this assumption is the practical difficulty of both formulating and solving the model.

Secondly, with regard to the gestation period the model has a shortcoming and the reason is practical difficulties arising especially when deriving the initial values of investment of the projects under construction. However, a suitable modification for the constant values of the sectoral model may be adequate to deal with this problem.

Thirdly, the sensitivity of the multi-sectoral model could be easily tested by changing the parameters (coefficients) of the investment constraints (incremental capital-output ratios); and by changing the values of the exogenous variables the impact of these variables on the pattern of growth can be shown.

Fourthly, the application of the sectoral model - for each economic sector - depends on the assumption that there exists many alternatives for proposed projects and a complete list of them is to be ready. In practice in some sectors, e.g. services, this may be difficult to achieve.

Fifthly, some practical problems; (i) in the case where it is proposed to expand an existing project rather than building a separate new one, this problem can be dealt with by revaluating the old project with its new expansion and can be considered as any other proposed project.

The only measure to be taken when applying the sectoral model is the modification of the values of the exogenous variables which are to be used in the sectoral model, e.g.

$$X_i \text{ is to be } X_i + P\bar{X}_i$$

where,

$P\bar{X}_i$ is total output of the old project to be yielded during the period of the plan.

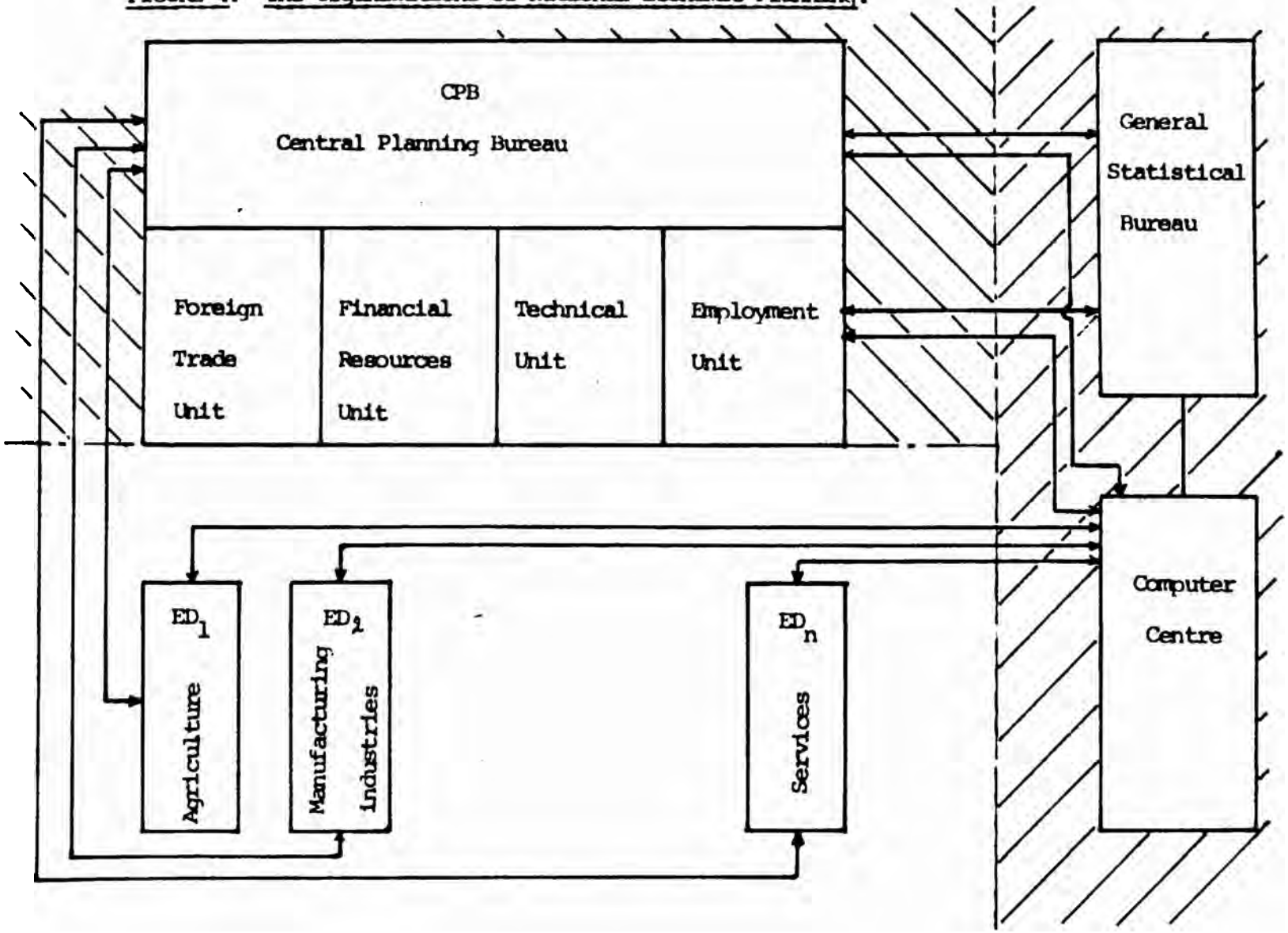
(ii) Some of the projects have been under construction before the implementation of the plan. In this case there is no point in evaluating the project again, but it is necessary to subtract imports required by those projects from the imports values which are derived endogenously by the multi-sectoral model. Capital is also to be subtracted and labour and export values are to be considered at the stage during which we estimate them exogenously.

(iii) Some projects will be completed after the plan's period. In this case we have to add to the endogenous values of total sectoral imports, total sectoral capital and to the exogenous values of labour and exports all the values of the corresponding variables of the proposed project.

5.7 THE STRUCTURE OF NATIONAL ECONOMIC PLANNING ORGANISATION

Corresponding to the different levels of the proposed model and to the required statistical data, we suggest the following structure of national economic planning organisation consisting of different bodies, where each one of them is responsible for implementing part of the integrated planning process. Needless to say that the efficiency of this system depends in the first place on the experience and enthusiasm of the people involved.

FIGURE 4: The Organisations of National Economic Planning.



PART II

CHAPTER VI THE STRUCTURE AND RECENT DEVELOPMENT OF THE IRAQI ECONOMY

This Chapter is devoted to examining quantitatively the structure and development of the Iraqi economy in recent years. Such analysis is essential to investigate the growth potentialities and reveal the underdeveloped features of the economy. The proposals derived through the discussion, however, will constitute the qualitative growth model upon which the assumptions of the proposed mathematical model are to be made.

1. GENERAL INTRODUCTION

Iraq has the features of an underdeveloped country, that is a low level of per capita income, a high level of unemployment, a high degree of unutilised resources, a great disparity of distribution of income and wealth, an unstable and relatively stagnant agricultural sector and a low productivity of labour. But unlike most of the underdeveloped countries, Iraq has excellent potentialities for development in terms of the available natural resources, capital, foreign exchange and the size of population.(114) The new prospects for development are associated with the recent development of oil production and revenues.

Before the First World War, Iraq was part of the Ottoman Empire and the economy was primitive in character. The economic policies of the Ottoman authorities during this period created unfavourable conditions

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(114) A recent study carried out by Professor Richard S. Meier to estimate the aggregate value of natural resources on a per capita basis for 60 selected countries revealed that Iraq ranked fourteenth whereas Denmark, for example, ranked twenty-third, Finland twenty-ninth, Japan fourty-first and Italy fiftieth. See Meier, R. S. [103] pp. 14-16, Table No. 1.

for the development of the dominant agricultural sector,(115) and discouraged foreign investment from playing any role in economic development.(116) As a result these policies impeded the possible growth of the capital accumulation process, the enlargement of internal markets and even the development of the handicraft industries.(117) In 1921 the Iraqi Government was formed under the British Mandate and achieved independence in 1932. Since then the Government has undertaken the responsibility for development of the economy. Up to the early 50's, Government investment went almost entirely into social overhead capital.(118) The agricultural sector achieved a noticeable development and became a rather more settled feudal system. Foreign trade (both exports and imports) made relatively good progress. However, the development in general was slow mainly due to the very low level of national income (119) and subsequently the saving (investment) level and in particular the shortage of government revenues. Such general conclusions

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(115) AL-Dura, S. [5] p. 4. A general introduction to the modern economic history of Iraq is given by Hamada, S. [38]

(116) "Foreign interest in Iraq's oil resources became evident in the last days of Turkish rule. Although several companies tried to negotiate concessions in Constantinople, none was granted." Langley, M. K. [91] p. 30.

(117) AL-Dura, S. [5] p. 4.

(118) Jalal, F. [77]

(119) No figures are available for this period but one can easily deduce this fact by studying the available figures for the national income of 1953 and onwards. See the following Section.

can be deduced from assessment of government expenditure, the capital formation figures and foreign trade statistics during the period from 1921 up to 1950.

Since 1950, the development of crude oil production and the vast increase in oil revenues,(120) the structure and pattern of growth of the Iraqi economy have radically changed. The importance of oil in Iraq goes far beyond its being a mere source of finance in the areas of the balance of payments, foreign exchange earning and currency stabilisation.

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(120) The first concession for the exploration and production of oil was granted to IPC in 1925 for 75 years. In 1935 it was granted to MPC and BPC. "Oil was first struck in commercial quantities in 1927". See Nasrauri, A. [104]. The three companies operating in Iraq are owned by the following shareholders:-

British Petroleum Company	23.75%
Shell Petroleum Company	23.75%
Compagnie Francais des Petroles	23.75%
Near Eastern Development Corporation (half owned by Standard Oil Company of New Jersey and Socony Mobil Oil Company)	23.75%
Participation & Exploration Company	5.0 %

(All these companies are registered outside Iraq.) See Nasrauri, A.[104] p. 5. The agreement of 50/50 sharing between the Iraqi Government and the oil companies was signed on 3rd February, 1953, but it was backdated to 1st January, 1952. See IPC, MPC and BPC [55] . According to Professor Abbass Nasrawi this agreement was due to the following reasons:-

(i) the nationalisation of the oil industry in Iran;

(ii) the adoption of the principle of profit sharing between some of the companies and the host governments as in Saudi Arabia;

(iii) the persistent demands of Iraq for more royalties.
Nasrawi, A.[104] p. 6.

Radical economic and social structural changes characterised the period between 1958 and 1969, notably the implementation of the Agrarian Reform Law introduced in late 1958, the nationalisation of the banks and insurance companies and the major industries in 1964, then restrictions on foreign trade exercised by the Government since 1964.

In the context of these growth prospects and potentialities and the existing characteristics of the economy, we shall, in the following Sections, examine quantitatively the growth parameters, in the light of the available statistical data, and the structure of the economy and its development since the early 50's up to the present time.

6.2 RECENT GROWTH AND ECONOMIC PERFORMANCE - QUANTITATIVE ASSESSMENT

6.21 Gross national product and income;

The national income of Iraq ([41], [42], [74] & [109]) has increased during the period 1953-69 from about 291 million ID to 780 million ID at constant 1966 prices. The average annual rate of growth for this period is about 6.7%. Between 1953 and 1958 this rate was 7.9% per annum and dropped to 6.3% per annum between 1958 and 1969. During the period 1963 up to 1969 this rate was 5.2% per annum. (121)

Gross national product at factor cost increased from about 316 million ID

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(121) The significance of classification of these periods lies in their relationship to radical changes in the structure of the economy. Thus such a classification is of help in examining the development plans which are to a certain extent based on different policies parallel to the changes of political power which brought about the above-mentioned structural changes.

in 1953 to 830 million ID in 1969 (at constant 1966 prices), that is at an average annual rate of growth of 6.3%. Relatively speaking this is a high rate of growth, but, however, this is due not only to an increase in domestic economic activities but mainly to the high growth rate of crude oil production, the services and government investment financed by oil revenues.(122) Although the crude oil contribution to GNP continuously decreased from 40% in 1953 to 32.6% in 1969 (in real terms), it is still the prime motivator of the economy.

Even though the average annual rate of growth of national income has been about 6.7% during the last 16 years, the standard of living of the majority of Iraqi people has not significantly improved and is still below the level of satisfaction of human needs. Disregarding the nature of the class structure of Iraqi society, where the minority enjoys a large share of the increase in national output, from a general glance at the figures for per capita income one may ascertain the gravity of the very low standard of living. The per capita income was only 51.2 ID in 1953 and increased to 85.9 ID in 1969 (at constant 1966 prices). The average annual rate of growth of per capita income during this period was about 3.5% (see Table No. 1).

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(122) Oil revenues were 51.3 million ID in 1953 and increased to 229.5 million ID in 1969 at an annual average rate of growth of about 13.5% (see Table No. 3 Appendix). The proportion of government consumption expenditure was 30% before 1959 which afterwards increased to 50%. 70% of government investments were financed from oil revenues.

TABLE NO.1

National and Per Capita Income at Current and Constant 1966 Prices for the years 1953-1969.

Year	Population	NI at current Prices Million ID	Per Capita Income at Current Prices ID	NI at Constant 1966 Prices Million ID	Per Capita Income at 1966 Prices ID
1953	5,676,343	243.95	43.0	290.76	51.2
1954	5,835,389	284.02	48.7	356.81	61.2
1955	6,001,672	289.28	48.2	330.61	55.1
1956	6,175,525	334.76	54.2	370.31	60.0
1957	6,339,960	352.72	55.6	385.49	60.8
1958	6,529,734	374.04	57.3	401.76	61.5
1959	6,724,788	391.62	58.2	407.94	60.7
1960	6,929,010	437.13	63.1	456.29	65.9
1961	7,142,834	484.24	67.8	518.46	72.6
1962	7,366,710	526.49	71.5	555.96	75.5
1963	7,601,112	525.30	69.1	536.57	70.6
1964	7,846,536	595.80	75.9	595.80	75.9
1965	8,097,230	659.2	81.4	685.33	84.6
1966	8,359,661	705.53	84.4	705.53	84.4
1967	8,632,709	714.79	82.8	658.19	76.2
1968	8,914,457	782.91	87.8	749.20	84.0
1969	9,205,185	826.81	89.8	780.01	84.7

Sources: As in Table No.40 and Table No.41 in Appendix No. II

*Up to mid November 1967 one Iraqi Dinar was equal to one Sterling Pound. Since the devaluation of Sterling pound the Par Value of £ became 1.167 i.e. 1 ID = 1.167 £.

Obviously, this rate has not brought about a quick rise in the standard of living, especially in the agricultural sector which contains 65 % of the total working population but accounts for only 24% of national income. This roughly implies that about 75 % of total population, the proportion working in agricultural sector gets only 24% of total national income. This situation is aggravated by the existing unequal distribution of income not only in the agricultural sector but in all other sectors where the major share of profit (out of total value added) goes to a small number of speculators in trade and manufacturing industries. To demonstrate the important effects which crude oil exerts on the standard of living in Iraq, if oil revenues were excluded from national income, per capita income would be reduced from (to) 36.2 ID for 1953, and to 44.7 ID for 1969.(123) Undoubtedly this level of income is not enough even to satisfy the basic human needs.

A general examination of the development of national product and sectoral behaviour during the period 1953-69 reveals the following important points; firstly, the annual rate of growth of GNP does not represent the maximum possible limit to development in view of the available natural and financial resources of Iraq. This is due to the present state of underutilisation of available resources. The level of per capita income is therefore below its potential maximum which shows the need for urgent action to improve the standard of living.

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(123) Disregarding the fact that oil revenues stimulate all other economic activities.

Secondly although the oil extracting sector does not represent a national investment activity, it contributes considerably to national income. This could influence to a great extent the future development of the Iraqi economy. In the light of both past political events and the current situation, a healthy policy should emanate from the principle of encouraging local production activities at a level ensuring economic independence from the crude oil extraction sector in the future. This essentially requires a review of the investment and consumption policies of government. Thirdly, agricultural output was in general unstable and relatively stagnant. The contribution to national product of agricultural output shows a downward trend. Fourthly, the value added of public administration and the defence sector rose consistently through the period, its level in 1969 having increased to almost six times that of 1953.

6.22 The Development of National Expenditures

The growth pattern of national expenditure reveals an important feature in the development of the Iraqi economy, this being the rate of growth of consumption expenditure (government and private) is very high compared with the growth rate of incapital accumulation and even higher than the GNP growth rate. This is an alarming phenonomen, reflecting the unbalanced growth of the economy as well as the need for new investment and consumption policies to be urgently implemented.

.(i) Government Consumption Expenditure

The development of government consumption expenditure reflects an important aspect of government policy; whenever public expenditure on

consumption goods increases the capacity to realise an economic surplus for capital formation decreases, the latter being a basic prerequisite of economic development. Government consumption increased from about 143 million ID in 1962 to 252 million ID in 1969.(124) The average annual rate of growth was 7.9%, which is higher than the rate of growth of GNP during this period. The share of government consumption in gross national expenditure was about 21.1% in 1964 and increased to 22.4% in 1969.(125) A general examination of the ordinary government budget reveals that total expenditure on national defence and security has considerably increased.(126) This implies that government consumption has grown mainly on account of government investment expenditure. It reflects an undesirable upward trend at a time when the necessity for economic development demands devotion of the maximum possible level of saving to finance investment.

(ii) Private Consumption

Private consumption has been estimated at 350.4 million ID for 1964 and increased to 511.6 million ID in 1969.(127) The average annual rate of growth for 1964-69 was 7.9% Its share of gross national expenditure increased from 43.5% in 1964 to 45.6% in 1969.(128) As in the case of government consumption this growth rate is higher than the GNP growth rate and hence it reflects an unhealthy trend which in the interests of the general economic development requires a quick remedy.

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(124) For 1962, 63 and 64 figures, see Rasaputram, W. [109] figures of 1965 up to 1969 are those of C.O.S. [75]

(125) See COS [75]

(126) The estimated figures for 1968-69 show that about 45% of total expenditure of the ordinary government budget goes to this sector, see Central Bank of Iraq.

(127) See C.O.S. [75] (128) Ibid.

The undesired upward trend in private and government consumption expenditure at a time when economic development necessitates the devotion of the maximum level of saving to finance investment, is one of the most serious problems for development of the Iraqi economy.

(iii) Gross Fixed Capital Formation

Examination of the gross fixed capital formation figures (see Table No.42&43 Appendix No.II) reveals another important feature of the Iraqi economy, that is the relative instability and considerable stagnation of investment in fixed capital formation. The annual average rate of growth was only 3.4% during the period 1953-69. On average the contribution of gross fixed capital formation to GNP was 21.3% during the 1953-58 period and then it dropped to 19.3% between 1959 and 1962 and to 15.8% between 1963 and 1969. These percentages consistently decreased during the whole period except for the years 1960 and 1961. Investment in the crude oil sector has been consistently decreasing to a very low level which is estimated at only 0.5 million ID for 1969, while investment in the public administration sector has been multiplied almost seven times. In manufacturing industries there has been a considerable upward trend. For other sectors, investment in fixed capital assets has been unstable and rather stagnant. In 1969 about two thirds of G.F.C.F. originated in the construction sector and the rest from manufacturing industries. Out of the total about 30% are complementary imported goods.

The above indication of the unstable and low level of expenditure on the replacement, addition to, and improvement of fixed capital assets

as compared with other types of expenditure reveals that the Iraqi economy has in some years been consuming the accumulated investment of previous years and on average its growth of about 3.4% has not brought about the required level of productive capacity needed to achieve a substantial increase in GNP and subsequently to raise the standard of living. A valid policy which can be suggested in this situation is to increase the general level of investment, especially in the commodities sectors, e.g. agricultural, manufacturing industries, and the crude oil sectors.

6.2.3 The Contribution of the Public Sector to Economic Development

The role of the public sector can be evaluated by studying its contribution to GFCF and to the value added generated by it as

compared with the private sector. Investment in fixed capital assets by the public sector has been consistently increasing during the period 1953-69. It has been estimated at about 47 million ID in 1953 and at about 89 million ID in 1969 (at constant 1966 prices).[129] On average over this period it was equal to 53% of total G.F.C.F.[130] This share, however, has been unequally distributed among different sectors. The public sector supplies all G.F.C.F. in public administration, electricity, gas and water, banking and insurance (since 1963), whereas it makes no contribution at all to mining and quarrying (crude oil) and construction. With regard to the other sectors, the public sector contributed, on average for the period 1953-69, about 68%, 59%, 73% and 64% of the G.F.C.F. in agriculture, manufacturing industries, transportation and the services sector respectively.

However, the value added generated by the public sector was estimated at about 208 million ID in 1965 (at 1966 constant prices), its share of GDP being 27%. This value increased to 265 million ID in 1969 which was still equivalent to 27% of GDP. This value constitutes 100% of value added by the public administration, electricity, gas and water sectors, while the rest is originated in the transportation, manufacturing industries, services and banking sectors. It is noticeable

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(129) C.O.S. [75]

(130) Ibid.

that only 0.12% of the total value added of the agricultural sector is generated by the public sector. All value added of construction and the ownership of dwelling is generated by the private sector.

The public sector, as the figures reveal, plays a considerable role in the process of capital accumulation, while its production activities are limited to certain sectors; these being the public administration, electricity, gas, water and banking sectors and it controls to a great extent the transportation and manufacturing industries sector. On the other hand the private sector completely controls the production activities of the construction, ownership of dwelling and agricultural sectors. This state has been more or less stable for the past few years except for 1964 when the nationalisation of the major industries, banks and insurance companies was realised.

6.2.4 THE DEVELOPMENT OF THE TRADE BALANCE

Up to the Second World War, foreign trade was the basic factor in the development of the Iraqi economy.(131) Afterwards the development of the foreign trade sector apart from oil extraction began to decline while the role of the crude oil extraction sector gradually increased until it became the prime motivator of the economy.

Since the early 50's up to the present time, the development of Iraqi foreign trade clearly shows weakness in character as a result of the unbalanced growth of the domestic production sectors compared with the development of the crude oil sector. This section is devoted to examining the features of foreign trade development and its future prospects.

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(131) Hassan, M. S. [40] p. 60

(a) Growth of exports

During the period 1953-69, the value of Iraqi exports increased from about 140 to 408 million ID, that is at an average annual rate of growth of 8.2% (See table No. 2). This growth may be considered as an achievement relative to general economic development, but before deriving such a conclusion the composition of Iraqi exports must be carefully examined. Iraqi exports consist mainly of crude oil, which accounted for 86% of the total value of exports in 1953, this proportion having increased consistently to 93% in 1968 and 1969. In other words the share of locally produced exports was 14% of total exports in 1953 and dropped consistently to only 7% in 1968 and 1969; that is to say there exists a deterioration in the trend of exports other than oil. However, the level of crude oil production for exports is a function of factors unrelated to the level of domestic investment activities being governed completely by foreign monopolistic conditions. Hence this level does not really reflect genuine economic progress.

(i) Exports other than oil; the basic aspect of the Iraqi exports other than oil is that their level is very low. It was about 20 million ID in 1953 and then decreased to only 8 million ID in 1961. During 1962-69 it remained at the same level as in 1953 (see Table No. 2). The composition of these exports reveals the close relationship between their low level and the underdeveloped state of the agricultural sector. Exports consist mainly of agricultural products, such as dates, wheat, barley, wool and hides and therefore export development hinges on

the development of agricultural output as a whole. This unbalanced situation also necessitates the increase of exports of non-agricultural products. The remedy for such a situation lies in achieving a high and balanced growth of not only the agricultural sector, but also of manufacturing industries and other sectors.

(ii) Crude oil exports; the value of crude oil exports increased from 121 million ID in 1953 to 345 in 1968 and 379 million ID in 1969. The average annual rate of growth was 9% during this period. For political reasons oil exports seriously decreased in 1956-57 (Suez Crisis), in 1967 (Middle East Crisis), and were stagnant during 1961-62 because of the dispute between the oil companies and the Iraqi Government.(132) In such a situation of this critical dependence on oil exports, it is only possible to establish the necessity for raising the level of exports other than oil.

(b) Growth of Imports

Iraqi imports increased from about 69 million ID in 1953 to 208 million ID in 1969, i.e. at average annual rate of growth of 8.4% (see Table No. 2). This development is characterised by two aspects: firstly, the sources of finance of imports are mainly the revenues of oil and not the exports of local products. This means that Iraqi imports rely upon the development of the crude oil sector.(133) Secondly, imports

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(132) In 1961 the Iraqi Government introduced legislation limiting the concession areas for exploiting oil, see Official Gazette, Law No. 80 of 1962.

(133) Import figures for 1958, 62, 63 and 67 respectively reflect such relation. They dropped as a result of a decrease in the crude oil exports in the same year, (see Table No. 2).

TABLE NO.2

SUMMARY OF FOREIGN TRADE, 1953-69.

(in millions of Iraqi Dinars)

Period	Imports			Exports		Re-Exports			Trade Balance	Trade Balance Excluding Oil Exports
	Imports by Oil Cos.	Other Imports	Total	Crude Oil	Other Exports	Oil Cos.	Others	Total	Includ. Oil Exports	
1953	13.19	55.50	68.69	120.70	19.67	..	..	139.94	71.25	-49.45
1954	5.78	68.36	74.14	134.64	17.97	..	..	153.21	79.07	-55.57
1955	6.27	90.88	97.15	168.13	15.92	1.05	0.26	185.36	88.21	-112.92
1956	7.39	107.16	114.55	156.64	13.17	0.27	0.45	170.53	55.98	-107.18
1957	10.37	112.05	122.42	113.16	12.88	1.22	1.14	128.39	5.98	-93.10
1958	9.98	99.82	109.80	185.54	14.25	1.22	1.23	202.23	92.44	-111.81
1959	16.98	99.40	116.38	201.676	11.47	0.42	2.68	216.24	99.86	-127.95
1960	14.60	124.35	138.95	222.63	7.98	0.32	2.70	233.62	94.68	-132.34
1961	12.06	133.53	145.59	223.09	7.87	1.43	3.95	236.34	90.75	-106.17
1962	1.84	127.57	129.57	223.74	19.31	1.63	2.46	247.14	117.57	-94.15
1963	1.57	112.46	114.03	258.97	16.73	0.90	2.26	278.85	164.82	-129.27
1964	0.71	146.74	147.45	281.76	15.29	0.19	2.70	299.94	152.49	-141.25
1965	0.94	161.67	162.61	293.59	18.12	0.12	3.12	314.95	152.34	-149.63
1966	1.00	175.10	176.10	308.85	23.24	0.06	3.17	335.32	159.22	-127.38

TABLE NO. 2 (continued)

SUMMARY OF FOREIGN TRADE, 1953-69.

1967	0.85	150.39	151.24	271.95	20.66	0.06	3.14	295.81	144.57	-114.90
1968	1.11	143.36	144.47	345.01	23.03	0.02	4.52	372.58	228.11	-159.70
1969*			208.40	378.8	28.7			407.80	199.10	-159.70

SOURCES: 1. The Central Statistical Organisation, Ministry of Planning, "Foreign Trade Statistics", various issues.

2. Ministry of Oil and Minerals.

* The figures of 1969 are primarily estimates of Ministry of Planning - C.S.O.

are composed mainly of manufactured foodstuffs, agricultural products, textiles, chemicals, metallic products including machinery, durable consumption goods, paper products, etc. In 1968 consumer goods accounted for about 40%; the rest was made up of capital goods. From the other side complementary imports constitute a sizeable percentage of the total imports.

6.2.5 THE STABILITY OF DOMESTIC PRICES

In recent years in Iraq prices have in general been stable. This distinctive trend can be explained briefly as follows. Iraq unlike most of the underdeveloped countries has such a favourable balance of payments that foreign currency has been available under past and present conditions to cover any level of imports required to offset the possible increase in prices of both imported[134] as well as domestic products.[135] Past experience shows that the state had political and social interest in maintaining stability of the price level through its import policy. The Government has acted effectively in fixing prices by setting up either maximum prices, that is maintaining prices permanently below a given level[136], or minimum prices, that is not

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(134) Here the change of prices of imported goods in the foreign market is excluded from our analysis. However, the government subsidises the import of essential consumer goods, such as wheat, in order to stabilise the price in the domestic market.

(135) The reason for the possible increase in prices of domestic products is that imports constitute a considerable proportion of intermediate demand.

(136) In late 1958 the Government introduced a bill to fix the maximum prices of most consumer goods. In some cases such as the prices of foodstuffs the policy was not completely successful. In other cases such as those of refrigerators, washing machines and some other durable goods this policy was successful in maintaining their price level.

letting prices fall below a given level.(137)

Examination of available figures on consumer retail and wholesale prices during the period 1963-68 confirms relative stability of prices. The general index number of consumer retail prices only shows an increase from 100.00 in 1963 to 102.57 in 1968.(138) On average rate of growth during this period was about 0.5%. The foodstuffs index number increased from 100.00 in 1963 to only 103.71, at about the same average rate as the general index number. The fuel index number fell to 98.99 in 1968 as a result of Government measures to prevent this level increasing. Clothing and materials, cigaretts and miscellaneous items show the same stability. The general index number for the wholesale prices of textiles only increased from 102.64 in 1963 to 102.85 in 1968,(139) foodstuffs prices decreased from 111.27 in 1963 to only 110.98 in 1968. Except for the prices of building

compared with 100.0 in 1963./ Rent prices show a level of relative stabil
ity as

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(137) A minimum level of wages for unskilled labour was being determined in 1968. This effects, to a certain extent, the general level of wages of building workers and workers in some service activities.

(138) See "Consumer Price Index Number 1: The City of Baghdad and its Environments in Ministry of Planning, C.O.S. "Annual Abstracts, 1963-68".

(139) See "Wholesale Price Indices in Baghdad Markets"in Ministry of Planning, C.O.S., "Annual Abstracts, 1963-68".

materials, which increased extraordinarily in 1968 because of import cuts due to the Middle East Crisis, wholesale prices were generally stable during the six years, 1963-68. Also taking into account the stability of interest rates,(140) wages (141) and crude oil export prices, one can deduce that prices during the last five years were relatively stable and will most likely remain so in the next few years. This means that under existing conditions, money income in Iraq varies in nearly the same proportion as real income.

3. OIL AND THE ECONOMY

Iraq enjoys an international position of considerable importance with regard to oil production and reserves. In 1969, Iraq's oil accounted for 10.2% of the total output of the Middle East countries. Thus it ranks fourth after Iran, Saudi Arabia and Kuwait. This level of production accounted for about 3.6% of the total world production, thus it ranks eighth after U.S.A., U.S.S.R., Venezuela, Libya and other

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(140) See "The Iraqi Central Bank" [71]

(141) A close observation of the wages in the dominant sectors such as agriculture, industries and trade showed that there has been no significant change in wages for many years.

Middle Eastern countries.[142] There exists in Iraq about 9% of the world's known oil resources.

Commercially, oil production in Iraq started in 1930.[143] In 1950, oil production reached a level enabling it to play a unique and vital role in the economic development. Oil production has been rapidly increasing since 1950, and likewise oil revenues have vastly increased, especially after the 50/50 profit sharing agreement.[144] They were 15.1 million £ in 1951 and increased to 199.6 million £ in 1969.

Oil contributes to the economy in two ways. Firstly, it contributes directly in terms of government revenues,[145] foreign exchange earning[146] and supply of energy. Secondly, it has an indirect effect on the financing of development and investment projects. To analyse the consequences of the impact of oil on internal economic variables one is obliged to assume, somewhat unreasonably, that oil production

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(142) O.P.E.C. [ ] , pp. 41-42, Table No. 31. The major market for Iraqi crude oil exports is Western Europe (Italy, France, United Kingdom, Netherlands), and then Brazil and South Africa. See O.P.E.C. [ ] p. 62, Table No. 44.

(143) "The history of foreign capital seeking investment in Iraq's oil goes back to the later part of the 19th century, when Iraq was astill part of the Ottoman Empire", see Longrigg, S. H. [ ] , particularly Chapters V and XV and XX. On the concessions of crude oil extraction in Iraq and production development see footnote No. and Table No.

(144) The agreement was signed 3rd February, 1953, but was backdated to 1st January, 1951. IPC, BPC and MPC

(145) See Chapter and Tables Nos. 5, 6, 8 & 10.

(146) Oil royalties provide some 95% of total foreign currency.

TABLE NO.3

IRAQ'S REVENUES FROM OIL SINCE 1931

Year	Receipt £ Million	Production of Crude Oil (000) Tons	Annual % Change
1931	.4	.712	-
1932	.6	.520	50.0
1933	.7	.569	16.7
1934	.8	6.008	14.3
1935	.9	28.507	12.5
1936	1.2	31.359	33.3
1937	1.2	33.708	-
1938	1.9	33.409	58.3
1939	2.2	31.204	15.8
1940	1.8	20.474	-18.2
1941	1.6	13.246	-11.1
1942	1.7	20.338	6.3
1943	2.1	28.934	23.5
1944	2.4	33.855	14.3
1945	2.6	36.551	8.3
1946	2.7	37.168	3.8
1947	2.7	37.595	-
1948	2.1	28.025	-22.2
1949	3.1	33.080	47.6
1950	6.7	50.972	116.1
1951	15.1	65.981	125.4
1952	33.1	142.378	119.2
1953	51.3	212.215	55.0
1954	57.7	232.198	12.5
1955	73.7	254.394	27.7
1956	68.9	234.610	-6.5
1957	48.9	164.086	-29.0
1958	79.9	266.939	63.4
1959	86.6	312.772	8.4
1960	95.1	355.829	9.8
1961	94.8	367.851	-0.3
1962	95.1	368.358	0.3
1963	110.0	424.090	15.7
1964	126.1	459.403	14.6
1965	131.4	479.099	4.2
1966	140.3	503.141	7.2
1967	131.7	448.231	-6.5
1968*	203.3 (a)	548.705	54,4
1969*	199.6	555.241	-1.8

(a) Including additional payment of 7 U.S. Cents per barrel over the period June through to December 1967.

* Excluding Government's production.

SOURCE: Organisation of the Petroleum Exporting Countries - Statistic Unit "Annual Statistical Bulletin 1969" - Austria, July 1970.

will continue to increase consistently at the same rate as in the past. In this context oil royalties can either help Iraq to solve its development problems or aggravate them. Oil royalties solve the immediate problem that arises from lack of financial resources, but the danger is that the burden of economic development falls wholly on the state. Such a situation although desirable in the early stages of development would lead to a state where economic development has to be financed almost exclusively by oil royalties. This implies that unless measures are taken to encourage private and public investment as national income grows, oil royalties will not provide sufficient investment to keep pace with population growth.(147)

6.4 THE STATE AND PROBLEMS OF THE DEVELOPMENT OF AGRICULTURE

Agriculture is, and for a long time is likely to remain, the predominant occupation in Iraq, contributing the largest share of the national income.(148) At the same time agriculture has good prospects

(147) In 1954, Professor S. J. Langley made a statement regarding the development problems in the Middle East: "The Middle East is faced with two general problems of development: that is its oil royalties can either aggravate or help to solve". On the negative side of the problem he recommended that: "Measures are to be taken to monopolise domestic saving". Langley, S. J. [92] pp. 102-103. Since then, the experience of economic development in Iraq confirms to a certain extent his predictions at that time.

(148) The agricultural contribution to national income ranks on average about fourth (see Table No.4o) and absorbs about 65% of labour force (see Table No. 21).

as Iraq enjoys a relatively vast area of cultivable land,(149) and water for irrigation.(150) Despite these potentialities, agricultural development has been relatively low and the fluctuations in output level are a recurrent phenonomenon. These problems will be more critical in future if we consider the fact that it will be necessary to ensure a high and continuous increase in foodstuffs in order to realise a level sufficient to meet the increasing demand of consumers resulting from both the growth of population and national income.

The aspects of agricultural underdevelopment may be summarised as follows. Firstly, there is a small area of cultivated land in comparison with total cultivable land.(151) It is estimated to be 55% of total cultivable land. Secondly, agriculture is characterised by an

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(149) Iraq is about 444.445 thousand square kilometres in size and if desert lands are excluded the remainder is about 241.913 thousand square kilometres or about 96 million MESHARA (local measure=1 acre). The area of agricultural units and holdings amount to about 32 million of which only 2 million are not cultivable. See Ministry of Planning, Central Statistical Bureau [61] . According to Doreen Warriner ". . . the area of agricultural land per head is five acres, or two hectares, somewhat more than in Syria and 20 times as much as Egypt. Warriner, D. 148

(150) The annual average rate of water in Euphrates and Tigries was estimated to be 77 million m^3 during the period 1930-58, which is much more than the quantity needed for irrigation in agriculture. See Jumaa, M. H.[78] . The present utilisation of water is estimated at about 38 million m^3. See ibid.

(151) The area of cultivated land was estimated at about 16 million ME in 1957-58. See Ministry of Planning, C.S.B.[61]

unproductive system of land utilisation. In Iraq a system locally known as "Nair and Nair" has been followed for centuries since ancient times.(152) Because of this system the utilisation of agricultural land is very low and hence the productivity level is very low.(153) Thirdly, with regard to migration from rural, to urban areas there exists in Iraq present migration from rural and in particular the southern region, to urban areas, especially Baghdad the capital. The effects of this are widespread and cover the economic, social and political life. Particularly important are the negative effects of this migration trend on the level of agricultural production. Fourthly, there is little diversification of agricultural products. The lack of wide diversification makes agriculture liable to the risk of fluctuations in foreign markets.

This state of underdevelopment, which has resulted in the failure to achieve a relatively steady and high rate of growth is not due to the level of investment, but is rather due to the various institutional and organisational problems. However, agricultural development should be considered within a framework determined by the following general priorities. Firstly, it should be concerned with the activities which have positive effects on the balance of payments, by either substituting imports or increasing exports, or both. Secondly, it should be concerned with activities which produce a high rate of employment and

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(152) By this system Half the land is left fallow every year.

(153) The climatic conditions contribute to a limited extent to this state of underdevelopment.

subsequently raise the standard of living of the working people in this sector can be realised. Thirdly the development of agriculture should be connected with industrial development by increasing agricultural products used in developing local industries. Such general economic policy cannot be fruitful unless other obstacles are removed, making possible achievement of a rapid and steady growth of agriculture output. In this respect it is very essential :- firstly, to hasten the implementation of the Agricultural Reform Law,(154) and to alleviate economic pressures on the peasants by giving them subsidies and providing them with agricultural equipment; secondly, it is necessary to help peasants organise their own cultivators' groups and political societies in order to be able to stand firm against the attempts by the backward feudal landlords to re-extend their power. This would also help economically both to increase the peasants' productivity and also the implementation of the Government agricultural policy. Thirdly, it is essential to increase the land productivity by abolishing the "Nair and Nair" system. This demands a quick overall development of the irrigation and drainage systems. It also requires dissemination of modern techniques such as use of agricultural land fertilisers and better seeds*

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(154) The first radical Land Reform Law was introduced in 1958. In 1970, more radical measures have been undertaken. The introduction of the Agrarian Reform Law in the late part of 1958 changed radically the structure of the land tenure system from semi-feudal to small land ownership.

* For a detailed assessment of land utilisation and aspects relating to agricultural policies, see Alwan, A. S. [6], Hassan, M. S. [39] IBRD [54] , Salter, L. [111] and Warriner, D. [148].

6.5 THE STATE OF INDUSTRIAL DEVELOPMENT

Despite its high rate of growth (155) industry in Iraq, as in most underdeveloped countries, is characterised by its weakness (156) and inadequacy in being one of the bases to accelerate overall economic development. In 1969 the contribution of manufacturing industries to GDP is estimated at 9.1%, that of electricity, gas and water 1.7% and construction 3.1%. In the same year industries absorbed about .25 million of employees, which was less than 10% of total employment.

With a few exceptions, such as oil refining and cement, manufacturing industries consist of small size establishments concentrating on activities utilisation of agricultural products, such as processing of foodstuffs, tobacco, spinning of yarn and textiles. A very large number of Iraqi industries employ 10 people or even less. Chemicals and other technological advanced industries are very few and far between. Metallic and oil refining industries are still in their early stages of development. Electricity, gas and water are highly developed and are completely owned by the Government. Examination of the composition of imported goods and its trends reveals that the ratio of manufactured imported goods as a percentage of total output of local manufacturing industries averaged about

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(155) The rate of growth of the manufacturing industries sector during 1953-69 is estimated at 9.4 %, that of electricity, gas and water 15 %, crude oil extraction at 6.0 %. See Table No. 40 P336

(156) The productivity of the major industries (except crude oil) is relatively low. On the productivity measures of the major industries in Iraq, see Suleiman, H. [119].

217% during the period 1966-68. This clearly indicates that Iraqi industries depend to a considerable extent on imports. This fact gives support to the view that Iraq needs to develop its industry.

In the late 50's, there was growing support for the idea that industrialisation in Iraq as a key factor in the process of economic development was coming into use. Several factors support this opinion such as the differential between the level of output per worker in industry and that of agriculture,(157) and the high imported manufactured goods, especially consumer goods against the desire of national investors to profit by replacing these imports by locally produced goods. Before the First World War, industry in Iraq was very primitive, consisting almost exclusively of handicraft industries. Since the early 20's much has been done to lay down the foundations for industrial development. During the Second World War the prime factor in the development was foreign interest in Iraq's oil resources and the growth of certain exports - processing industries for products such as dates, wool and grain.(158) Since the Second World War industry has been growing rapidly. While the foreign and private entrepreneurships initiated the industrialisation early in this century, the Government consistently increased its concern in its sphere and at present the bulk of Iraqi industries

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(157) According to Professor K. M. Langley; "the output per worker in the non-oil sector of Iraq's industry has six times the value of that per worker in agriculture", Langley, K. M. [91] p. 5.

(158) Langley, K. M. [91] p. 23.

(except for crude oil extraction) are wholly or partially owned and controlled by the Government. In this respect it is necessary to emphasise the fact that in Iraq the private sector had great opportunities for developing manufacturing industries, particularly during the 50's and early 60's, but it failed to take advantage of the current Government measures. The Government was also inefficient in the development of this sector. The reason for such a state was the failure of both private and Government sectors to take the right investment decisions. It is claimed that the Government did not encourage the development of private industry and thus it is blamed for its unconstructive measures.(159) This criterion is not wholly valid because it neglects the fact that a high proportion of industrialists in Iraq exploited the Government facilities such as subsidies and exemption from duties for speculation in the foreign trade sector.

Although Iraqi industries have a special feature, i.e. they are not competitive, and enjoy the benefit of relatively cheap raw material, the general analysis of the problems of industrialisation in Iraq show that Iraqi industries face the same problems as most of the underdeveloped countries. They include the low level of per capita income in conjunction with the small size of population which limits the size of

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(159) Dr. F. Jalal, for example, implicitly arrived at this conclusion and in his opinion, the main reason for this is the political factors that corrupt the administrative machinery and in turn hinder the pace of industrialisation. Jalal, F. [77]

the market and the weakness of enterpreneurship. More generally, the foreseeable returns on capital investment in industry are insufficient to cover cost. On the supply side, production costs can be reduced by the formation of social overhead capital, but the outlays for this type of investment are very large, and there is not likely to be a direct monetary return for a very long time. Thus private savings, if they exist, are not likely to be placed in such undertakings and therefore the public sector will be required to initiate growth. On the demand side private as well as public investment can reduce risks by simultaneously creating mutually dependent demands. However, the utilisation of the external economies depends on entrepreneurial initiative and ability which is not present to a great extent in underdeveloped countries.

6.6 POPULATION AND EMPLOYMENT IN IRAQ

6.6.1 Population

Iraq does not face a serious population problem such as that of most of the underdeveloped countries, but the rapid population growth in recent years and the relative changes in population composition indicate that population pressure would considerably affect the standard of living in the future. In this context two aspects of population growth are to be emphasised. Firstly, if the population grows at a rate higher than the future growth rate of national income then the standard of living will fall. Secondly, the change in the age composition of population would, as expected in Iraq, increase the unemployment level.

The relation between population growth and employment can be seen as reflected by the following. Firstly, the high rate of population growth results in the parallel growth of the labour force, which in turn creates, in the absence of adequate investment, new pressure in the form of a high level of unemployment. Secondly, migration from rural to urban areas will change the employment distribution in different sectors.

The total population of Iraq was estimated at 8.097 millions in 1965 compared with 6.34 millions in 1957, the annual rate of growth during this period being 3.17%. In 1969, total population is estimated to be 9.205 millions and it will be about 11 millions in 1975. The rate of growth shows an upward trend over the period 1957-74. On average, annual rate of growth is estimated at 3.17%, 3.24% and 3.33% over the periods 1957-64, 1965-69 and 1970-74 respectively.(160) Thus whatever base year we use the annual rate of growth is much higher than the average 0.5 to 1.5% rate of growth for developed countries.(161) In Iraq, the proportion of population in urban areas to the rural areas has been varying as a result of the changes in economic, social and political conditions. The proportion of the urban to total population was 36.0% in 1947 and rose to 39.2% in 1965 and to 44.1% in 1970. This trend is likely to continue.(162)

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(160) See Chapter X Section 3 on these estimations.

(161) See U.N. "Demographic Yearbook, 1962", New York, Tables 14 and 18.

(162) See U.N./S.F. [138]

The 1947, 1957 and 1965 censuses and the projected figures up to 1970 point out an important characteristic of population growth in Iraq, this being the significant rise of the ratio of non-productive consumers to total population over this period. This ratio was 50.5% in 1947 and increased to 51.2% in 1957 and to 53.4% in 1965, which continued at this level until 1970. This phenonomenon is due to the increase in the proportion of children under 15 years of age, while on the other hand, old people aged 60 and over are decreasing rapidly.(163)

6.62 Employment and unemployment

In absolute terms the labour force grew from about 3.3 millions in 1960, to about 4.3 millions in 1969. The annual average rate of growth was about 2.9%.(164) As in the case of most underdeveloped countries, Iraq is characterised by a high level of unemployment, both real and disguised. Disguised unemployment cannot be estimated quantitatively, but one can easily observe it in real life and perceive that the gravity of the situation requires a very rapid remedy. However, the available figures on employment (165) show that during the period 1960-69, the number employed has increased from about 2,358 thousands in 1960 to 2,710 thousands in 1970. On average the annual rate of growth of the number employed is estimated to about 1.6%. Offsetting this increase in the number employed, the labour force was growing during the same period at an average annual rate of about 2.9%. In absolute terms the labour

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(163) See U.N./S.F.

(164) See U.N./S.F. [138]

(165) Labour is defined as any male or female aged between 15 and 60 yrs.

force increased from 3,299 thousands in 1960 to 4,260 thousands in 1969. As a result, the employment level increased from 741 thousands in 1960 to 1,281 thousands in 1969, that is an average annual growth rate of more than 5%.(166)

These results show explicitly how successful economic development in Iraq has been in providing jobs for the labour force. Undoubtedly the burden of unemployment will remain great if this trend continues.

6.7 THE FINANCIAL RESOURCES

This Section aims to examine the financial resources (excluding oil revenues) of the Iraqi Government, so as to implicitly reveal the Government capacity to finance the desired investment programmes.

Since 1921, economic development in Iraq has been accompanied by a consistent and rapid increase in Government revenue, which was only about 4 million ID in 1921, and in 1969-70 has been estimated to be 177.6 million ID. An important question is how far this increase in Government revenue can be sustained and how far these financial resources affect the development of the economy. To answer such questions it is necessary in the case of Iraq to analyse these revenues in relation to oil revenue. This can be achieved through examination of the "ordinary" Government budget as follows. If income tax on oil companies

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(166) See Chapter X Section 5.1.

is excluded the other financial resources of the Iraqi Government, which account for less than 60% of the total ordinary budget come from the following sources.

(i) Various taxes, such as: income taxes, profit taxes, inheritance tax, customs and excise duties, taxes on agricultural land and estate.

(ii) Revenue from public services provided by the Government, such as telephone and telegraph duties, stamp duties, etc.

(iii) The budget's share of profits of Government institutions such as the Central Bank, insurance companies, commercial banks (after the nationalisation in 1964) and specialised banks.

Each of these revenues contributed a different and changeable percentage to total revenues. These revenues have been rising steadily. It is only natural that this upward trend is a result of general economic development. What is more important is that this growth in revenues is relatively low compared with the growth rate of government consumption and the instability in the proportion contributed by each item of these revenues. This reflects that during the period concerned the Government followed an unstable fiscal policy and a non-rational consumption policy. However, this instability cannot be separated from the effects of political factors. Also this trend in Government revenues has a strong relationship with the level of oil revenues as can easily be observed for 1957, 1962 and 1963.

The general examination of the various revenue sources and their development leads to the following main conclusions. Firstly, customs

and excise duties contribute largely to total revenues. In view of the present economic conditions and prospects these revenues will increase but the contribution ratio of this source will tend not to continue at the same level as in the past. Income tax will not increase except in small quantities because of the inadequacy of the existing system of collecting income tax, especially when the big share of national income goes to the traders and industrialists is subject to easy evasion as occurs at present. Secondly, revenue collected from services provided by the Government constitute a low percentage of total revenues, which did not exceed 9% during the period 1953-66. Because of public needs which demand an increase in the provision of these services, these revenues will increase, but at the same time the low level of per capita income will contribute against this trend. As a result the rate of growth of these revenues will probably not be much more than in the past.

For the purposes of the projection of Government financial resources, the above conclusions imply that unless resources grow at a rate equal to or less than the growth rate of Government consumption, there will be no prospect of allocating more than 50% of oil revenues to Government investment programmes. It also reveals that the Government financial capacity is not great and may be a binding constraint on the Government investment programmes.

CHAPTER VII RECENT EXPERIENCE WITH DEVELOPMENT PLANNING

EVALUATION OF APPROACH AND PERFORMANCE

Although Iraq has a relatively long history in development planning a comprehensive appraisal of its past experience reveals that planning has not been efficient in channelling the available resources, particularly oil revenues into development programmes and therefore has produced very little economic progress. Planning experience in Iraq is still far less than the present wide utilisation of quantitative analysis in rationalising the state (Government) as well as the individual economic behaviour which has been exercised in a considerable number of underdeveloped countries. An economic plan essentially consists of a systematic set of policies so designed, and interrelated so as to promote and eventually achieve stated objectives within a given period of time. In Iraq such a concept does not exist in practice yet.

Since 1950, the Government emerged rightly, as a result of the vast increase in oil revenues, to play the dominant role in the course of economic development. This was embodied in the establishment of the Development Board (DB) in 1950.(167) Although the DB was not the sole body responsible for designing the overall economic policy (168)

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(167) Until1950, public investment in Iraq was very limited, handled through the ordinary budget.

(168) For example, the Ministry of Trade & Economics was responsible for the foreign trade policy and internal trade.

it had a vital role in the shaping and orientation of this policy owing to the fact that 70% of oil revenues were devoted to finance its development programmes.(169) The DB started operations in 1951 up to 1958 and in 1959 it was abolished and the Ministry of Planning and Planning Board were established instead. After 1958, planning in Iraq has changed in three aspects. Firstly, the approach of centralisation of planning and execution of projects was replaced by centralisation of planning but decentralisation of execution. Secondly, as compared to the period after 1958, the period 1951-59 witnessed more frequent changes in planning machinery. Thirdly, conceptually planning since 1965 tended to be more comprehensive in terms of targets as well as regarding the areas of activities.(170)

During the era of DB, four development programmes have been prepared and since then five economic plans have been formulated by the Ministry of Planning. The investigation, however, shows that so far no qualitative uniform model for economic development is being elaborated. Nor is quantitative analysis being utilised for plan formulation.

The question is to what extent planning in Iraq succeeded in reflecting and achieving the targets of economic development. Under

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(169) The DB had a separate budget financed from oil revenues (see Section 7.3).

(170) After 1958, the term "Economic Plans" replaced the term "Development Programmes". However, such change of terminology, as we shall explain later on, had no practical significance.

certain considerations an attempt is being made in this Chapter to answer in detail this question and some related issues. No specific suggestions are given but some policy conclusions can be derived. The frame of the analysis is being outlined in Section 7.1 and Section 7.2, and particular attention is given to the five year Economic Plan (1964/65-1969/70), and to the framework of the National Development Plan (1969/70-1974/75).

7.1 GENERAL CONSIDERATIONS

The evaluation of economic planning has to be considered with respect to approach, formulation and implementation. In the context of this study the functions of planning and the features of different development programmes and plans are being examined with special attention given to the planning technique and investment allocation. Problems associated with the implementation aspects of planning are being considered only when necessary.(171)

For more realistic conclusions the analysis is being considered in view of the fact that planning targets and content should be relevant to the structure of the economy and to the level of development. This implies that the planning history can only be examined with full consideration of the corresponding stage of economic development and the socio-political environments.(172) At the same time this analysis

(171) The implementation aspect is strongly related to the political changes, management capability and the administration machinery. A study on these problems is prepared by the experts of the United Nations.

(172) See Chapter II.

is carried out on the basis of the following general principles. First, economic planning requires the orientation of the maximum level of saving (investment), whether public or private, to the most productive economic activities. This implies the necessity of assessing the potential financial resources as well as appraising the investment decisions. From this it follows that: (i) the framework of the plan should include the public and private economic activities; (ii) the allocation of public investment amongst the projects should generally depend on social marginal revenues versus social marginal cost - regulations and measures to control and direct private investment are to be devised as well. Secondly, the objectives of the plan should be quantitatively specified for all economic magnitudes such as national product, sectoral output, consumption, investment, foreign trade, employment and so on. Thirdly, the allocation of total investment on a sectoral level should depend on the structure of the Iraqi economy and the interrelationships between the sectors. Fourthly, the planning process needs to be continuous and stable, and it also requires the co-operation of the whole society.

7.2 THE STRATEGY OF ECONOMIC DEVELOPMENT

7.2.1. The Strategic Factor of Iraqi Development

Since 1950, the role of oil revenues became vital and unique in the development of the Iraqi economy. Thus the proposition of channelling oil revenues for development projects has been the central theme of the development strategy in Iraq. Up to 1958 this was

reflected in the allocation of 70% of oil revenues to finance the investment projects. Afterwards the proposition widened to include not only the utilisation of oil revenues for development purposes but also to reduce dependence on these revenues in the long run. Events have proved the validity of this new strategy. So long as the impact of oil revenues on the economic development is as simple and clear as it is in Iraq, there is no need to ascertain the strategic role of crude oil production (revenues).(173) But what is of importance is that the implemented economic development policy, especially after 1958, has not been in correspondence with the acceptable general proposition regarding the role of oil. This can be realised by looking at the contribution of oil revenues towards the investment programmes and development projects which have decreased to 50% as compared to 70% prior to 1958. Such a change has come about by favouring government consumption expenditures. The proposition is that the Government should devote at least 70% of its oil royalties for financing development projects, hence in the long run the contribution of the domestic producing sectors will increase so as to reduce the dependence on oil revenues which are bound to be limited in the future.

7.2.2. The Balanced Versus Unbalanced Growth

Up to 1958, there has been great emphasis on agricultural development on the grounds that agricultural expansion would provide

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(173) See Chapter VI, and particularly Section 6.

more materials for industrial activities and by raising rural standards of living this would create a wider market for industrial projects. Such policy has characterised the DB investment programmes.(174) After 1958, the emphasis turned on industrial development and agricultural development became the second priority.(175) Recently the Government ascertained again that agricultural development has to be of first priority in its economic development policy.(176) However, whatever policy the Government adopts regarding this controversial issue, i.e. giving priority to agriculture versus manufacturing industries, the rational approach in treating this matter theoretically starts with the strategy of balanced versus unbalanced growth. Other problems

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(174) In 1952, the report of the International Bank for Reconstruction and Development has recommended to the Government that any development programme for Iraq must put primary emphasis on agriculture, IBRD [54] p. 4. Lord Salter [111] has also stressed on agriculture priority and moreover the advocated not to free the pace of industrialisation. Carl Iverson [76] whose study was concerned with the monetary policy is also certain that Iraq is to remain an agricultural country. The recommendations of the above valuable studies provide the basis upon which the DB programmes are being designed.

(175) See Provisional Economic Plan (1959/60-1962/63), Law No. 181 of 1959, Detailed Economic Plan (1961/62-1965/66), Law No. 70 of 1961, Five Year Economic Plan (1965/66-1969/70), Law No. 87 of 1965.

To show how far this policy is popular in Iraq, one can say that the negligance of the DB to industrial development was one reason for the 1958 revolution. See Langley, K. M. [91]; also Hassan, M. S. [39]

(176) The National Development Plan 1970-74, Law No. 70 of 1970.

such as consumer goods versus capital goods, social services versus productive investment are in the category of the "efficiency" problems.(177)

The doctrine of balanced growth is based upon the fact that due to the low level of per capita income and productivity, the small size of local markets in underdeveloped countries limits the advantageous utilisation of large scale economies. To enlarge the size of the markets investment allocation is to balance the different sectors of the economy so that labour productivity is to be increased with more capital and improved techniques and the various sectors become each other's customers.(178) Accordingly, the role of the state is to assume simultaneity of investment in a large variety of enterprises. This strategy was challenged on the grounds that in underdeveloped countries investment funds and entrepreneurial abilities are lacking. Thus it is not possible to set up several industries simultaneously. Alternatively the unbalanced growth strategy is being suggested for economic development as a chain of disequilibria by investing in only the leading sectors.(179) The role of the state by this strategy is to induce disequilibria of the development. However, the objections to the adoption of balanced growth in Iraq is greatly reduced because Iraq is endowed with vast investment funds. At the same time Iraqi practice shows that there is no assurance that the strategic oil sector will be able to pull the sluggish sectors for a long time.

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(177) See Chapter IV on the investment criteria and economic efficiency.

(178) Nurkse, R. [106]

(179) Hirschman, A. O. [52]

Iraq since the inception of development planning in 1951, has undertaken the strategy of balanced growth. The IBRD mission emphasised the need for a well balanced government investment programme. The report stressed that ". . . any programme for realising the economic potentialities of the country should be broad in conception and well balanced."(180) Lord Salter was in favour of balanced growth. The purpose of his study was "to give advice as to the timing and balance of the different investment projects; the impact of each upon the other's and upon the general economy of Iraq".(181) Carl Iverson summarised the economic goal of Iraq's monetary policy as follows: "To attain the maximum rate of well balanced and relatively stable economic development and expansion compatible with the avoidance of inflationary pressure and the maintenance of an adequate foreign exchange of reserves."(182) Since then the strategy of balanced growth has become the official policy of the Government.(183)

In our opinion the practical and rational treatment to this problem can be summarised as follows. Given the production structure of the Iraqi economy and the desired targets (economic and social), then the best strategy is the one which maintains the feasibility conditions and realises the economic efficiency. Such an approach can only be achieved by utilising the quantitative analysis on different levels of activities in such a uniform model as is suggested in this study.

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(180) IBRD [54] pp. 2--3

(181) Salter, Lord [111] pp. 134-136.

(182) Carl Iverson [76] p. 177

(183) In addition to the IBRD, Lord Salter and Carl Iverson Studies, Iraqi economists like Dr. Jan Earnest and Dr. M. S. Hassan have advocated this strategy. . . . See also the Five Year Economic Plan [64] and the National Development Plan. [65]

7.3 THE DEVELOPMENT PROGRAMMES (1951-58)

It is not surprising that the first development programme prepared by the DB in 1951 was a mere list of unrelated public, infrastructure projects.* Such a partial planning approach (project by project) was inevitable. The Iraqi economy at that stage of development was both deficient and inefficient, deficient in every respect virtually, and thus infrastructure projects were badly needed. In addition, no extensive economic surveys were undertaken and planning experience of the DB was almost nil. Therefore the first programme was bound to be incomplete and had many shortcomings. What is remarkable is that this limited scope of planning was maintained during the whole period of the DB, i.e. 1951-58, and little progress has been made towards the elaboration of an integrated and more comprehensive public investment programme. It seems that this state was mainly due to the conservative policy of the DB and the then government with regard to the changes of economic, social and political conditions, rather than to the lack of financial resources or experience.

The DB prepared four investment programmes; the first was designed to cover the period 1951/52-1955/56[184]; the second one for the period 1951/52-1956/59[185]; the third for the period 1955/56-1959/60[186]; and the fourth for the period 1955/56-1960/61.[187] The first and the third

(184) Government of Iraq, The Official Gazette, Law No. 35 of 1951.
(185) Government of Iraq, The Official Gazette, Law No. 25 of 1952.
(186) Government of Iraq, The Official Gazette, Law No. 43 of 1955.
(187) Government of Iraq, The Official Gazette, Law No. 54 of 1956.

* In fact some of the investment projects were included in the ordinary budget during that period.

did not last a complete year. The second six year programme replaced the first five year programme in response to the recommendations of the IBRD mission and due to the vast increase of oil revenues.(188) On the advice of Lord Salter the fourth six years' programme was a revision of the third five years' programme.(189) All these programmes, however, were mainly concerned with infrastructure projects such as flood control projects, irrigation, roads and some industrial activities such as electricity.

Total investment allocated for these programmes was as follows: 65.7, 155.4, 304.3 and 500.0 million ID. respectively. On average more than one third of total investment was devoted to agricultural sectors. The second priority was given to transport and communication projects, for which about one fourth of total investment was allocated. Public buildings such as hospitals, schools, summer resorts and rest-houses were given third priority and about one firth of total investment allocated to it. Industry was at the bottom of the priority list of the whole programme, though investment in this sector increased in absolute terms.

TABLE NO. 4

EXPENDITURES OUTLINED IN THE DEVELOPMENT PROGRAMMES OF IRAQ (1951/52-1960-61)

Sector / Programme	(Millions of Iraqi Dinars) 1st 5 yrs 1.	%	2nd 6 yrs 2.	%	3rd 5 yrs 3.	%	4th 6 yrs 4.	%
Agriculture	30.0	45.7	53.4	34.4	114.4	37.6	168.1	33.6
Industry	-	-	31.0	19.9	43.6	14.3	67.1	13.4
Transportation & communication	15.9	24.2	26.8	17.2	74.2	24.4	124.4	24.9
Building & housing	12.6	19.2	18.0	11.6	60.9	20.0	123.2	24.6
Other activities	7.2	10.9	26.2	16.9	11.4	3.7	17.3	3.5

(188) IBRD [54]

(189) Salter, Lord [111]

TOTAL	65.7	100	155.4	100	304.3	100	500.1	100

SOURCE: Government of Iraq, Official Gazette, Law Nos. 35 of 1951, 25 of 1952, 43 of 1955 and 54 of 1956.

Key, No. (1) = Programme 1951/52.1955/56, No. (2) = Programme 1951/52-1956/57, No. (3) = Programme 1955/56-1959/60, No. (4) = Programme 1955/56-1960/61)

The first development programme was financed by 100% of total oil revenues, i.e. 91.1 million ID, plus 4.0 millions of foreign loans. The second programme was financed by 70% of oil revenues plus only 40.0 million ID foreign loans, i.e. total anticipated revenues were equal to 168.7 million ID. The last two programmes were merely financed by 70% total oil revenues.

TABLE NO. 5

REVENUES OUTLINED IN THE DEVELOPMENT PROGRAMMES OF IRAQ (1951/52-60/61)

PROGRAMME (Millions of Iraqi Dinars)

SOURCE OF REVENUES	1st 5 yrs 1.		2nd 6 yrs 2.		3rd 5 yrs 3.		4th 6 yrs 4.	
		%		%		%		%
Oil	91.1	95.8	164.6	97.6	215.0	99.7	385.0	98.7
Foreign Loans	4.0	4.2	4.0	2.4	.6	.3	4.8	1.2
Interest Payments; Miscellaneous			.1	-	.1	-	.2	.1
TOTAL	95.1	100.0	168.7	100.0	215.7	100.0	390.0	100.0

SOURCE AND KEY, as for Table No. 4

It is remarkable that the planned total investment expenditures of the first two programmes were less than total expected revenues, whereas in the third and fourth programmes there was planned deficit, (see Tables Nos. 4 to 8). However, total actual revenues and expenditures were far less than planned.(190)

7.3.1. The Main Aspects of the DB Programmes

As we have mentioned earlier, it is not reasonable to evaluate the development programmes of the DB as they have to be comprehensive and have the same features as the theoretical ideal national economic plan.(191) The DB programmes were bound not to be successful in all aspects. However, it is essential to have certain criteria of development from which it is possible to judge whether planning policies during that period were taking the economy in the right direction.

Except from the differences between the levels of total anticipated revenues and expenditures, all the DB programmes were of the same nature and had more or less the same shortcomings. They were not more than lists of unrelated public investment projects. Private investments were excluded and although this may be justifiable in view of the nature of the proposed projects and the low level of private investment, the DB had no policy at all to direct or encourage private investment.(192)

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(190) See Table No. 6.

(191) See Chapter II, particularly Sections 2 and 4.

(192) For example, no economic measures were given to subsidise or protect private investment in industry. In fact this policy was recommended by the IBRD Mission.

As a result private investment was not fully utilised in productive economic activities. Another important feature characterised in the development programmes is the absence of any economic criteria for making investment decisions. A general investigation into this problem shows that neither the development programmes nor the economic studies being prepared for the DB had explicitly suggested any criterion for investment decisions or sectoral or project level. Except for the emphasis on agricultural development and some suggestions for industrial development the DB had no concrete /and uniform criteria for economic efficiency. It is remarkable that no quantitative analysis was being utilised for project evaluation and for investment allocation on sectoral as well as macro- level.(193) Moreover, no choice of alternatives was being practised on project's level.(194) In all cases personal judgements and commonsense were the only basis for investment decisions. Unfortunately these judgements were not successful. A glance at the sectoral investment allocation, the actual against the anticipated expenditures and revenues will give a rough idea about the unstable investment policy of the DB and where they were failing.

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(193) In some cases choice of techniques were based on "engineering" points of view.

(194) "The DB did not consider the cost and the benefit of the projects, especially in agriculture. Thus so much money spent on very high cost projects to increase production by extending the agriculture cultivation land, whereas it was possible to concentrate on increasing the land productivity to achieve the same increase of output level with much less expenditures". Hashim, J.[45] p. 16 .

As a matter of fact even the overall economic and social objectives were not clearly specified although it was stated that the main purpose of DB is to draw up national economic and financial plans for Iraqi development in order to raise the standard of living of the Iraqi people.(195) As a result investment projects were not co-ordinated but were scattered in such a manner and some of them became obsolete and incurred losses such as Al-Dujaila agricultural project. Some non-urgent projects were included on a political basis. In addition administrative efficienty was very low and consequently there was extravagance in expenditures at all stages of the implementation of the projects.

The DB was responsible for planning and implementation as well. This overlapping resulted in the continuous changing of the projects in accordance with the relationships between the DB on the one hand and the consultant and executive companies on the other hand.

7.3.2. The Achievements of the DB Programmes

Although it is not sufficient to assess planning performance of the DB by considering only the actual expenditures as compared to planned investment, in the absence of statistical information such an indication would - to a certain extent - reflect the reality of the DB's efforts. This indicator, however, implies that the allocation pattern of

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(195) Article (3-1-a) Law No. 23 of 1950.

investment among different sectors should be considered with respect to the actual expenditures during the same period. By ignoring the effects of the political changes after the 14th July, 1958, on planning machinery and the administrative part of it, total actual expenditures on the development programmes amounted to 329.7 million ID, i.e. 65.7% of the total planned expenditures, whereas the actual revenues were 349.1 million ID, i.e. 92.4% of the anticipated revenues, and there was an accumulated surplus of about 19.3 million ID in 1959/60. However, the percentage of actual expenditure to actual revenues was 94.4%; out of total actual expenditures 34.4% went to agricultural projects, 28.4% to housing and building, 26.2% to transportation and communtcations and only 11.0% went to industry.

TABLE NO. 6

The Annual Anticipated and Actual Revenues and Investment Expenditures of the DB Programmes.

Fiscal Year	1 Planned Expend-itures	2 Actual Expend-iture	(2:1) %	3 Anti-cipated Revenues	4 Actual Revenues	(4:3) %	(2:4) %
1951/52	9.3	3.1		10.5	7.5		
1952/53	20.5	12.8		20.5	24.0		
1953/54	28.4	12.3		33.8	35.3		
1954/55	31.5	20.9		34.9	40.7		
1955/56	46.6	34.0		44.8	60.8		
1956/57	81.9	43.0		65.8	51.1		
1957/58	100.8	57.4		65.8	35.9		
1958/59	99.6	52.2		65.8	61.7		
1959/60	83.5	94.0		65.8	32.1		
TOTAL	502.1	329.7	65.7	377.7	349.1	92.4	94.4

Accumulated Surplus	
1951/52	4.4
1952/53	15.5
1953/54	38.5
1954/55	58.4
1955/56	85.1
1956/57	93.2
1957/58	71.7
1958/59	81.2
1959/60	19.3

SOURCE: Compiled from, Republic of Iraq Ministry of Finance, Annual Report of the Director's General of Accounts (various issues); Central Bank of Iraq, Quarterly Bulletin (various issues); Official Gazette, Law Nos. 35 of 1951, 25 of 1952, 43 of 1955 and 54 of 1956.

During the DB period, the main economic problem of Iraq was, unlike most underdeveloped countries, not to increase its resources in order to meet the requirements of economic development. At that stage oil revenues provided a sufficient source of finance. The problem was to choose a number of economic productive projects which was essentially a problem of investment criteria. Unfortunately, the DB programmes had no designed and interrelated investment policies so as to promote and eventually achieve stated - if not quantitatively measured - the economic objectives relevant to that period.

7.4 ECONOMIC PLANNING DURING 1958-63

After the revolution of 1958, the Iraqi economic development policy was specifically orientated towards radical agricultural reform, to accelerate the pace of industrialisation and to reduce the degree of dependence on oil revenues. This new policy has been reflected by the introduction of the Agrarian Reform Law,(196)

(196) Republic of Iraq, Official Gazette, Law No. 65 of 1958.

the promotion of private investment in industrial, agricultural and housing sectors,(197) implementing new foreign trade policy,(198) and more fundamentally by drawing up new economic plans which had to be more consistent, efficient and comprehensive as compared with the development programmes of the DB. Therefore, the DB was abolished and the Ministry of Planning and Planning Board were set up instead.(199)

7.4.1. The Provisional Economic Plan 1959/60-1962/63

In December 1959, a four year provisional economic plan (1959/60-1962/63) was introduced and superseded the develop ment programmes.(200) The plan anticipated 392.2 million ID for total investment expenditures and total revenues were not specifically estimated, that is no balance between financial resources and investment expenditures was maintained. It seems that the planner followed such an unrealistic approach in order to avoid giving specific measures for dealing with the deficit in the plan's revenues. The financial resources were not more than 50% of oil revenues plus about 77.0 million ID from foreign sources.(201)

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(197) Private investment in industry has been encouraged through exemptions from certain customs duties and income taxes, loans from the industrial bank and protection from the competition of competing imports; in agriculture through limited loans from the agricultural bank; in the housing sector through long term loans from the estate bank.

(198) To trade with the socialist countries, particularly the U.S.S.R. and Czechoslovakia, under formal trade agreements.

(199) Republic of Iraq, Official Gazette, Law No. 33 of 1959.

(200) Republic of Iraq, Official Gazette, Law No. 46 of 1959.

(201) According to agreement with the U.S.S.R. signed in March 1959, Iraq was given credits amounting to 65 million ID. In the agreement with Czechoslovakia, a credit amounting to 12.0 million ID was also granted.

Comparing the types of projects included, the plan did not differ from the development programmes of DB. There were no criteria for investment decisions and economic appraisal of the proposed projects was lacking. In this respect the same criticism directed to the development programmes is valid against this plan. It seems that the scope of choice of projects was limited by the need to complete those already under execution. This may explain the fact that most of the projects of the DB programmes were included in this plan. The only justification given for this is, however, to avoid a great waste of capital. The shortness of time for formulating the plan and the structural changes of planning machinery were other reasons for the limited scope of this plan.

Total investment was allocated among different sectors on completely different bases of priorities as compared to the development programmes. The first priority was given to social investment in housing, building, health and education, to which 48.7% of total anticipated investment was allocated. Agriculture had only 12.2% of the total and industry had 12.4%, whereas transportation and communication projects had 25.7% of total investment.

TABLE NO. 7

Expenditures outlined in the Provisional Economic Plan (1959/60-1962/63)

Sector	Value (million ID)	Percentage
Agriculture	47.9	12.2
Industry	48.7*	12.4
Transportation & communication	100.8	25.7
Housing & building	126.9	32.4
Health & education	63.8	16.3
Other	4.0	1.0
TOTAL	392.2	100.0

* Included 10.0 million ID the value of the Iraqi-Soviet agreement projects.

SOURCE: Republic of Iraq, Official Gazette, Law No. 181 of 1959.

The question is on what economic basis this allocation pattern of investment was being determined. Our investigation shows no evidence to suggest that the plan had certain economic criteria for sectoral efficiency. Thus, in this respect, the provisional plan had the same weakness as the development programmes of DB.

Total expenditures were estimated at about 108.4 million ID, of which 40.0 million ID went on public building, housing and summer resorts, 20.0 million ID to transportation and communications, 21.0 million ID to agriculture and about 12.0 million ID went to industry. This, however, is not an assessment to the performance of the provisional plan because the plan lasted only two years; also in the absence of

specific targets - quantitatively measurable - it is, it seems, impossible to appraise the plan. Generally we may conclude that the provisional plan had - except for the use of different terminologies - the same features and weaknesses of the DB development programmes.

7.4.2. The Detailed Economic Plan (1961/62-1965/66)

In 1961, the provisional economic plan was replaced by the detailed economic plan for the years 1961/62-1965/66.(202) This plan in contrast to the DB development programmes and the provisional economic plan, emphasised industrial development and was intended to make use of financial resources from sources other than oil. For the first time the plan had a specific aim, which was of doubling the level of national income in ten years and total investment estimated on the bases of the required rate of growth and the overall capital output ratio.(203) It balanced total expenditures and resources as follows. Total anticipated expenditures were accounted at 566.3 million ID, which is equivalent, on the average, to about 32% of net national product. Industry received 30% of total investment; 20.3% allocated for agriculture, 24.5% for transport; and 25% allocated for less productive projects. Thus agriculture received more attention in this plan compared to the provisional plan, whereas investment on transportation and communications dropped sharply from 48.7% in the provisional plan to 24.7%.

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(202) Republic of Iraq, Official Gazette, Law No. 70 of 1961.

(203) The overall capital-output ratio was arbitrarily assumed to be 4.0. However, it was found that this claim was only a general statement and no evidence was found to prove this claim.

The general weakness concerning the consistency and the feasibility of the plan are reflected in three aspects. Firstly, the plan had a deficit of 142.5 million ID or about 25.3% of total investment. No definite financial measures were given to cover the required level of investment, and the only conclusion to be derived is that many projects included would not be implemented. In other words, the plan right from the beginning failed to achieve its targets. Secondly, the mal-distribution of investments among the sectors. Thirdly, the plan did not specify its targets in numerical terms, such as the size of employment, foreign trade, consumption and the sectoral production.

TABLE NO.8

Total Anticipated Revenues and Planned Expenditures of the Detailed Economic Plan (1961/62-1965/66).

Sectors	Expenditures Million ID	Percentage
Agriculture	113.0	20.0
Industry	166.8	29.4
Transportation & communications	136.5	24.1
Housing & building	140.1	24.7
SUB-TOTAL	556.4	
Payments of loans and interests	10.0	1.8
TOTAL	566.4	100.0

Financial Sources	Revenues Million ID	Percentage
Oil	315.8	55.8
Share of net profit of public enterprises	22.8	4.0
Foreign loans	77.2*	13.6
Others	8.0	1.4
Unidentified sources (deficit)	142.6	25.2
TOTAL	566.4	100.0

The efficiency of the plan was very poor indeed. There were no specific criteria according to which projects were to be evaluated and selected within each sector. Specific economic criteria for allocating investment on a sectoral level were also lacking.

The detailed plan was not implemented as was intended because of the political changes of 1963. Officially it lasted only two years and transitional annual plans (or investment programmes) had been adopted for the years 1963, 1964 and 1965. In principle these annual investment programmes were not more than collections of the same projects of the detailed plan. The only difference was the reduction of the annual detailed plan's expenditures - due to the increase of the government consumption expenditures - and the postponement of the execution of some

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* Total foreign loans include 65.2 million ID of the Soviet loan and 12.0 million ID of the Czechoslovakian loan.

SOURCE: Republic of Iraq, Official Gazette, Law No. 70 of 1961

projects. As a result of this investment policies were not fully executed and some projects of the Soviet-Iraqi agreement were suspended. In such a hazardous situation one can hardly appraise the achievements of the detailed economic plan. However, total (actual) expenditures were about 204.0 million ID or about 51.0 million ID per annum. In absolute terms this level was higher than any yearly (actual) expenditures on the DB programmes.

Actual investments on agriculture were about 20 million ID or 10% of total expenditures which is very low indeed. Investment on industry was accounted at 30 million ID or 19% of total expenditure. Transportation and communications had 27% of total expenditures, i.e. 55.0 million ID. The rest of it went for building, housing and other projects. If we compare actual expenditures with total planned expenditures, we find a sort of unbalance in favour of less productive projects. This can be shown as follows.

Sector	The ratio of actual investment expenditures to total planned expenditures	The ratio of planned investment to total planned expenditures
Agriculture	17%	20.3%
Industry	22%	30.0%
Transportation & communications	40%	24.5%
Other activities	64%	25.0%

Sector	The ratio of actual investment expenditures to total actual expenditures
Agriculture	10%
Industry	19%
Transportation & communication	27%
Other activities	44%

Generally, we may conclude that planning during the period 1959-65 was not comprehensive and the plans were not more than lists of projects included in a framework of government investment programmes. The projects might have been from the engineering point of view feasible, but it was found that no quantitative economic criteria were considered in their evaluations. Investment allocations on a sectoral level were also not based on quantitative economic efficiency criteria.

7.5 NATIONAL ECONOMIC PLANNING AFTER 1965

7.5.1. The Five Year Economic Plan (1965/66-1969/70)

In July 1965, a new economic plan for the years 1965-69 was introduced,[204] and so far as the planning approach, particularly the sectoral allocation of financial resources and the consistency of the plan is concerned, the plan could be considered as a serious attempt compared to both the DB programmes, and provisional and detailed

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(204) Republic of Iraq, Official Gazette, Law No. 87 of 1965.

economic plans. In this respect it may be considered as a significant step forward towards the establishment of comprehensive planning in Iraq.

(i) The Targets of the Plan

The plan was drawn up under the guidance of three main principles. Firstly, to raise appreciably both the production level of the economy and the standard of living by accelerating the rate of economic growth and ensuring a reasonable level of economic stability. Secondly, to restore equilibrium to the Iraqi economy by diversification of production and the reduction of dependence on oil revenues as a mere source of income and foreign exchange. Thirdly, the plan emphasised the fact that output level of the commodities sectors (agriculture and industry) should grow at a higher rate than their past growth rates. The growth targets, as the planner claimed, were considered in view of the capacity of the economy as reflected by the past experiences and the new efforts to be exerted for improving that capacity.(205) Accordingly, the planner determined the average growth rate of national income as at least 8% during the plan's period. This implies that the sectoral rates of growth were assumed to be as follows:- crude oil production would grow at an annual rate of 6%(206); the commodity sectors

(205) Republic of Iraq, Official Gazette, Law No. 87 of 1965, and Kanaan, T. "Some Problems of Economic Planning in Iraq", The Economist "Quarterly Journal of the Iraqi Economic Association", Vol. V, No. 4, Baghdad, 1964, in Arabic Al-Maaref Press.

(206) Republic of Iraq, Law No. 87 of 1965, p. 72.
Earnest, J. "A Process of Formulating the Development Plans", The Economist, "Quarterly Journal of the Iraqi Economic Association", Vol. v, No. 4, Al-Maaref Press, Baghdad, 1964, in Arabic.

as a whole was assumed to grow on average by 9.4% per annum; agriculture output was anticipated to grow by 7.5 % annually; industry by 12%; construction by 8%; and electricity by 20% annually; Non-commodities sectors were assumed to grow on average as follows:- public administration by 8%; services including health and education by 10%; transportation and communications by 7.4% annually; banking and insurance by 10%; trade by 7%; and the ownership of dwelling sector by 3.5%. Accordingly the desired level of total value added (excluding crude oil) resulting from the implementation of the proposed projects was estimated as 228 million ID.

TABLE NO. 9

Production targets of the Five Year Economic Plan classified by sectors

Sector	The estimated value added of 1964	The projected value added of 1969	Annual Rate of growth
Crude oil & mining	145	196	6.0%
Agriculture	110	158	7.5%
Industry	70	120	12.0%
Building & construction	30	45	8.0%
Electricity	6	15	20.0%
Transportation & communication	48	68	7.4%
Trade	38	53	7.0%
Banks & insurance	12	19	10.0%
Ownership of dwellings	12	14	3.5%

TABLE NO.9 (continued)

Services	50	80	10.0%
Public administration & defence	70	102	8.0%
TOTAL	591	870	8.0%

SOURCE: Republic of Iraq, Official Gazette, Law No. 87 of 1965.

NB: Note that the value added of crude oil was underestimated.

The examination of the projected growth rates reveals many shortcomings surrounding the adoption of this extrapolation approach. It is found that the overall growth target, i.e. 8%, was overestimated. The agricultural growth rate, for example, during the period 1953-63 was unstable and the annual average growth rate was almost zero (see Table No.). Thus the planned rate of agricultural growth, i.e. 7.5%, is hardly to be realised in view of the pattern of investment allocation. The industrial growth rate was unrealistic too. As a matter of fact the high growth rate of industrial sector came as a direct result of the government policy after 1958 of encouraging the industrial development through different measures; and then the nationalisation measures of 1964 had negative effects on the development of private industries. Therefore, in the circumstances prevailing then, the growth rate of the industrial sector was overestimated as well. In addition the annual growth rate of population was underestimated, and consequently,

this would change all the magnitudes of per capita income and per capita consumption downwards.

As for the diversification of production principles, no specific policies were adopted, and even if we relied on the general statements of the plan the policy drawn up by the plan was mainly limited to the development of import substituting industries. No particular considerations were given to the exporting sectors such as agriculture and more fundamentally to the development of national oil industries, particularly the petro-chemical industries. This was overlooked by the plan as was shown, for example, by the allocation of investment expenditures on petro-chemical industries during the plan's period.

With regard to employment targets, the plan was not successful either. The projected increase in the volume of employment during the plan's period was an increase in demand for labour in all sectors amounting to 261.483 thousand labourers. The number of labourers yearly required for construction in all sectors of the economy was estimated to be 62.84 thousand; the rest, i.e. 198.672 thousand is the number of operators and beneficiaries from agricultural land.(207) These projections, the planner claimed, were based on studies prepared for this purpose. Actual increase of total employment in all sectors of

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(207) Law No. 87 of 1965 [63] p. 80. On the validity of such statements see Chapter X Section 3 which reveals that no extensive studies on employment were carried out.

the economy during 1965-69 is estimated at only 82.1 thousands.(208) This reflects the unrealistic anticipations of the plan's employment targets. Moreover, the planner claimed that it was intended to turn to the attempt of applying the intermediate production technology in cases where that was feasible and all new projects were to be studied on this basis for finding out the possibility of reducing their capital costs and increasing the proportion of labour employed. However, no evidence can be found to support this claim and, in particular, no application of labour-output criterion was attempted at all.(209)

Insofar as the planning of foreign trade is concerned the plan has serious weaknesses. The planner admits the fact that Iraqi non-oil exports were deteriorating and also that Iraq should not depend on crude oil exports as a mere source of foreign currency and income, but no assessments of the required imports and the desired export level were given and thus no specific economic measures to deal with the matter were given. The only statement made was that the plan aims to increase the level of exports and to reduce the unnecessary imports.(300)

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(208) See Chapter X Section 3.

(209) In fact the planner in general statements ascertained the necessity of not applying the advanced productive technology because in addition to the problem of relative scarcity of saving it does not lead to maximum increases in the size of employment and does not eventually help greatly in reducing the unemployment problem.

(300) From the designed pattern of the development of the national expenditures categories between 1964 and 1969, it is found that the planner implicitly assumed the surplus (exports - imports) in 1969 will be 32 million ID. See Law No. 87 of 1965, Table No. 7, p. 77. How this could be achieved was not explained.

(ii) Resources and the pattern of investment allocation

A. Total anticipated investments; the plan estimated total gross investments required for achieving the production targets at 820 million ID. This was done by utilising the simple Harrod-Domar basic relation under the assumption that the capital-output ratio would be 3.6 during the period of the plan. Out of total investments, 181 million ID were assumed to be private investment, i.e. the projected share of the government would be 78% of total investment. No definition was given to the method used for the allocations among private and public sectors except that "both private and government sectors participated in total investments in previous years by almost equal shares. However, it is necessary to presume that the share of the government sector will exceed its previous ratio of 50% due to the implementation of the socialistic laws and the expansion in the public sector that will follow."(301) It seems that the planner for the sake of achieving an artifical consistency for the plan, obtained the figures of private investments by deducting the government's contribution - which was estimated at 640 million ID - from total investment.

In allocating total investment among the principle sectors of the economy the planner made use of the relation between the sectoral capital-output ratios and the projected sectoral value added, i.e. investment allocated for sector i = net increase in the value added of sector i X incremental capital-output ratio of sector i, where i = 1,2,3,4. Accordingly the anticipated investment to develop the

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(301) Republic of Iraq, Law No. 87 of 1965 [63] p. 79

agricultural output was estimated to be 174 million ID, which is about 25% of total gross investment, 187 million ID or 26% of total investment for the industry and the transportation and communications sector had 110 million ID or 25% of total investment.

The application of this approach is, however, subject to serious criticism. The practical experience in preparation of the framework of the plan revealed that it was at first arbitrarily assumed that the overall capital-output ratio would be 4.1, and there the planner claimed that the expected improvements in the labour productivity and the administration efficiency were being taken into account, and therefore this ratio would be reduced to 3.6.

As there is no evidence to accept the planner's claims, it seems that this was done in order to maintain the artificial balance between total investments and the projected final demand. The same approach for anticipating investments on a sectoral level was being followed. In other words, the capital-output ratios were assumed to be of such value that the exogenous investments would be balanced with the exogenous level of output (value added). As a result neither the capital-output ratios nor the overall and sectoral levels of investment were reliable estimates.

B. The financial resources; the main financial resources to cover the investment expenditures of the plan were as follows. Firstly, oil revenues; it was estimated that government investments (668 million ID) would be financed from 50% by the total oil revenues of

TABLE NO. 10

Financial Resources and Investment Allocation of the Five-Year Economic Plan (1964/65 - 1969/70)

(In Million Iraqi Dinars)

Sectoral Allocation of Investments

Sector	Government Central Investment and Public Enterprises	Private Investment	Total
Agriculture	145	12	157
*Industry	210	5	215
Transport and Communications	99	20	119
Building, Housing & Social Services	122.5	141.0	263.5
Trade & Services	1	3	4
International Liabilities & Repayment of Loans	25	-	25
Planning, Statistical & follow-up systems	2.5	-	2.5
Ministry of Defence (Productive project)	35	-	35
	640.0	181.0	821.0

Financial Revenues

Source	
(i) Central Government Savings:	
Cash balance brought forward on 31.3.1965	30.7
50% of income tax on oil companies	390.0
Net Profits of Government Establishments and Institutions	12.0
Foreign Loans	95.0
Domestic Loans	30.0
Other Revenues	3.5
(ii) Public enterprise	78.8
(iii) Private saving	181.0
	821.0

*including electricity and water

Sources compiled from:

Republic of Iraq, Official Gazette, Law No. 87 of 1965.

Note that international liabilities, are included as investment expenditures.

the government, i.e. 390 million ID. This was based on the assumption that the prevailing international conditions regarding the oil industry would remain the same, that is to say the policy of oil companies and the Iraqi government's attitude would remain as it was in the initial year (1964) and oil production would increase about 6% annually. Secondly, foreign loans; up to 1965, the balance of the Iraqi foreign loans was 41 million ID, and in the target year 1969-70, it was estimated to be about 90 million ID or about 12% of total investment. Thirdly, private investment; total private investment was estimated at 181 million ID. Except for the assumption regarding oil revenues, there were no economic calculations to determine the capacity of the economy, to observe foreign loans and to estimate the level of private savings. Thus the effects of both foreign loans and private consumption (investment) on the pattern of the economic growth were not mentioned.

(iii) The Efficiency and Consistency of the Plan

The consistency of the plan is assed by examining through the balance relations between the available resources and their allocations amongst various sectors of the economy, and also by examining the balance between total (and sectoral) investment and the required rate of growth or the exogenous output level. If we drop the objections to the assumptions behind the output targets and the available resources the plan achieved a consistent framework. However, such consistency was artificial, not only because of the validity of the unrealistic

assumption of the targets, but also because the arbitrariness of the estimation of both the overall and sectoral capital-output ratios, the level of private investments, and the level of foreign loans, as we have explained earlier. Moreover, no attempt to assess the interrelation effects among the sectors of the economy was made at all.

With regard to efficiency the plan was a complete failure, both on sectoral as well as on project level. No concrete criteria for the investment decisions were given and in this respect the plan did not differ from the DB programmes, provisional and the detailed plans. The planner made it very clear that efficiency criteria were not applied. The plan stated ". . . the underlying reason was due to a number of factors, chiefly among which was the narrow option in choosing the projects comprising the plan, because for a great number of them their execution had commenced either prior to the elaboration of the plan or on the completion of their studies, or their characteristics were such that they required the application of the advanced technology."(302)

(iv) Assessment of the Plan Performance

In the absence of reliable information and statistical data about the actual amount and allocation pattern of private investment, it is very difficult to associate the development of the economy during 1965-69 with the achievements of the plan. In the course of such investigation another difficulty arises from the necessity of assessing the effects of projects under construction (gestation period of investments) and the

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(302) Republic of Iraq, Law No. 87 of 1965 [63] p. 80.

indirect effects of others. However, the personal judgements and commonsense in evaluating the effects of investments and the impact of private investment with full consideration of the government investments (which accounted at about 54.7 million ID per annum) seems to be the reasonable alternative to achieve the aim of this Section. Generally, the examination of various aspects of economic development for the period in question reflects a little degree of success of the plan in achieving its targets. This, however, does not mean from a technical point of view that success reflects a certain degree of efficiency or consistency.

The available statistical data reveals that the standard of living, as reflected by the per capita income, rose appreciably from 75.9 ID to 89.8 ID, i.e. at an annual rate of growth of 3.4%. which is less than the anticipated level. The annual average growth rate of national income during the plan's period was estimated at 6.8% against 8%, which was the target of the plan. From the expenditure side of gross domestic product, the plan had failed to control the magnitudes of private and government consumption. Private consumption increased on average at annual rates of growth of 9.2%, whilst it was planned to be only 5.5%. Even the ratio of private consumption to GDP increased to 45.6% in 1969, whilst it was 43.6% in 1964 (see Table No. 41). Government consumption was also increased at a rate higher than the planned rate. It increased from 169.5 million ID in 1964 to 251.6 million ID in 1969, i.e. at an annual rate of growth of 9.7% against 8%, the planned rate. Whilst the consumption expenditures

increased, the ratio of capital formation to GDP decreased from 18.3% in 1964 to 14.2% in 1969. This was a very serious setback. The plan failed to achieve its strategic target with regard to foreign trade, i.e. to reduce the degree of dependence on crude oil exports for improving the balance of payments. In 1969, crude oil exports were estimated to be 85.3% of total exports whilst it was 86.8% in 1964.

The estimations of employment and unemployment revealed that the plan without any doubt failed to achieve its target of reducing considerably the level of unemployment.

Many reasons can be given to explain the failure of the plan. Some are related to the problems of project execution, political problems, administration problems and others emerge from the approach of and the technique utilised to formulate the framework of the plan. In our opinion the basic problem lies in the fact that the plan did not apply the economic criteria for making the investment decisions on micro-, sectoral and macro- level. The investment projects of the plan were only feasible from the engineering point of view but may not be from the economic point of view efficient if not infeasible, no choice among alternatives being made on economic calculations and in this respect the efficiency of the plan could not be achieved.

In Iraq it has always been argued that the political reasons have a great influence on the investment decisions of different stages of plan formulation or its implementation. Therefore, many Iraqi economists blamed these political factors for the failure of the plan. This is not

quite acceptable. The problem is if there are no clear economic criteria for making investment decisions, it is not practically possible to offset the effects of these undesired political factors. Unless such criteria can be established the blame on political factors has no valid justifications. Thus it may be considered as an excuse for the failure of the planning approach and technique to achieve the feasibility, consistency and efficiency.

7.5.2 THE NATIONAL DEVELOPMENT PLAN (1969-74)

The "National Development Plan" was introduced in April 1970 to pursue the previous "Economic Five Year Plan", and to cover the period 1969-74.(304) In this Section the general strategy of the plan, its targets and approach, is being generally examined, whilst an extensive evaluation of the plan projections is to be attempted in Chapter XI..

(i) The General Framework of the Plan

In principle, the framework of the plan was drawn up on the basis of comprehensive planning for the development of a "socialist" system.(305) The plan considered not only the economic activities of government and

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(304) Iraqi Government, Official Gazette, Law No. 70 of 1970.

(305) Although the planner did not give a clear definition of the "socialist" economic system, it can be deduced from the strategy of the plan as shown on the concentration in the public sector and the incentives given to the private economic activities within the frameowrk of the plan.

public enterprises, but also the activities of the private sector. It also integrates the investment activities, consumption, production, employment, exports, imports and other economic activities in such a way as to achieve certain economic and social targets. The plan noticeably attempted to define the economic policies, i.e. fiscal, monetary, and commercial policies by which it aims to control the government consumption expenditures, to encourage the public sector to take initiative in order to play a more effective role in the course of development, to achieve the balance between the resources and the requirements of the plan and finally to maintain the stabilisation of prices against any possible inflation pressures which may lead to increase the existing income disparities among different classes.(306) The justification for such an approach can be deduced from the adoption of what the planner calls "a strategy of national development" within the political background of "socialism". The main principles of this strategy are the following; balanced growth, increasing investment (saving) and private consumption level, increasing and diversifying exports and creating a favourable environment for private capital participation and to enthuse people to help to carry out to implement the plan. Administratively, by this strategy, the planner advocates the principle of "planning centralisation", and the "decentralisation of implementation". Such a strategy and the consistent framework of the

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(306) Iraqi Government, Official Gazette, Law No. 70 of 1970, p. 129.

plan, however, can be judged on the basis of concrete assumptions relevant to the structure and potentialities of the Iraqi economy, but, as will be shown later, the planners' decisions were mainly based on commonsense and personal judgements. Thus it is only possible to say in this case that the positive effects of this strategy cannot be guaranteed.

(ii) The Targets of the Plan

Strategically, the plan set up its targets on two main principles. Firstly, it aims significantly to change the structure of the Iraqi economy by giving first priority to agricultural development and by reducing the dependence of the economy on crude oil exports (foreign sector). Secondly, it introduces the concept of "regional"planning through the geographical allocation of the plan's projects.(307)

Technically, the targets of the plan were derived in most cases by following the same approach as the previous plan. The planner, however, gave no concrete reasoning in setting up the sectoral and the overall output targets, but only mentioned general statements such as "on the basis of the potentialities of these sectors" and the "interrelationships" amongst them and the "anticipated demand" on their output.(308) The examination of the whole approach shows that no quantitative analysis was

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(307) It might be useful to mention that in this plan, as well as in the previous five year plan, emphasis is given to the "economic integration with the Arab countries" as one of the economic targets of the plan. However, none of these plans examined seriously this aspect, either in theory or in practice.

(308) Iraqi Government, Official Gazette, Law No. 70 of 1970, pp. 138-139.

used, and thus no evidence exists for its reality. As a matter of fact the strategy of the whole approach hinges on "commonsense" and "personal judgements" of the planner. It seems that the output targets were fixed "exogenously" in view of the past trend of national income, sectoral output and population growth.

The principle target of the plan is, however, to increase per capita income over the plan's period, 1969-74, by an annual compound rate of growth of 3.6%, and accordingly national income has to increase at an annual compound rate of growth of 7.1%.(309) In view of this target, and within the general strategy of the plan, the value added of agriculture was assumed to increase at an annual compound rate of growth of 6.9%. For manufacturing industries this rate was assumed to be 12%, in the mining and quarrying sector 19.2% (mainly due to sulphur extraction), whilst in crude oil extraction this rate was assumed to be only 1.4%. For electricity, gas and water the rate was assumed to be 11.4%, and in construction 15.0%. Accordingly, the contribution of value added of crude oil sector to GDP is to be reduced to 26.4% in 1974 compared to 32.1% in 1969, whereas for agricultural contribution it increased from 19.1% in 1969 to 19.7% in 1974 and in the manufacturing industries from 7.4% in 1969 to 9.6% in 1974. The value added of the

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(309) It is noticeable that the Iraqi planner starts fixing the level of per capita income in the target year and then estimates the level of national income at the target year, ending up by doubling the national income over a ten year period. The latter has become a common principle target in many underdeveloped countries.

services sectors, i.e. public administration and defence, ownership of dwellings and other services, was to decrease from 20.1% in 1969 to 19.9% of GDP in 1974.

TABLE NO. 11

The anticipated increase of value added by sectors during 1969-74

	Sector	Estimated Value Added - 1969	Projected Value Added - 1974	Compound Annual Rate of Growth
1.	Agriculture & forestry	198	277	6.9
2.	Crude oil	333	357	1.4
3.	Mining & quarrying	6	14	19.2
4.	Oil refining	18	25	7.2
5.	Manufacturing industries	77	135	12.0
6.	Electricity, gas & water	18	31	11.4
7.	Construction	32	65	15.0
8.	Transport & communications	68	98	7.7
9.	Trade	64	96	8.5
10.	Banking & insurance	16	26	9.6
11.	Ownership of dwellings	17	20	3.5
12.	Public administration	129	168	5.5
13.	Services	64	92	7.6
	GDP	1,039	1,405	6.2
	Minus net factor abroad	159	170	1.2
	Minus depreciation	53	72	6.4
	NATIONAL INCOME	827	1,163	7.1

SOURCE: Republic of Iraq, Official Gazette, Law No. 70 of 1970.

With regard to employment, the plan aimed to increase the employment level from 2546.2 thousand in 1969 to 3165.7 thousand in 1974. Moreover this increase would be accompanied with an increase of 94 million ID in wages during the period. However, no evidence is given to support the planners' claim.

Total exports are anticipated to increase from 407.5 in 1969 to 465.5 in 1974 and total imports to increase from 208.4 in 1969 to 263.0 in 1974. This implies that the plan aims to achieve a favourable balance of payments.

TABLE NO. 12

The Balance of Payments as anticipated by the National Development Plan

(Value in million ID)

	1969	1974
Total exports	407.5	465.5
Net factor income from abroad	6.6	7.4
Total imports	208.4	263.0
Net factor income abroad	164.2	175.6
Surplus	41.5	34.3

SOURCE: Republic of Iraq, Official Gazette, Law No. 70 of 1970

The important feature of the foreign trade targets is the change in the composition of imports. It is claimed that imported capital and intermediate goods in 1974 would be up to 75.2% of total imports, i.e. the consumer goods would be only 24.8% of total imports in 1974 compared to 35.0% of total imports in 1969.

(iii) Investment Allocation

As shown in the previous section, output targets are set up exogenously, and following the example of the simple Harrod-Domar model, total investment and its allocation amongst sectors are derived. The striking feature of such an exercise, as in the economic Five Year Plan, is that the overall and sectoral capital-output ratios are no more than adjustable factors to arrive at a consistent framework of investment level and output objectives.(310)

TABLE NO. 13

Investment allocation of the NDP 1969-74 among the principal Sectors of the Iraqi economy Development Plan 1969-74

(Values in million ID)

Sector	Investment	Percentage
Agriculture	211.000	19.7
Industry	212.550	19.8
Mining and quarrying	154.550	14.4
Electricity	26.900	2.5
Transportation & communication	149.290	13.9
Trade and banking	32.500	3.0
Housing	160.250	15.0
Services	111.750	10.4
Other activities	13.601	1.3
TOTAL	1, 072.391	10 0

SOURCE: Republic of Iraq, Official Gazette, Law No. 70 of 1970.

(310) Exactly the same approach was followed in drawing up the five year plan (1964-69). See Section 7.5 of this Chapter.

Total investment allocated among government, public enterprises and agencies and the private sector is as follows.(311)

	million ID
Government investment	536.9
Public enterprises & agencies	321.8
Total investment in public sector	858.7
Investment of private sector	285.0
TOTAL INVESTMENT	1,143.7

7.6 THE INSTITUTIONAL FRAMEWORK AND PLANNING MECHANISM

In Iraq, as a result of revolutionary political changes in 1958, the institutional framework of planning underwent radical changes since its establishment in 1952. In these two periods no fundamental institutional changes took place.

In 1952, the DB was the sole body respondible for formulating and implementing the development programmes. In 1953, the Ministry of Development was set up. These two bodies were jointly responsible for drawing up and implementing development programmes up to 1952. The procedure of drawing up a development programme was as follows. Development projects were mainly prepared and evaluated by independent consultant

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(311) On the financial sources of investment, see also Chapter X Section 3.3.

companies and experts. If these projects were approved by the Ministry of Development and the DB, the whole programme would go to the Council of Ministers, which would present it to Parliament for approval;when approved by Parliament the programme would become law and its implementation is delegated to the Ministry of Development.

In 1959, the DB and the Ministry of Development were replaced by the Economic Planning Board (EPB), and the Ministry of Planning. The EPB was the authority for approving the projects of the economic plans whilst the Ministry of Planning was responsible for drawing up those plans. However, the implementation of the projects was delegated to the ministries concerned. In 1964, the structure of EPB was slightly changed by including some four Iraqi experts in addition to the original number of Ministers and a "Steering Committee" was set up to be responsible for national economic planning and the follow-up plan implementation.(312) The Ministry of Planning still has the responsibility of drawing up and evaluating projects from technical as well as economic points of view.

Since 1964, planning mechanism in Iraq can be summarised as follows. The project is proposed first of all by a development in a ministry which then sends the proposal to the Ministry of Planning. The project

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(312) The Steering Committee is made up of the Minister of Planning, the Under-Secretary of the Ministry of Planning, and the four Iraqi experts of the EPB.

is sent to the department concerned in the Ministry of Planning, which studies the project from technical and economic points of view.[313] If the Ministry of Planning recommends the project, it sends it to an independent consultant company for a general preliminary study. Then the original proposal as well as the preliminary study of the consultant company and the recommendations of the Ministry of Planning are sent to the Steering Committee which takes a decision on whether to study the project further or whether to reject the proposal. If the project is accepted by the Steering Committee, the Ministry of Planning sends the project again to an independent consultant company for a detailed study. On the basis of this detail study the Steering Committee approves the projects and lists them in its development plan. However, the final decision is subject to the EPB approval. If the EPB approves the recommendation of the Steering Committee, the propsal will be sent by the EPB to the Council of Ministers for the final approval.

No doubt this is a very complicated and time-consuming procedure of planning, and if we consider the complexities of spending on the project (execution), one can easily deduce that planning mechanism in Iraq is one of the main factors in planning shortcomings.

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(313) Although in principle the Ministry of Planning has to evaluate the project technically and economically, in fact the study is mainly an engineering evaluation.

CHAPTER VIII AN OPTIMISATION ALLOCATION MODEL FOR THE IRAQI ECONOMY

In view of the general propositions made in Chapter V, Section and in Chapter VI, an attempt is made in this Chapter to formulate a multi-sectoral model combining a programming and input-output technique for dealing with the optimal level and allocation pattern of production, investment, private consumption and imports for the Iraqi economy during the period 1969-74 on alternative assumptions regarding capital and foreign exchange availability at different levels of government consumption and exports. The model investigates the impact of the oil industry on the rate and pattern of growth of the Iraqi economy. It also serves to explore the scope for an import substitution policy during the period 1969-74. A comparative analysis of the variants of the model would help to obtain a consistent, efficient and feasible plan.

As is extensively explained in Chapter X, all the exogenous values and the structure and behaviour of all parameters are based on the actual observations of the recent years or on the estimates of the probable values in the period 1969-74.

8.1 CLASSIFICATION OF THE IRAQI ECONOMIC ACTIVITIES

The model covers all economic activities of the Iraqi economy. In classifying these activities, we followed the International Standard Industrial Classiciation (ISIC) of the United Nations.(314)

(314) This classification considers only the structure of the industry rather than any single principle such as techniques or the raw materials, U.N. [129]

This adaptation is necessary in order to make use of the available statistical data as well as to have a concrete basis for comparison purposes. However, three main considerations are taken in determining the degree of disaggregation:-

(i) some activities have no great importance in terms of their output level and their development prospects; some others are of special importance and therefore they have to be distinguished as a separate sector for their significant role, either at the present or in the future - at least during the plan's period; the sectors which should be distinguished are the following

(a) crude oil extraction,
(b) public administration,
(c) oil products (refining)
(d) ownership of dwelling (315);

(ii) to make use of the available statistical data which are generally presented on the ISIC basis;

(iii) to make the model practically manageable within the available limited capacity of the model solution and in view of the enormous amount of statistical data.

In view of the above considerations, the Iraqi economy is, therefore, subdivided into the following 13 production sectors:-

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(315) In the ISIC the ownership of dwelling sector does not appear separately; thus in this respect we follow the United Nations Industrial Classification of Domestic Products (U.N.[199] p. 38) instead of the ISIC.

No.	SECTOR	ISIC Code (Division)
1.	Agriculture, forestry and fishing	0
2.	Crude oil extraction	1
3.	Mining and quarrying	1
4.	Oil products (refining)	3
5.	Manufacturing industries	2-3
6.	Electricity, gas and water	5
7.	Banking and insurance	8
8.	Trade, wholesaler and retailer	7
9.	Transportation and communications	6
10.	Construction	4
11.	Ownership of dwelling	9
12.	Public administration	10
13.	Services	11

8.2 ASSUMPTIONS RELEVANT TO THE ECONOMIC STRUCTURE OF THE IRAQI ECONOMY

8.2.1. Crude Oil Sector

Production and investment of crude oil extraction sector is to be treated differently from the other production activities. They are assumed to be exogenous variables.(316) The reason for this assumption lies in the fact that the growth of crude oil depends on a number of factors beyond the initiative and control of the Iraqi economic

(316) From the available figures of GFCF of the period 1953-69 ([43], [44] & [73]) one can deduce no direct relation between the level of investment and crude oil output.

institutions, and it is not the outcome of Iraqi investment. Crude oil exports basically determine the level of output[317] depending mainly on the monopolistic conditions of crude oil economics in the foreign markets. Even the production of the Iraqi National Oil Company (INOC), which will not exceed during the next five years 6% of total crude oil production - exports and investments are based on strategic policy in which non-economic factors play an important role in the determination of their levels. This means that the national crude oil industry is in the same situation as we treat crude oil production exports and investments of the foreign companies.

In projecting the output level of crude oil during the period 1970-74, the following two assumptions are made: firstly, up to the year 1974, there would be no change in the international market of the price of exports; secondly, there would be no radical change up to the target year 1974 in the policy of the Iraqi authorities regarding oil such as the nationalisation of foreign companies.

(i) Foreign Companies; the level of crude oil exports (production) is limited by the capacity of transporting the production to the exports area, i.e. the output level is determined - taking into consideration other economic and political factors - by the available pipelines

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(317) The interrelationship between this sector and other domestic sectors reflected by the technical input-output coefficients and final demand figures, are very weak indeed (see Chapter V Table No.15)

(transportation) capacity. Accordingly, the maximum limit of crude oil output produced from the IPC and MPC oilfield (north of Iraq) is about 56 million tons, whereas the upper limits of the BPC oilfield (south of Iraq) is about 36 million tons. Since 1968 the capacity of the north oilfield has been just about fully utilised.(318) In view of the present and most likely in the future investment policy of the companies concerned, this implies that there exists only one possibility of increasing the production level by increasing the output of the southern field (BPC) at an annual average rate equal to that of the period 1959-69 (excluding the year 1967), i.e. at a rate of 6% per annum. On the basis of the actual 1968 and the estimated figures of 1969, we projected the production of crude oil of foreign companies as follows.

YEAR / COMPANIES	1968	1969	1970	1971	1972	1973	1974
IPC & MPC	278.9	282.8	282.8	282.8	282.8	282.8	282.8
BPC	65.3	96.0	101.6	101.6	113.4	119.2	128.0

(ii) Iraqi National Oil Company*; by 1974, production of INOC is estimated to add up to 22.5 million tons to crude oil output. In 1971, it is assumed to be about 2.5 million tons and 5 million tons for each

(318) In 1968, the total production of the IPC and MPC north oil fields was 56.1 million tons. See C.B.I. [70]

* Trying to consolidate its national oil policy, the Iraqi Government pressed Law No. 80 of 1962 and then Law No. 97 in 1967 according to which the oil exploitation right of some territories which formerly fell within the concession area of foreign companies was transferred to the state-owned Iraqi National Oil Company (INOC).

year of the period 1972-74. In monetary value this is approximately equivalent to about 6 million ID in 1971 , and 12 million ID for each year of the period 1972-74.

8.2.2 Mining and Quarrying - Sulphur

Recently the Iraqi Government engaged itself in a large scale mining activity, which, however, is not subject to the same approach and calculations by which the level of output, consumption and investment of the other domestic activities are determined. The project is surrounded by conditions that make it difficult to rely on the parameter of ICOR in order to determine its output and investment level. In addition, sulphur extraction is a new activity of a very low local consumption, i.e. it is an extracting industry, and it has been established on a basis of special economic terms which have been signed between the Iraqi Government (INMC) and the Polish Government. Therefore, part of the production and investment of the mining and quarrying sector, i.e. sulphur, is assumed to be exogenous.

The INMC is due to start its production in 1971 which would be about 40-45 thousand tons. This level will increase to about 280-320 thousand tons in 1972 and to about 1.0 to 1.25 million tons in 1973 and 1974 respectively. If INMC successively carried out its planned production, the value of output of crude sulphur is assumed to be as follows.

YEAR	THE MINIMUM POSSIBLE VALUE $ million	THE MAXIMUM POSSIBLE VALUE $ million
1971	.560	1.395
1972	3.920	9.900
1973	14.000	31.000
1974	14.000	31.000

The export prices of crude sulphur are highly fluctuated and at the present it shows a downward trend. However, prices per ton range between $13, 14, 15 in France and Holland, and $26-36 in the U.S.A. and Mexico.

8.2.3 Private Consumption

As has been suggested in Chapter V private consumption is regulated by behaviouristic relations depending basically on demand elasticities; the adoption of such an approach is practically impossible for Iraq, since no detailed data on private consumption by sector and income groups are available. Alternatively, lower bounds for sectoral private consumption at the target year are assumed to be at least equal to the level at the basic year, plus new demand created by population growth. Theoretically, an upper bound may also be imposed on particular sectors. In fact the demand on commodities, particularly agricultural product, is generally less than the saturation point and within a reasonable growth rate of total private consumption this treatment is justified.

8.3 VARIANTS OF THE MODEL

To provide the planner with different possibilities, solutions for the model are derived for several variants corresponding to alternative assumptions concerning the rate of growth of government consumption, exports and oil output. Different alternatives of total available investment are also assumed to trace the impact of investment magnitudes on the rate and the pattern of economic growth and structure. The combination of these variants are defined as follows.

INVESTMENT ALTERNATIVES		MAXIMUM LEVEL OF EXPORTS FOREIGN EXCHANGE & GOVERNMENT CONSUMPTION	MINIMUM LEVEL OF EXPORTS FOREIGN EXCHANGE & GOVERNMENT CONSUMPTION
		Variant A	Variant B
		MODEL CODE	MODEL CODE
Required minimum level of investment	a	1 A	1 B
5% of (a)	b	2 A	2 B
10% of (a)	c	3 A	3 B
maximum level of investment (70% of oil revenues)	d	4 A	4 B

On the other hand different objective functions are tested to determine the minimum level of investment required for achieving the targets and also to investigate the implications of variants on social welfare.

8.4 THE STRUCTURE OF THE MODEL

8.4.1. Notations and Definitions

(a) The Endogenous Variables

$X_{f,i}$ is a scalar, X_f is a vector of gross output of each sector i (i=1,3,...13) of the economy at the target year, 1974. $i \neq 2$

$M_{f,i}$ is a scalar, M_f is a vector of competitive imports of sector i (i=1,3,4,5,7) of the economy at the target year, 1974, in domestic prices.

$\overline{MI}_{f,i}$ is a scalar, $\bar{M}I$ is a vector of imports of complementary capital goods required for capital formation originated by sector i (i=5,10) at the target year, 1974, in domestic prices.

$\overline{MD}_{f,i}$ is a scalar, $\bar{M}D_f$ is a vector of complementary imports required for intermediate demand, producing one unit of output of sector i (i=2,5,10) of the economy in the target year, 1974, in domestic prices.

$\bar{M}c_{f,i}$ is a scalar, $\bar{M}c_f$ is a vector of complementary imports required for private consumption of sector i (i=1,3,...,13; $i \neq 2,10,12$) of the economy at the target year, 1974, in domestic prices.

TM_f the level of total imports at the target year, 1974.

$I_{f,i}$ is a scalar, I_f is a vector of gross investment by destination required for sector i (i=1,...,13; $i \neq 2$) of the economy at the end of the target year, 1974.

$I^*_{f,i}$ is a scalar, I^*_f is a vector of gross investment originated by sector i (i=5,10) of the economy at the target year, 1974.

$\mathbf{I}$ total investment during the period 1969-74.

$C^p_{f,i}$ is a scalar, C^p_f is a vector of consumption by households of the output of sector i (i=1,3,...,13; $i \neq 2,10,12$) of the economy at the target year, 1974.

C^p total private consumptionat the target year, 1974.

S_p total private saving during the period 1969-74.

V_p total private investment during the period 1969-74.

S_g total government saving during the period 1969-74.

V_g total government investment during the period 1969-74.

Y gross national product.

(b) The Exogenous Variables

$C^g_{f,i}$ is a scalar, C^g_f is a vector of consumption by government of output of sector i (i=1,4,5,6,8,9,12,13) of the economy at the target year, 1974.

$\bar{M}G_f$ total non-competing imports required for government consumption at the target year, 1974.

$E_{f,i}$ is a scalar, E_f is a vector of exports of sector i (i=1,2,3,4,5) of the economy at the target year, 1974.

L the required minimum level of total employment at the target year, 1974.

2^I_f investment in crude oil extraction sector at the target year, 1974.

2^I total investment in crude oil extraction sector for the period 1969-74.

3^I_f investment in crude sulphur (part of mining and quarrying sector) at the target year, 1974.

3^I total investment in crude sulphur (part of mining and quarrying sector) at the target year, 1974.

2^X_f production level of crude oil extraction sector at the target year, 1974.

3^X_f production level of crude sulphur (part of mining and quarrying sector) in the target year, 1974.

FA_f net factor income from abroad in the target year, 1974.

FT_f net factor income abroad in the target year, 1974.

BP_f net balance of payments in the target year 1974 (if $BP_f > 0$, then deficit if $BP_f < 0$, then surplus if $BP_f = 0$, then it is an equilibrium state).

FL net foreign loans (including capital inflow from abroad) during the period 1969-74.

Y_d private gross disposable income after taxes.

Ca total production capacity at the beginning of initial year, 1969.

$X_{o,i}$ is a scalar, X_o is a vector of gross output of each sector i ($i=1,3,\ldots,13; i\neq 2$) of the economy at the initial year, 1969.

$C^P_{o,i}$ is a scalar, C^P_o is a vector of private consumption of each sector i ($i=1,3,\ldots,13; i\neq 2$) of the economy at the initial year, 1969.

$I_{o,i}$ is a scalar, I_o is a vector of investment of each sector i ($i=1,3,\ldots,13; i\neq 2$) of the economy at the initial year, 1969.

R total government revenues from taxes, external, and internal loans.

(c) The Parameters of the Model

k_i is a scalar, k is a vector of gross incremental capital-output ratios of sector i ($i=1,3,\ldots,13; i\neq 2$) of the economy.

k_{ij} is amount of investment of type i required per unit of output of sector j, i.e. K is a matrix of sectoral incremental capital-output.

h_{ij} is amount of capital goods of type i ($i=5,10$) used per unit level of investment activity I_j ($i=1,3,\ldots,13; j\neq 2$), i.e. H is a matrix of investment coefficients.

a_{ij} is amount of commodities produced in sector i (i=1,2,...,13) currently used in producing one unit of output in sector j (j=1,2,...,13) of the economy.

c_{mj} is amount of non-competing imports of consumption goods required by per unit level of consumption by households of output of sector j (j=1,3,...,13;i≠2,10,12).

a_{mj} is amount of non-competing imports required in producing per unit level of output of sector j (j=2,5,10)

ℓ_i is a scalar, ℓ is a vector of labour-output ratios of sector i (i=1,2,...,13) of the economy.

s average private propensity to save.

α growth rate of population.

β growth rate of government consumption.

V_{mj} is amount of non-competing imports of capital goods required by per unit level of investment in sector j (j=1,3,...,13;j≠2).

t subscript refers to the year. In the base year t=0, and in the final year of the planning period t=f.

8.4.2. The Equations of the Model

(a) Output Determination

$$(1)\quad X_{f,i} + M_{f,i} - \sum_{i=1}^{13}\sum_{j=1}^{13} a_{ij} X_{f,j} - I^{*}_{f,i} - C^{p}_{f,i} \geq C^{g}_{f,i} + E_{f,i} \qquad (i=1,2,\ldots,13;\ i\neq 2)$$

$$(2)\quad X_{f,2} - \sum_{j=1}^{13} a_{2j} \geq C^{p}_{f,2} + C^{g}_{f,2} + E_{f,2} + M_{f,2} + I^{*}_{f,2}$$

$$(3)\quad X_{f,i} \geq X_{o,i} \qquad (i=1,2,\ldots,12)\ (i\neq 3,7)$$

$$X_{f,i} \leq \bar{X}_{o,i} \qquad (i=3,7,13)$$

(b) Investment and Capital Capacity Constraints

(4) $I_{f,i} = k_i \ (X_{f,i} - X_{o,i})$ $\quad (i=1,3,\ldots,13;i\neq2)$

(5) $I^*_{f,i} = \frac{2}{f-1} \sum_{j=1}^{13} k_{ij} X_{f,j} - \frac{2}{f-1} \Sigma k_{ij} X_{o,j} - \frac{f+1}{f-1} I^*_{o,i}$

$\quad (i=1,3,\ldots,13;i\neq2)$

(6) $I^*_{f,i} = \sum_{j=1}^{13} r_{ij} . I_{fj}$ $\quad (i=1,3,\ldots,13;i\neq2)$

(7) $I_f = \sum_{\substack{i=1 \\ i\neq3}}^{13} I_{f,i} + {}_2I_f + {}_3I_f$

(8) $\sum_{t=0}^{f-1} I_t = S_p + S_g$

(9) $\sum_{t=0}^{f-1} I^*_t = \frac{f+1}{2} I^*_o + \frac{f-1}{2} I^*_f$

(10) $k_i X_{f,i} \leqslant Ca_{,i} + I_{f,i}$ $\quad (i=1,3,\ldots,13;i\neq2)$

(11) $I_{f,i} \gtrless I_{o,i}$

(c) Private and Government Consumption and Saving

$$(12)\quad C^p = \sum_i C^p_{f,i}$$

$$(13)\quad S_p = f\ (\ (1 - s)\ Yd\ ) = V_p$$

$$(14)\quad C^p_{f,i} \gtrless C^p_{o,i}\ (1 + \alpha)$$

$$(15)\quad C^g_{f,i} = C^g_{o,i}\ (1 + \alpha)$$

$$(16)\quad S_g = R - \sum_i C^g_i = V_g$$

(d) Balance of Payments

$$(17)\quad TM_f = \sum_i M_{f,i} + \sum_i \bar{MD}_{f,i} + \sum_i \bar{Mc}_{f,i} + \sum_i \bar{MI}_{f,i} + \bar{MG}_f$$

$$(18)\quad \sum_i \bar{MD}_{f,i} = \sum_j a_{mj} X_j$$

$$(19)\quad \sum_i \bar{MC}_{f,i} = \sum_j C_{mj}\ C^p_j$$

$$(20)\quad \sum_i \bar{MI}_{f,i} = \sum_j V_{mj}\, I_j$$

$$(21)\quad BP_f = FA_f - FT_f \neq FL$$

$$(22)\quad TM_f - \sum_i E_i \lesseqgtr BP_f$$

(e) Employment

$$(23)\quad \sum_{i=1}^{13} \ell_i\, X_{f,i} \gtreqless L$$

(f) GNP Determination

$$(24)\quad Y = C^p + C^g_f + I_f + \sum_i E_{f,i} - TM_f$$

(g) The Objective Functions

(i) As it has been mentioned earlier, it is basically intended to maximise GNP at the target year, i.e. to maximise

$$Y = \sum_{\substack{i=1 \\ i\neq 2,10,12}}^{13} C^p_{f,i} + \sum_{\substack{i=1 \\ i\neq 23}}^{13} I_{f,i} + {}_2I_f + {}_3I_f + C^g_f + \sum_{i=1}^{5} E_{f,i}$$

$$-(\sum_{i=1,3,4,5,7} M_{f,i} + \sum_{i=2,5,10} \bar{M}D_{f,i} + \sum_{i=2,5,10} \bar{M}c_{f,i} + \sum_{i=5,10} \bar{M}I_{fi} + \bar{M}G_f)$$

$$= \sum_{\substack{i=1 \\ i\neq 2,3,7,10}}^{13} C^p_{f,i} + \sum_{\substack{i=1 \\ i\neq 2,3}}^{13} I_{f,i} + {}_2I_f + {}_3I_f + C^g_f + \sum_{i=1}^{5} E_{f,i} - \sum_{i=1,3,4,5,7} M_{f,i}$$

$$- \sum_j a_{mj} X_j - \sum_j c_{mj} C^p_j - \sum_j V_{mj} I_j - \bar{M}G_f$$

But ${}_2I_f$, ${}_3I_f$, C^g_f, $\sum_{i=1}^{5} E_i$ and $\bar{M}G_f$ are exogenous variables, and therefore the objective function becomes:-

$$\text{to maximise} \quad \sum_{\substack{i=1 \\ i\neq 2,10,12}}^{13} C^p_{f,i} - \sum_j C_{mj} C^p_j + \sum_{\substack{i=1 \\ i\neq 2,3}}^{13} I_{f,i} - \sum_j V_{mj} I_j - \sum_j a_{mj} X_j$$

$$- \sum_{i=1,3,4,5,7} M_{f,i}$$

Also

(ii) It is designed to estimate the minimum investment required for achieving the targets of the plan. Thus the objective function is formulated to minimise total investment. Mathematically:-

$$\text{to minimise} \quad I_f = \sum_{\substack{i=1 \\ i\neq 2,3}}^{13} I_{f,i} + {}_2I_f + {}_3I_f$$

But if $_2I_f$ and $_3I_f$ are exogenous variables, therefore, the objective function becomes:-

$$\text{to minimise} \quad I_f = \sum_{\substack{i=1 \\ i\neq 2,3}}^{13} I_{f,i}$$

This is subjected to the condition that the financial requirements of the capital capacity constraints are assumed unlimited. This exercise also tries to examine the popular claim that Iraq has no problem in providing the required capital and foreign exchange for more ambitious economic and social targets.

(iii) It is attempted to maximise total private consumption, as the ultimate aim of development, in order to test the implication of different object functions on the level of economic variables. Mathematically:-

$$\text{to maximise} \quad \sum_{\substack{i=1 \\ i\neq 2,10,12}}^{13} C^p_{f,i}$$

8.5 COMPUTATIONAL ARRANGEMENTS

The general form of the model consists of 42 variables and 72 constraints (see Table No. 39) and thus for each alternative of the model we have to solve a linear programming problem of the same size. This has been done by using a parametric algorithm for which a computer procedure written in ALGOL was constructed by Thomas J. Aird [4]

which was then modified and rewritten in EGDON by A. McKay [100]
For solving each alternative, the computer programme was run on the KDF9 English Electric Birmingham University Computer, and it took about five minutes.

CHAPTER IX PROJECT EVALUATION - CASE STUDIES

It has been shown in Chapter IV that investment decisions of the micro- level (project evaluation) represent the most crucial stage of the planning process because such decisions translate the overall objectives of the plan and give reality to the grand design. In Chapter VII it has been mentioned that planning experiences in Iraq were unsuccessful in establishing concrete economic criteria for project evaluation as related to the overall objectives of the plan. In this Chapter an attempt in this direction is made for more investigation and through practical evaluation of four particular projects in the manufacturing industries sector.

Project appraisal involves many different problems such as the technical feasibility, assessment of the demand on output and problems associated with the administration.(319) For practical reasons these problems may be regrouped into two categories. (i) Problems of measurements; Accountants have worked out various criteria for classifying costs and returns of project under consideration while from the "national" economic point of view the planners may have different sets of criteria for calculating costs and benefits. (ii) Problems of priority; The planner essentially aims to design those actions or activities which bring about the desired economic and social changes with the highest ratio of benefit to cost. That is to say that priority is one of the principal tasks of the planner. As a guide to the decision-maker the aim of this Chapter is to work out a uniform formula for evaluating

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(319) A detailed study on these problems has been prepared by the United Nations. See U.N. [134]

projects, i.e. to derive the coefficients of the objective function and the constraints of the integer programming sectoral model,(320) and to demonstrate the relation between overall, sectoral and project analysis. This implies that the choice among projects is to be worked within the same sector, whilst the multi-sectoral model implicitly takes the case of selecting different projects concerning various sectors. It is necessary, however, to emphasise that at this stage of planning there must be a number of proposed projects to choose from within the limits of available capital and foreign exchange capacities as well as the sectoral output and export targets. Planning is essentially a matter of choosing the "best" amongst various possible alternatives. Yet such a concept does not seem to exist in Iraq.

In this Chapter it is not intended to discuss the problems of technical production alternatives, volume of demand, prices of output, consumer preferences and the possible technical innovations. The aim is limited to standardise a particular format for evaluating projects. Four case studies will be undertaken in the manufacturing industries sector for which the technical data are available. Such an attempt implicitly reveals how investment decisions on a micro- level are taken in Iraq.

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(320) However, if there exists no possibility of constructing a multi-sectoral model, project priorities can be achieved by applying this formula and then ranking the proposed projects accordingly.

9.1 CLASSIFICATION OF COSTS AND RETURNS OF THE PLAN'S PROJECTS

The necessity for classifying costs and returns of any project under evaluation which might be different from that advocated by the accountants has two justifications. Firstly, the planner may need to adjust the market prices of some cost or return items on the basis that the commercial profit may not be the best measure of ranking project priorities. Secondly, since different projects have varying useful lives both costs and returns of all proposed projects should be converted to an equivalent series of equal annual values to be a common basis for comparison.

A complete list of suitable classifications of costs and returns of an industrial project is given below.

(A) PRODUCTION VALUE

(a) cif (Basra Port) value

(b) Market (wholesale) prices

(c) Value added due to external economies

(B) CAPITAL INVESTMENT

(a) Land

(b) Building

(c) Equipment) (i) foreign
) (ii) local

(d) Installation cost) (i) foreign
) (ii) local

(e) Development Cost) (i) foreign
) (ii) local

(B) CAPITAL INVESTMENT (continued)

(f) Total fixed capital (a + b + c + d + e)

(g) Working capital

(h) Total foreign loans
- rate of interest

(C) PRODUCTION COST

(a) Direct materials) (i) imported
) (ii) local

(b) Direct labour) (i) skilled and semi-skilled
) (ii) unskilled

(c) Manufacturing overhead

(i) Indirect labour

1. Managers

- foreign

- local

2. Professionals

- foreign

- local

3. Supervisors

- foreign

- local

4. Maintenance

- foreigh

- local

5. Train and social services

6. Guards and "Farasheś"(porters) - unskilled labour

(C) PRODUCTION COST (continued)

(ii) Depreciation
- (i) land
- (ii) building
- (iii) equipment

(iii) Supplies

1. Maintenance and equipment spare parts
   - foreign
   - local
2. Lubricants
   - foreign
   - local
3. Power
4. Fuel
   - foreign
   - local
5. Water
6. Miscellaneous supplies

(d) Administrative costs

(i) Legal costs

(ii) Auditing

(iii) Taxes

(iv) Insurance

(v) Contingencies

(e) Financial (Capital) Costs

Interest on loans

(f) Sales costs

(i) Commissions, royalties and salaries

(ii) advertising

(iii) transportation of finished goods

(g) Foreign Exchange

- from exports

- to imports

(D) EMPLOYMENT

(i) Number of employees

- skilled and semi-skilled

- unskilled

- foreign

- local

(ii) Wages and salaries

- skilled and semi-skilled

- unskilled

- foreign

- local

(E) (Gross Commercial Profit)

(A minus C)

(F) FOREIGN EXCHANGE SAVING

(i) Net of capital cost

(ii) Net of production cost

(iii) Net of exports minus imports

(G) TIME DIMENSION

(i) The gestation period (number of years)

(ii) The useful life of the project (number of years)

9.2 SHADOW PRICES OF THE PRINCIPAL RESOURCES

The implications of investment decisions on social versus private cost-benefit and the theoretical reasoning of using the shadow prices in guiding investment decisions on a project level has been shown in Chapter IV. However, the shadow prices derived from the multi-sectoral programming model may not reflect adequately the "real" prices since many economic functions of the model were approximated or affected by social and political preferences, and since there are many alternatives, no set of shadow prices can be relied upon. Alternatively in the process of project appraisal an approximated set of shadow prices of the principal resources are derived as follows in order to adjust their market prices so as to consider their scarcity from social "national" point of view.

(i) Foreign Exchange. The shadow price of foreign exchange is obtained by dividing the official value of the Iraqi Dinar in Beirut (1 ID = 840 LL) by the free market value of the Iraqi Dinar in Beirut (1 ID = 730 LL).(321) That is to say that imports of capital or consumer goods, rate of interest on foreign loans, and foreign personnel earnings are to be adjusted by 1.152.

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(321) This treatment is similar to that suggested by the United Nations experts working in Iraq. See U.N.S.F. [138]

(ii) Capital. The official rate of interest in Iraq does not reflect the true cost of capital. A more realistic rate is that charged in the "unofficial" market. In fact there is no mechanism to regulate the money market and the rate of interest is fixed administratively since the Government fixes the rate (discount) at which it lends to the banks, all of which are nationalised. Therefore, the official rate of interest should be adjusted by 2.4, which is the ratio of the "unofficial" market to the offical rate of interest.(322)

(iii) Power and Fuel. The prices of power and fuel are fixed by the Government at a higher level than the cost. The difference is equivalent to an excise tax which is estimated by 20% of the market prices of power and 30% of fuel.(323)

(iv) Labour. In theory because there is widespread unemployment the shadow prices of labour should be zero. However, it is practically impossible to ignore the effects of social and political factors as reflected by the Government decisions to fix the minimum level of wages of labour. Hence the adjustable factor of market wages of both skilled and semi-skilled is assumed to be 1.0, whereas the shadow prices of unskilled labour is assumed to be .70 of their market wages.

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(322) The average official rate of interest during 1969 is about 5% and the average "unofficial" market rate is estimated at about 12%. The latter is derived by direct contact with some private Iraqi industrialists.

(323) U.N./S.F. Demeter, J. [138]

9.3 CALCULATION OF SOCIAL ECONOMIC BENEFIT OF THE PROPOSED PROJECTS

9.3.1. The concept of present worth value

In dealing with the project's appraisal the time factor has to be considered so as to standardise the costs and returns with respect to the lifetime of different projects. This requires to reduce all annual values to the equivalent of only one value made at the "present" time of investment. The general formula for obtaining the present worth value of investment may be derived as follows: Assuming that total "initial" investment is equal to I, API is annual payments placed for n years (useful lifetime of the project) at a compound rate of interest r capitalised at the end of each year, and C is total cost over the n years from the present data. Then we have.

$$C = I\ (1 + r)^n \qquad \ldots \text{(VIII-1)}^*$$

and

$$C = API\ \frac{(1 + r)^n - 1}{r} \qquad \ldots \text{(VIII-2)}^{**}$$

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* At the end of the first year capital (investment) I becomes (I + Ir) or I(1 + r). In the second year I becomes I(1 + r) × I(1 + r) = $I(1 + r)^2$. Thus at the end of year n the present value of investment (total cost) C becomes equal to $I(1 + r)^n$.

** At the end of the first year the API will earn interest during (n - 1) years and according to formula (1) total investment (cost) becomes $API(1 + r)^{n-1}$ and payment made at the second year will be $API(1 + r)^{n-2}$.

$$C = (API\ (1 + r)^{n-1} + API\ (1 + r)^{n-2} + \ldots + API\ (1 + r) + API)$$

or $$C = API\ (1 + (1 + r) + (1 + r)^2 + \ldots + (1 + r)^{n-1})$$

The parenthesis is a geometric progress whose sum equals

$$\frac{(1 + r)^n - 1}{r} \quad \text{i.e.} \quad C = API\ \frac{(1 + r)^n - 1}{r}$$

or

$$API = \frac{C\ r}{(1 + r)^n - 1} \qquad \ldots \text{(VIII-3)}$$

Substituting C of formula (VIII-3) by its equivalent in (VIII-1), then

$$API = \frac{I\ r(1 + r)^n}{(1 + r)^n - 1} \qquad \ldots \text{(VIII-4)}$$

Formulae (VIII-1) and (VIII-4) are used in the following Section.

9.3.2. A Standard Formula for Evaluating Social Economic Benefit of the Plan's Projects .

In principle the priorities of development projects have to be assessed on the bases of their contribution to the overall targets of development planning. This implies that projects which contribute more to national income, employment and to the surplus of balance of payments have first priority among other possible alternatives. The evaluation process thus requires the estimation of the annual average increment in national income, the net effect on the balance of payments and total cost of production factors with full consideration of the "social" cost of the principal production factors.

Assuming that:

P is the increase in annual production originated by the project at market prices, after excluding tariffs, taxes and subsidies;

E is the increase in annual production due to external economies at market prices;

M is the cost of imported annual materials valued at the national currency;

m is the shadow prices of foreign exchange, i.e. an adjustments parameter reflects the over or under valuation of the exchange rate;

C is the present worth value of capital increment (investment) at shadow prices;

L is the cost of domestic, skilled and semi-skilled, labour at market prices;

UL is the cost of domestic unskilled labour at market prices;

u the shadow price of unskilled labour;

D is the cost of domestic materials (except power and fuel) at market prices;

pR is the cost of domestic power valued at shadow prices;

fF is the cost of domestic fuel valued at shadow prices;

FC is fixed cost including administration cost and depreciation at market prices;

a combine rate of amortization and interest on foreign loans;

BD effects of the project's installation cost on the balance of payments valued at the national currency;

Bs effects of the project's operation upon the balance of payments valued at the national currency;

then the priority social economic criterion can be derived as follows.

$$\frac{P + E - mM}{C} - \frac{L + uUL + D + pR + fF + FC}{C} - \frac{m(aBD - Bs)}{C} \quad . . \quad (VIII-5)$$

Now if we assume the rate of interest on domestic capital is r_1 and on

foreign loans is r_2 and the useful lifetime of the project under evaluation is n then formula (VIII-5) can be explicitly written as follows.

$$\frac{P + E - mM}{I(1 + r_1)^n} - \frac{L + uUL + D + pR + fF + FC}{I(1 + r_1)^n} - \frac{\frac{m(r_2\ (1 + r_2)^n + BD - BS}{(1 + r_2)^n - 1}}{I(1 + r_1)^n} \quad \ldots \text{(VIII-6)}$$

where,

I is the initial value of investment.

From a social "national" point of view formula (VIII-6) approximates the net contribution of investment (capital) per unit at present worth value to the national economy plus the balance of payments.

9.4 CASE STUDIES

In this Section an attempt is made to utilise the general propositions advocated earlier for project appraisal. Four government projects in the manufacturing industries sector are selected in view of the availability of data as well as the purpose it serves in illustrating, in practice, the project versus sectoral and overall analysis. Some aspects of the Iraqi experience are also briefly outlined.

The technical information used is that derived by the Department of Industry in the Ministry of Planning[324] and the reports of the United Nations Special Fund experts.[325] These data however are based on the unpublished reports of independent "foreign" consultants. The reliability of these data has to be taken for granted as there is no other way of getting them. The classification of this information is being considered within the proposition given in Section 1 of this Chapter.

9.4.1. Present Experience of the Project's Appraisal

An examination of a large selection of proposed projects in the manufacturing industries sector shows that the government investment decisions at projects level are far less than efficient. The choice among alternatives, if there are any, is very limited and there exists no uniform economic criteria to be judged on. The logical result of such an undesirable state is clearly a waste of the available resources and in turn a restraint of the pace of development. To support this statement the following examples may be cited. In the Economic Five Year Plan (1964-69) investment decisions were taken to construct certain industrial projects. Some of these projects such as the Electrical Bulb Factory were completely abandoned despite the fact that investment funds were

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(324) (i) Ministry of Planning, Department of Industry, "National Development Plan - Final Results of the Proposed Projects of Industrial Sector". Memo No. 40, dated at 11/2/70.
(ii) Ministry of Planning, Department of Industry.

(325) (i) U.N./S.F. - Demeter, J. "Electric Bulb Factory", Inter-office memo No. Ind. o, dated at 25/10/66.
(ii) U.N./S.F. - Demeter, J. "Industrial Project Evaluation - Production Cost Sheet - Economic and Social (shadow prices) Accounting", Inter-office memo No. Ind. 4, dated at 25/5/66.

allocated for their execution over the five year period of the plan. In some other cases such as the extension of Mosul Sugar Factory, the implementation was postponed for the next National Development Plan (1969-74). In other cases the gestation period was under-estimated. Planning inefficiency at this level can also be shown by mentioning some particular cases such as the Iron and Steel Factory and Petro-Chemical projects which have been under extensive studies for the last ten years and no decision has yet been made to either accept or to reject them. A close investigation reveals a general feature characterising the investment decisions; they were changeable and as a result the cost of projects rose. The only justification given by the planner in this respect is the change of the technical structure or under-estimation of prices of imported capital goods.

With particular reference to the National Development Plan (1969-74) the investigation revealed that for a large number of projects the planner had no choice but to include them. The Fine Textile Factory at Hindiya, for example, was initiated in 1961 on the 20th April, and until the 31st March, 1969, total expenditure on its construction was 7.55 million ID, i.e. about 60% of total cost which is re-estimated at 12.6 million ID. Another similar example is the Paper and Pulp Factory in Basrah, which was due to start production early in 1969 and is now delayed to 1972-73, while only 35% of the adjusted cost of 18 million ID (it was 16.5 million ID, as proposed in the Five Year Plan, 1964-69) is spent.

Leaving aside the problems associated with the administration of the project's execution, the main and serious shortcoming of planning at this level is the absence of certain economic criteria to provide the bases for project appraisal and link in a consistent way the investment decisions with the sectoral and overall targets of the plan. In proposing and implementing all projects of the plan the only justification given is that these projects will contribute to the development of the economy by its output, wages and profit. Although the "department" concerned present the projects with one or more of the following priority criteria; annual profit, profit/capital ratio, capital/annual value added (wages and profit) and foreign exchange saving, many of these projects were not profitable. The analysis of some projects shows that neither the "commercial" cost-benefit nor the "social" economic criteria were passed. The link between project, sectoral and overall analysis is not quantitatively assessed.(326) In this respect it seems that the only factor considered is that total investment allocated to the sector should not be exceeded,(327) This leads in many cases to inefficient investment decisions and contributes to the existing bottlenecks of planning in Iraq.

9.4.2 Case Study No. 1 - Electric Bulb Factory

This project was enlisted in the Economic Five Year Plan (1964-69) at a total cost of 1.3 million ID. In late 1966 the United Nations experts recommended the implementation of the project at a cost of 1.6 million ID, i.e. 300 thousand more than the initial cost estimation,

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(326) In fact even total sectoral investment is practically estimated by considering total costs of the proposed projects in the sector.

(327) An attempt was made in the manufacturing industries sector by the U.N./S.F. experts to link these criteria to the sectoral objectives of the plan. See U.N./S.F. [138]. However, the planner did not take these suggestions into consideration.

on the basis that the project has "a favourable social economic benefit to the country indicated by the 16% earning return on investment (profit/total investment) obtained when costs are adjusted by social economic shadow prices factors", and for its contribution to the objectives of the plan by "adding to the national income, providing employment and in the saving of foreign exchange".(328) The project has not been executed and has been abandoned for the time-being. Surprisingly, although the project was excluded from the list of industrial projects to be executed for the 1969-74 plan, it was recommended for implementation in the next plan, 1975-80. In fact it is initially decided to implement the project during the period of the next plan at a cost of more than 4.0 million ID, and to be financed by the new Hungary-Iraq economic agreement. As compared with some plan projects, the Electric Bulb Factory is, as we shall see later, more economical and has the priority. This is an example reflecting the "inefficiency" of investment decisions which contribute in the final analysis to the tardiness in the execution of the projects of the plan, to raising the cost(329) as well as holding up the realisation of the plan's targets.

The following summary of information and analysis of data has been prepared from the given detailed data by the United Nations experts.(330)

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(328) U.N./S.F. [135] p. 7.

(329) In the case of the Electric Bulb Factory the United Nations experts of the Special Fund projects have pointed out that the prices of imported equipment are increasing in the foreign markets at a rate of 10 to 12% per annum. U.N./S.F. [135] p. 7.

(330) See U.N./S.F. - Demeter, J.[135]

	ITEM	VALUE 1,000 ID
I	PRODUCTION COST	910.000
	(i) direct material	183.000
	- foreign	125.345
	- local	57.655
	(ii) direct labour	211.160
	- skilled	200.000
	- unskilled	11.160
	(iii) manufacturing overheads	
	(a) indirect labour	119.180
	- managers, professionals, supervisors and maintenance (skilled)	102.700
	-- social services, clerks and drivers (skilled)	11.800
	-- guards and Farashes (porters) (unskilled)	4.680
	-- foreign	66.000
	- local	53.180
	(b) depreciation	133.500
	(c) supplies	144.960
	-- foreign equipment parts	35.957
	-- local " "	33.388
	- power	54.215
	- fuel	14.000
	- others	7.400
	(iv) total administration cost	58.200
	(v) total sales costs	60.000

II	ANNUAL PRODUCTION VALUE	
	at market (wholesale) prices	1,524.000
III	CAPITAL INVESTMENT	1,600.000
	(a) land and building	210.000
	(b) equipment	1,230.000
	(c) fixed capital (a + b)	1,440.000
	(d) working capital	160.000
	(e) foreign component of total investment	1,099.015
	(f) local component of total investment	500.985
IV	FOREIGN EXCHANGE SAVING	
	- from import substitution	651.823
V	TOTAL NUMBER OF LOCAL EMPLOYEES	495
VI	ANNUAL AVERAGE OF IMPORTS REQUIRED FOR CONSTRUCTION AND OPERATION OVER THE FIVE YEARS OF THE PLAN	359.924
VII	EQUIVALENT ANNUAL COST OF FIXED INVESTMENT	
	- at 5% rate of interest	212.640
	- at 12% rate of interest	254.851

VIII INVESTMENT CRITERIA

(a) Social economic criterion

As explained in Section 9.3 formula (VIII-6) approximate the "social" economic value of the plan's projects. By utilising this formula the priority weight of the Electric Bulb Factory is estimated at .246.

(b) Benefit-Cost Criteria

(i) Social Cost-Benefit Criterion

A social criterion of benefits-costs is derived by dividing the value of annual production by total equivalent annual cost. Total equivalent annual cost is the sum of annual production cost plus

equivalent annual cost of the fixed investment. The latter is derived by utilising formula (VIII-4) at the shadow prices of capital-investment and foreign exchange of the imported material of production for the useful life of the project (10 years). This is estimated at 1.308.

(ii) Commercial Cost-Benefit Criterion

The "commercial" benefits-costs is derived similarly to the "social" benefits-costs criterion except that the market price of capital (5% rate of interest) and the official rate of exchange are used instead of the shadow prices of capital and foreign exchange. This is estimated at 1.358.

9.4.3 CASE STUDY 2: Expansion of Mosul Sugar Factory

This project was enlisted in the Five Year Plan at a total cost of 2.5 million ID. The annual allocation of investment over the plan's period was as follows.

YEAR					
1965-66	1966-67	1967-68	1968-69	1969-70	Total Allocation in the Plan
Value (million ID)					
50	50	300	750	950	2100

The project was due to finish early in 1970, but up to the 31st March, 1969, total expenditures were accounted at only 270 thousand ID. The same project was enlisted in the National Development Plan (1969-74) at a double cost of 5 million ID. Although this rise in cost may be due to changes in the structure and capacity of the project, undoubtedly such changes reflect the "inefficiency" of investment decisions leading to the wastage of resources and efforts. Project execution is assumed for the 13th May, 1969, and the operation starts in late 1972. The annual allocation of investments is as follows.

YEAR			
1970-71	1971-72	1972-73	Total
Value (million ID)			
2700	1000	500	4.200

The economic criteria upon which the project is selected with its annual profit estimated at 1.5 million ID and the foreign exchange saving estimated at 760 thousand ID. Commercially, the project passed the cost-benefit criteria, but if compared to other projects such as the Electrical Bulb Factory, it may not be attractive. From the social economic point of view the project is not as attractive as the Electrical Bulb Project, (see Table No. 14).

9.4.4. CASE STUDY 3: Sugar Factory at Sulaimaniya

Although this project was enlisted in the Economic Five Year Plan 1964-69, and 1 million ID were allocated for its execution as part of its cost of 3 million ID, only 40 thousand ID were spent as the cost of studies. In fact the final technical and economic study was finished in April 1969, and it was decided to include the project in the 1969-74 Plan at a cost of 6 million ID (at twice the initial cost) distributed over the period of the Plan as follows.

YEAR					
1970-71	1971-72	1972-73	1973-74	1974-75	Total
Value (million ID)					
1.500	2.000	1.500	.900	-	5.900

However, until early 1970, no decision was taken for the initial date of execution and thus the date at which the project starts to operate cannot be fixed.

The criteria used by the planner to evaluate the project economically wer as follows. Total commercial profit was estimated at 450-490 thousand ID in addition to 300 thousand ID to be paid as production taxes; the profit/capital ratio was estimated at 7%; profit/total sales were estimated at 12.5% Employment was estimated at about 400-600 during the execution of the project and 400 during the operation. No relative assessment of these criteria compared to other projects was considered.

Compared to the other three projects, this project does not seem attractive at all, and should be ranked at the bottom of the priority list. (See Table No. 14.)

9.4.5. CASE STUDY 4: Wool Textile in Nassiriya

This is a new project included in the National Development Plan 1969-74, at a cost of 5.250 million ID to meet 27% of the domestic demand for wool products. The project was selected on the basis of its commercial profitability which is estimated as follows.

1st, 2nd & 3rd Year of Operation	4th Year of Operation	5th & subsequent Years of Operation
57,000 ID (loss)	100,000 ID profit	175,000 ID profit

The other criteria for which the project was selected was its saving of foreign exchange, about 350 thousand ID annually and the employment rise which was 1,020. No data for the execution and operation of the project were given.

9.5 PROJECT VERSUS SECTORAL AND OVERALL ANALYSIS

Assuming that all necessary information about the projects, the sectoral magnitudes of output, total investment, consumption, imports and exports are given, then the ration or the link between project, sectoral and overall analysis can be stated as it is suggested in Chapter V.

Denoting Pro_{15} is the Expansion of Mosul Sugar Factory, where 1 refers to the numerical order of projects, 5 to the manufacturing industries sector. Similarly Pro_{25} and Pro_{35} are the Sugar Factory at Sulaimaniya and the Wool Textile in Nassiriya. Then the sectoral model would be:

to maximise $.066\ Pro_{15} + .002\ Pro_{25} + .024\ Pro_{35} + \ldots + Pro_{n5}$

subject to

$$5225\ Pro_{15} + 3770\ Pro_{25} + 3000\ Pro_{35} + \ldots + \alpha\ Pro_{n5} \geqslant \text{Total sectoral output}$$

$$1772\ Pro_{15} + 1212\ Pro_{25} + 605\ Pro_{35} + \ldots + \alpha Pro_{n5} \leqslant \text{Total sectoral imports}$$

$$300\ Pro_{15} + 400\ Pro_{25} + 1020\ Pro_{35} + \ldots + Pro_{n5} \geqslant \text{Total sectoral employment}$$

By solving the model, the projects of the plan can be selected and accordingly the parameters of the multi-sectoral model are to be adjusted, i.e. the feedback of these projects are to be taken into consideration. The multi-sectoral model has then to be solved again, and if values of the sectoral output, employment, investment, imports and exports are different then the constant values of the above sectoral model have to be changed and the model should be solved again until no new project is added to the list of the plan's manufacturing industries projects.

Table No. 14

Summary of Project Analysis - Firm Case Studies

	PROJECTS OF NATIONAL DEVELOPMENT PLAN			
	CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
Capital Cost	1600.000	5000.000	6000.000	4000.000
(i) land & building	210.000	1200.000	2200.000	1500.000
(ii) equipments	1230.000	3600.000	3550.000	2400.000
(iii) others	-	200.000	250.000	100.000
(iv) working capital	160.000			
- foreign	1099.015	3500.000	4000.000	3250.000
- local	500.985	1500.000	2000.000	750.000
Production Value at market wholesale price	1524.000	5225.000	3770.000	3000.000
Production Cost	910.000	4170.000	3470.000	2445.000
(i) depreciation	133.500	340.000	370.000	245.000
(ii) materials	465.975	3710.000	2940.000	1800.000
- foreign	191.345	2550.000	2060.000	1300.000
- local	274.630	160.000	880.000	500.000
(iii) wages	310.525	120.000	160.000	400.000
Foreign Exchange Saving	651.823	760.000	548.72	350
Total number of employees	495	300	400	1020
Annual average of imports during the plan's period	360	1722	1212	605
Social Economic Criteria	.246	.066	.002	.024
Equivalent annual cost of capital investment accounted at 12% rate of interest	254.851	884.900	1061.88	707.92
Equivalent annual cost of capital investment accounted at 5% rate of interest	212.640	664.500	797.400	531.600
'Social' Cost-Benefit criterion (12% rate of interest)	1.308	1.034	.832	.905
'Commercial' Cost-Benefit criterion (5% rate of interest)	1.358	1.081	.883	1.009

CHAPTER X STATISTICAL SOURCES - METHODS OF ESTIMATIONS AND PROJECTIONS

In Iraq detailed statistical data ready for the application of mathematical planning models are lacking. This is not unusual as an aspect in an underdeveloped country. However, this deficiency does not hinder the efforts made to construct a multi-sectoral model, to estimate the parameters and to project the values of the variables required for economic analysis. In fact the application of a formal and comprehensive planning model - although a time-consuming task - provided a good opportunity to point out the statistical gaps and thus indicate their necessity in national economic planning.

This Chapter is devoted to outlining the operational arrangements in order to prepare the statistical data in a suitable form for the purposes of the study.

10.1 INTER-INDUSTRY FLOWS OF THE IRAQI ECONOMY

10.1.1. Characteristics of the Available Input-Output Tables

In the first attempt to construct an overall input-output table for the Iraqi economy [80] , the production activities were classified into 20 producing sectors, i.e. the technology input-output matrix was of the order 20 by 20. The level of disaggregation was limited because of practical difficulties.(331) The economic activities were classified

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(331) Kanaan, T. H. [80] p. 152.

according to ISIC, except for minor modifications.(332) On the basis of this pioneering study, a more elaborate and comprehensive work was undertaken at the Ministry of Planning [81] to construct input-output and social accounts of Iraq for the years 1960-63. The inter-industry system was classified into 32 production sectors. The ISIC was also followed. Fundamentally, the operational arrangements were the same as the first study except for the extension of the number of sectors. The examination of this study shows an unrealistic phenomenon which does not exist in the economy. The inter-industry technology matrices of this study show a large range of technical improvements, particularly during the period 1962-63, which can be related to either one or both of two reasons, that is either there was an improvement in production technology (completely new or an improvement to the existing technology), or there existed an idle capacity in 1962. In the light of the economic situation during that period (where there was a deterioration in the overall growth of the national product) such results reveal to a certain extent the degree of inaccuracy of the statistical work and data. At this moment a serious attempt is being made to establish a social accounting matrix for the year 1966 . The production side of this study is being

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(332) For example (i) due to the importance of crude oil in the Iraqi economy, this sector is treated as a separate sector of the economy, thus differing from the ISIC mining and quarrying major groups;
(ii) carpentry activities regarded as a separate sector, i.e. it was not considered as a part of construction activities. See Kanaan, T. H. [80] pp. 154-155

considered on the basis of the production transactions for 1962,[333] except for two variations:-

(i) the economy was classified into 47 production sectors; and

(ii) more fundamentally, measures are being taken to consider the development of some new industries.[334]

Important modifications and adjustments of the 1966 input-output coefficients matrix are introduced in order to reflect the inter-industry activities expected to be in operation during the period 1969-74 . This study was based on the following.

(i) the structural change of inputs of some sectors and the change of prices between 1966 and 1969;

(ii) some of the economic activities are expected to start production either in 1969 or during the period 1970-74.[335]

The adjusted coefficients are related mainly to the following activities; paper industry, mechanical machinery industries, sulphur, manufacturing of natural gas, synthetic fibres, pharmaceuticals and fertilisers.[336] All these adjustments were based entirely on engineering data.[337] However, this is a necessary forward step to achieve a more adequate representation of the existing technological relations of the economy. With suitable arrangements - to be discussed in Section 3 - the adjusted technology matrix is then used to reflect

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(333) Kanaan, T. H. [81]

(334) Shair, K.[115]pp. 2-5

(335) Shair, K.[115]pp. 13-18

(336) Shair, K.[115]p. 14

(337) These data are derived from consulting engineering reports and unpublished technical information available at the Ministry of Planning.

the inter-industry transactions of the Iraqi economy during the period 1969-74.

10.1.2. The Technology Input-Output Matrix for 1969-74

Following our classification of the Iraqi sectors (see Chapter VIII Section 1), the adjusted input-output coefficients matrix (see Section 1) has to be aggregated accordingly, i.e. the original matrix of order 47 by 47 (see Table No.45) is to be reduced to a matrix of order 13 by 13. The arrangements of aggregation are being carried on in view of two main considerations.

(a) The aggregation should be considered within the ISIC. This is a straightforward step, as is shown in the following table;

No. of the Sector	Original Classification	ISIC Code			Our Classification
		Major Group	Division	No. of the Sector	
1.	Field crops	01	0	1	Agriculture
2.	Vegetables	01	0	1	"
3.	Fruits	01	0	1	"
4.	Forestry	02	0	1	"
5.	Animal Products	01	0	1	"
6.	Fishing	04	0	1	"
7.	Crude oil	13	1	2	Crude oil
8.	Natural gas	13	1	3	Mining & quarrying
9.	Sulphur	19	1	3	"
10.	Other mining	19	1	3	"
11.	Grain milling	20	2	5	Manufacturing industries

TABLE NO. 14 (continued)

12.	Cotton growing	01	0	1	Agriculture
13.	Food processing	20	2	5	Manufacturing industries
14.	Drinks	21	2	5	"
15.	Tobacco	22	2	5	"
16.	Synthetic Fibres	30	3	5	"
17.	Textiles	23	2	5	"
18.	Jute	23	2	5	"
19.	Clothing	24	2	5	"
20.	Footwear	24	2	5	"
21.	Leather	29	2	5	"
22.	Woodwork	25	2	5	"
23.	Furniture	26	2	5	"
24.	Packing	27	2	5	"
25.	Paper	27	2	5	"
26.	Printing	27	2	5	"
27.	Vegetable oil	31	3	5	"
28.	Oil refining	32	3	4	Oil refining
29.	Fertilisers	31	3	5	Manufacturing industries
30.	Pharmaceuticals	31	3	5	"
31.	Other chemicals	31	3	5	"
32.	Non-metallic	33	3	5	"
33.	Metallic	33	3	5	"
34.	Mechanical machinery	36	3	5	"
35.	Electrical equipment	38	3	5	"
36.	Transport equipment	38	3	5	"

TABLE NO. 14 (continued)

37.	Industries n.e.s.	39	3	5	"
38.	Electricity, gas & water	51 & 52	5	6	Electricity, gas & water
39.	Banking & insurance	61 & 63	6	7	Banking & insurance
40.	Trade	61	6	8	Trade
41.	Transport	71, 72, 73	7	9	Transport
42.	Construction	4	4	10	Construction
43.	Education	82	8	13	Services
44.	Health	82	8	13	"
45.	Other services	81, 83, 84	8	13	"
46.	Dwelling	9	9	11	Dwelling
47.	Public administration	81, 83, 84	8	12	Public administration

(b) Since there is no actual data of the inter-industry transactions for 1969, but only the adjusted input-output coefficients, it becomes necessary to derive first the inter-industry flows on the assumption that final demand vector is given exogenously. Then we have derived the technology matrix of the order 13 by 13 for the years 1969-74.

Such steps required the following mathematical operations:-

(i) total output of each sector at 1969 is derived by utilising the following basic input-output relationships;

$$\underline{x} = (I - A)^{-1} \underline{f}$$

where,

$\underline{X}$ is a vector of output of the 47 production sectors;

$\underline{f}$ is a vector of total final demand of 47 elements;

A is an adjusted technology matrix of order 47 by 47;

I is a unity matrix of the order 47 by 47.

(ii) After deriving the values of the elements of the output vector (step (i)), we then derive the actual inter-industry flows as follows.

$$x_{ij} = a_{ij} X_j \qquad i, j = 1,2,\ldots,47$$

(iii) The x_{ij} matrix of 47 by 47 sector is being aggregated into a matrix of 13 by 13 sectors. This step is performed with full consideration to the above condition (ii).

(vi) From the aggregated inter-industry flows of the matrix of the order 13 by 13 sectors, we derived the aggregated technology matrix following the basic input-output technical relations, i.e.

$$a_{ij} = \frac{x_{ij}}{X_j} \qquad i, j = 1,2,\ldots,13$$

Two computer programmes are being constructed to perform the above step (i) (computer programme No. 1), and for the other three steps, (ii), (iii), (iv) (computer programme No. 2.).

TABLE NO. 15

THE AGGREGATED INPUT-OUTPUT MATRIX OF THE IRAQI ECONOMY (1969-74)

SECTOR	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Agriculture	.07974	-	-	-	.157040	-	-	-	.01190	-	-	-	.00002
2 Crude oil	-	.00380	-	.03830	-	-	-	-	-	-	-	-	-
3 Mining & quarrying	-	-	-	.00100	.00545	-	-	.07500	-	.06400	-	-	-
4 Petroleum products	.03836	-	.05219	.00810	.01906	.00390	.01180	-	.00820	.00630	-	-	.06863
5 Manufacturing industries	.00254	.00850	.00537	.02240	.34504	.07400	.00040	.045306	.11020	.37680	-	-	.04078
6 Electricity, gas & water	.00002	-	.00434	.00010	.00581	.02600	.00170	.00740	.00670	.00030	.06530	-	.00776
7 Banking & insurance	-	.00160	-	.00020	.00129	-	-	.04110	-	.00230	-	-	.00460
8 Wholsale & retail trade	.00893	.00450	-	.16500	.05499	.00350	-	-	-	.05530	-	-	.00110
9 Transportation	.00424	.00460	.00373	.01750	.02042	.00350	-	.12100	[illegible]	.05530	-	-	.00743
10 Construction	-	-	-	.00100	.00067	-	-	-	.03400	-	.20000	-	.01237
11 Ownership of dwelling	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Public administration	-	-	-	-	-	-	-	-	-	-	-	-	-
13 Services	-	-	-	-	-	-	-	-	-	-	-	-	.06446

.13383 .1827c .07670 0 1.213 .07759

135/-

10.2 PROJECTION OF THE SECTORAL FINAL DEMAND FOR THE BASIC YEAR 1969

Final demand consists of private consumption, government consumption, capital formation, net balance of foreign trade and net change of stock. The value of the net change of stock is assumed to be nil, both at the base year and at the target year. This assumption is based on the fact that in Iraq a substantial level of stocks come from the agricultural sector, and thus it depends upon the fluctuations of its production level. From historical observations it is reasonable to assume that the years of the plan's period are average years. That is the algebraic sum of the accumulated stocks at good years and depleted stocks at bad years, is zero. Such an assumption is supported by the fact that these values are of no importance because of the insignificance of the amount.(338) The disaggregation of the other values of the final demand categories are based on different assumptions and with the aggregation framework of the national accounts of the C.S.O. (see Table No.4). A complete set of the results is shown in Table No.18

10.2.1. Gross Fixed Domestic Capital Formation

The current production in any society is usually distributed between:-

(i) satisfying the society's needs and its immediate consumption;

(ii) making capital goods which include tools and instruments, machines and different types of production equipment.

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(338) See Kanaan, T. H. [81]

The latter represents capital formation. The concept "gross fixed capital formation" includes expenditure on the replacement of, addition to, and improvements to fixed capital assets in different sectors of the economy. Gross fixed capital formation represents the investment of the society in different economic activities.

(a) The Investment Coefficient Matrix

The available figures of the GDFCF for the year 1969 are classifed by the following types of assets (see also Table No.):- which one?

(i) residential building;

(ii) non-residential building;

(iii) other construction and works;

(iv) machinery and other equipments;

(v) furniture and fixtures;

(vi) transport equipment.

These classifications have to be converted accordingly for the purposes of constructing the sectoral-investment matrix for 1969, i.e. to reclassify the given data of capital formation (investment) by destination into investment by origin for the purposes of constructing the investment-output matrix. This has been done on the bases of the following assumption:-

(i) the available figures of 1969 are used as a basis upon which the calculations are carried out;

(ii) the given global figures of the GFCF, as classified by types of assets are disaggregated on a sectoral level;(339)

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(339) This step was done by a direct investigation into the sources of the original data during my research fieldwork in the summer of 1970.

(iii) for each sector it is assumed that residential and non-residential building, other constructions and works, originate from the construction sector, whereas all machinery and equipment, furniture, fixtures and transport equipment are assumed to be from the manufacturing industries sector in origin:

(iv) afterwards the investment coefficients matrix is derived by dividing the value of capital goods originated from each sector (i - manufacturing industries and construction) and currently used by each sector (j - all sectors of the economy except for crude oil extraction) by total investment allocated to sector j.

TABLE NO. 16

THE INVESTMENT COEFFICIENT MATRIX

to sector / from sector	i_1	i_2	i_3	i_4	i_5	i_6	i_7	i_8	i_9	i_{10}	i_{11}	i_{12}	i_{13}
i_5	.4437	-	-	-	.5840	.3915	.1617	.4780	.2891	.8897	-	.0835	.3039
i_{10}	.5563	-	-	-	.4160	.6085	.8383	.5220	.7109	.1103	1.0	.9165	.6961

*Note that investment and output of crude oil sector are exogenous variables. Thus no coefficients for this sector are derived.

(b) The Sectoral ICOR Matrix

The sectoral ICOR matrix is derived by multiplying the investment matrix (say H) by the vector of sectoral ICOR (say k),

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i.e. $K = H\underline{k}$

clearly,

$$\sum_{j} h_{ji} = k'_i \qquad \begin{matrix} i = 1,3,\ldots,n \\ i \neq 2 \end{matrix}$$

where K is the sectoral ICOR matrix.

TABLE NO.17

THE SECTORAL ICOR MATRIX

Sector	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}
x_5	.567	-	-	-	2.5135	1.229	.0514	.3810	3.0798	1.2224	-	.1516	.1343
x_{10}	.711	-	-	-	1.7905	1.910	.2666	.4160	7.5732	.1516	19.519	1.6634	.3077

(c) Complementary imports and indirect taxes of investment

The value of complementary imports of capital goods are those estimated by Shair [340] for 1969. It was estimated at 34.665% of total value of gross investment. Indirect taxes are also taken from Shair's estimations. [341] It was estimated at about 3.6% of total gross investment. These ratios are assumed to be constant over the period 1969-74.

(340) See Shair, K.[115] p. 17.

(341) Ibid.

10.2.2 Imports

To utilise the features of our model, imports are classified into competitive and complementary imports. In the case of Iraq complementary imports are generally made up of capital goods, such as cars, machinery and equipment, durable consumer goods, such as refrigerators and washing machines, raw materials, such as chemical products, and consumer goods such as tea, coffee and pharmaceutical products. Complementary imports are required to satisfy both the intermediate demand and part of the final demand, i.e. part of private consumption, government consumption, and investment. Competitive imports are defined as those types of goods and services which can be substituted by increasing the output level of the existing production units.(342)

Detailed figures of the imported goods are given by the C.S.O. foreign trade statistics for the year 1968. An overall figure only is available for the year 1969 (see Table No. 2). This necessitates the following steps. Firstly, break down the overall figure of total imports into competitive and complementary imports. Secondly, disaggregate the value of the competitive imports into the different sectors of the economy, on the assumption that the pattern of the imported goods in 1969 is not different from that of 1968. These steps are performed because there is no other alternative. Accordingly the total value of complementary imports is estimated at 130.20 million ID. This value is distributed between capital formation (see Section 2.1), private consumption (see Section 2.4), intermediate demand (see Section 1.2), and on government consumption as a residual between total value of imports and total value of the allocated first three items.

(342) For example, fruit, vegetables, shoes, printed matter and carpets.

On the basis of the pattern of contribution of each type of the imported goods at 1968, the value of competitive imports (total imports minus complementary imports) is being disaggregated into the 13 sectors of the economy.

(a) . Complementary Imports for Intermediate Demand

The following aggregated coefficients are derived for the year 1966 from the input-output table of 1966

crude oil sector = a_{m2} = .00348

Manufacturing industries sector = a_{m5} = .07163

Construction sector = a_{m10} = .09995

The aggregated coefficient for the manufacturing industries sector (a_{m5}) is derived as follows.

(i) The coefficient for each sub-sector (included in the manufacturing industries) is derived by dividing the values of complementary imports in 1966 by the corresponding values of output in 1966 as given by Shair's study.

(ii) These coefficients are then multiplied by corresponding output values of 1969

(iii) Complementary imports as well as the corresponding values of output for 1969 are disaggregated in accordance with our classification, then this ratio is derived.

The above coefficients are then used to derive the absolute values of complementary imports for 1969 using the corresponding values of output for 1969 as given by C.S.O.

Complementary imports used in sector 2 = .00348 x 381.501 = 1.328

" " " " " 5 = .07163 x 210.402 = 15.07

" " " " " 10 = .0995 x 87.904 = 8.786

TOTAL 25.185

25.181

10.2.3 Exports

As has been shown in Chapter VI , exports mainly consist of crude oil and only a small quantity of foodstuffs and raw materials. Therefore, if we exclude the value of crude oil out of total exports, then the rest is of no significance in terms of value. Thus the possibility of having a certain degree of error from the disaggregation processes, as has been done in the case of imports, is very small indeed. However, as in the case of imports, it is assumed that there is no change in the contributions of different types of exported goods (excluding crude oil) in 1969, compared with those of 1968. The overall figure of total exports is disaggregated into different sectors of the economy accordingly.

10.2.4 Private Consumption

As the elasticities of demand for consumer goods vary between different commodities and according to different income groups, the estimation of private consumption should be theoretically based on such assumptions. In practice the lack of data leads one to consider a different approach for the estimation of private consumption.(343) Recently an attempt has been made to estimate private consumption in different sectors by means of regression analysis of time series, covering the period 1960-66, and in a few cases, the 1956-66 period. For a few elements such as consumption of agricultural products, electricity and water and petroleum products and regression relationships estimated from data of the 1961 family budget survey for the city of Baghdad and its environs were used.(344)

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(343) Kanaan, T. H.[80] & [81] , Shair, K. [115]

(344) U.N. [132] pp. 76--77.

An examination of this study shows very unreliable results.(345) However, against this lack of data, total value of private consumption given by the C.S.O. is disaggregated on the basis of the results obtained by Dr. Shair [115]. This approach is being adopted in order to avoid the inconsistency resulting if we derived private consumption as a residual from the basic supply and demand relation.

10.2.5 Government Consumption

In Iraq, where there is no uniform accounting system of the various government ministeries, agents and enterprises, it is very difficult to derive up-to-date detailed figures of different types of the government expenditure. The ordinary budget which is usually published at the beginning of each financial year does not serve our purpose because of a very different classification that followed as compared to our classification of the sectors of the economy. This difficulty necessitated the utilisation of the detailed figures of 1966. The figures for 1966 are already being classified according to different sectors of the economy.(346) Thus we rely on that pattern of allocation to disaggregate the estimated total value of the government expenditure in 1969.(347) This step is being done with full consideration to the sectors classification problem.(348)

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(345) See Appendix III, relation 27. U.N. [132] pp. 96.

(346) This was being done by Shair, K. [115]. His classification was based on ISIC.

(347) The C.S.O.'s estimation.

(348) In fact except for the government expenditure on national defence and security, the pattern of government expenditure on different sectors is characterised by its stability or steady rate of growth.

TABLE NO. 18

Final Demand by Sectors at the Base Year, 1969

(Values in million ID)

	SECTOR	PRIVATE CON-SUMPTION	GOVERNMENT CON-SUMPTION	INVESTMENT BY DESTIN-ATION	EXPORTS	COMPETITIVE IMPORTS
1.	Agriculture	153.77	.31	17.5	16.12	22.10
2.	Crude oil	-	-	-	378.80	-
3.	Mining & quarrying	.31	-	.5	-	-
4.	Oil refining	5.08	7.86	-	1.21	2.31
5.	Manufacturing industries	157.56	1.55	35.9	11.37	45.18
6.	Electricity, gas and water	11.21	1.47	2.2		-
7.	Banking & insurance	5.13	-	10.8		.78
8.	Trade	37.01	3.35	22.1		7.82
9.	Transport & communication	46.27	3.25	7.3		
10.	Construction	-	-	.7		
11.	Ownership of dwelling	23.18	-	29.9		
12.	Public administration	-	128.76	21.3		
13.	Services	18.58	69.36	10.8		
	Complementary imports	23.825	35.67	45.5*		
	Indirect taxes	29.67	-	4.89*		
	TOTAL	511.6	251.6	159.0	407.5	78.19

* Not to be added to the total value as it is included in the sectoral values of investment.

10.3 PROJECTIONS OF THE EXOGENOUS VARIABLES FOR THE PERIOD 1970-74

The exogenous variables of the model include exports, government consumption, financial resources available for investment, the required level of employment (labour) and total population. For exports, and in particular crude oil exports, it is reasonable to assume that prices in the foreign market during the period 1970-74 will remain constant. Such an assumption is justifiable in view of the fact that crude oil exports (production) are subject to the policy of foreign companies which monopolise not only its production, but also its marketing and even its refining. In addition there exists the entanglement of the internal political situation and its relationship with the oil companies on the one hand and the relationship of the oil companies with other oil producing countries on the other. Exports of sulphur are projected on the basis of two different assumptions.(349) The projections of agriculture and manufacturing industries' exports involves a great deal of personal judgement.

Government consumption is projected on the basis of two different assumptions, thus two possible levels of government consumpgion are possible. The allocation of government consumption among different sectors in 1974 is assumed to be the same as the allocation pattern in the base year, 1969.

10.3.1 Exports Level during the Period 1970-74

(a) Crude Oil Exports

The projection of crude oil exports is based on the same assumptions that have been made for our estimation of the production level of crude oil during the period 1970-74 (see Chapter VIII Section 2.1). In this respect the assumption of stable export prices in foreign markets is to be emphasised. It is also necessary to ascertain that there would be no radical change in the Iraqi government policy towards the oil companies. Local consumption is assumed to increase at about 5%. This approximate rate of growth is based on the expected development of the oil refining industries. Total exports during the period 1970-74 are thus estimated as follows.

Year	Total Production in million ID	Local Consumption in million ID	Total Exports
1970	384.6	2.8	381.8
1971	395.4	2.9	392.5
1972	408.2	3.1	405.1
1973	414.0	3.2	410.8
1974	422.8	3.3	419.5

(b) Non-oil Exports

(i) Sulphur. In Chapter VIII Section 2 we have estimated the level of sulphur production during the period 1971-74. On the basis of those estimations we have projected the exports of sulphur. The local consumption of sulphur is estimated to be only 5,000 tons annually. Therefore, total exports are estimated to be within the following range.

Firstly, the minimum level of .150, 1.375, 4.974, 4.974 million ID in 1971, 1972, 1973 and 1974, respectively. Secondly, at the maximum level of .200, 3.487, 11.015, 11.015, million ID in 1971, 1972, 1973 and 1974, respectively.

(ii) Other sectors. Exports of other sectors, particularly agricultural goods, has been characterised by high fluctuations since 1961. Before that period the value of exports reached its peak in 1953 and then consistently decreased until 1961. Therefore, it is unrealistic to forecast total agricultural and other exports on the basis of their trend in the last 16 years. However, an approximate rate of export growth for agricultural and manufactured goods can be given on subjective judgements.(350) Accordingly, it is assumed that exports of manufacturing goods are to increase at 6% annually whereas total exports of agricultural goods are to increase at 4% annually from their level at 1969.

Oil products are assumed to increase at a rate equal to that of capacity refining, i.e. an increase of about 5%.(351) Thus our projections

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(350) For example; (i) the agricultural output is assumed to increase consistently at a moderate rate of growth;
(ii) the exports of agricultural equipment (of the agricultural equipment complex) would contribute a high proportion to the total manufacturing industries exports.

(351) The refinery capacity in Iraq increased at an annual average rate of 4.98% during the period 1964-69 (O.P.E.C.[107] p. 43). The same rate of growth is assumed for the period 1970-74.

for non-oil exports during the period 1970-74 are shown below.

Year	Agricultural Exports in million ID	Oil Products Exports	Manufactured Products Exports
1970	14.08	1.07	10.12
1971	14.62	1.12	10.69
1972	15.16	1.17	11.26
1973	15.70	1.22	11.83
1974	16.24	1.29	12.40

10.3.2 Government Consumption

In Iraq the level of government consumption is practically determined by the political situation in the country as well as in the region as a whole. Thus the projection of government consumption should be considered on the basis of two possibilities. Firstly, the case where the present political tension will continue to characterise the period 1970-74. Accordingly, it is reasonable to assume that government consumption will increase at the same annual average rate of the period 1962-69, i.e. at about 7.9% annually. The second possibility is rather a 'difficult' one. It is the case where the political situation has less priority then the national economic policy. That is to say that the government consumption would increase at a rate not more than the rate of the general economic development in recent years. Thus we may assume that government consumption during the period 1970-74 would be as follows.

YEAR	The maximum level (first assumption)	The minimum level (Second Assumption)
1970	271.5	264.7
1971	291.4	277.8
1972	311.3	290.9
1973	331.2	304.0
1974	351.1	317.1

TABLE NO. 19

GOVERNMENT CONSUMPTION BY SECTORS IN 1974 (million ID)

SECTOR	VALUE AT MAXIMUM PROJECTED GROWTH	VALUE AT MINIMUM PROJECTED GROWTH
X_1	.4326	.3907
X_2	-	-
X_3	-	-
X_4	10.9686	9.906
X_5	2.163	1.9535
X_6	2.0514	1.8526
X_7	-	-
X_8	4.6749	4.222
X_9	4.5354	4.096
X_{10}	-	-
X_{11}	-	-
X_{12}	179.6846	162.2762
X_{13}	96.7919	87.4144
Complementary imports	49.8054	44.9801
Indirect taxes	-	-
TOTAL	351.1	317.1

10.3.3 The Financial Capacity for Investment

Until recently, Iraq has had no serious problems, as have most underdeveloped countries, of providing financial resources for the required or planned investment. Although the government plays a major role in the process of development, and in investment accumulation in particular, private saving (investment) still contributes considerably to the process of capital accumulation. It is true that the effects of the nationalisation of the major industries in 1964 had reduced the profit surplus that went to the private sector, and as a result the level of private saving (investment) is also reduced. It is true also that government revenues are continuously increasing, but the high growth of government consumption restricts to a certain extent the government capacity to finance the investment programmes. Thus it is required to consider both the government saving and private saving within one framework of the financial plan.

(1) Private Saving

Private saving (investment) is estimated to be on the average of 56.8 million ID per annum, i.e. total financial capacity of the private sector for investment during the plan's pweiod would be 284 million ID approximately. Our estimation is based on the assumption that during the plan's period, the private propensity to save is 10.(352) This implies that the distinction between private saving and private

(352) The value of this parameter is estimated by the United Nations Experts (U.N.[133] p. 16) from the time series of recent years. The disposable private income of 1969 is used as the basis of our projections.

investment during the period 1970-74 is of no practical significance.(353)

(ii) Government and Public Saving

The available financial resources of central government investment are generally made up from the following sources:- its share of oil revenues, its share from the profit of the independent government agencies and nationalised industries, internal and foreign loans. Apart from the oil revenues, we relied on the official estimations of the financial sources from other sources.(354) The government share of oil revenues for investment is estimated in accordance with our projection of crude oil production (exports) during the plan's period.(355)

The financial resources available to the public sector - which consists of the independent agencies and the nationalised industries - are estimated to be 324.8 million ID.(356) Internal loans are estimated to be 60 million ID.(357)

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(353) Some economists emphasised on the fact that because of the effects of nationalisation laws, it became necessary to distinguish between the two concepts, private saving and private investment, and that the level of private investment is in general less than the level of private saving. Shair, K.[115]. For the purposes of our projections this problem is practically solved, because the parameter (private propensity to save) used reflects to a great extent the effects of the nationalisation laws of 1964.

(354) The National Development Plan (1970-74), Law No. 70 of 1970.

(355) See Chapter VIII Section 1.

(356) The National Development Plan of 1970-74.[65]

(357) However, out of the total financial resources of the central government, an amount of 27.3 million ID goes to different government agencies in the form of loans, and 44.0 million ID goes to cover the amortization and rate of interest on foreign loans.

Total financial resources available for investment during the plan's period (1970-74) are estimated as follows.

	Year / Source	(in millions ID) 1970	1971	1972	1973	1974	Total
1.	Private sector	56.8	56.8	56.8	56.8	56.8	284.0
2.	Government sector						321.8
	(i) 50% oil revenues	95.4	98.1	101.3	102.7	104.8	502.3
	(ii) Internal loans						10.0
	(iii) Foreign loans						60.0
	(iv) Profit share of independent agencies, nationalised industries and other sources						35.9
	TOTAL						1,214.0

10.3.4 Total Employment during 1970-74

Disregarding the widespread disguised unemployment, the qualitative study of real unemployment revealed that unless the economic policy is drastically changed, Iraq will face, in the near future, a very serious problem of unemployment. The available figures on employment and population show that during the last ten years the employment level rose at an average annual rate of about 1.6%.(358) Against this rate, however, the growth rate of the labour force was, on average, about 2.9% during the period 1960-69. As a result unemployment figures

(358) On the estimation of population and employment, see the following Section of this Chapter, and Section 6 of Chapter VI.

increased from 741.0 thousands in 1960 to 1,280.8 thousands in 1969. The annual average growth rate was more than 5%.

The best policy one can suggest to deal with the situation is to keep the unemployment level at least as it was in 1969, or in other words, to stop the explosive increase in unemployment. This implies that new investments must absorb the whole new increase in the labour force. Thus employment should at least increase from 2,709.5 thousands in 1969 to 3,486.0 thousands in 1974, i.e. at an annual average rate of 5.2% during the period 1970-74. This would reduce the ratio of unemployment to labour force from 29.1% in 1961 to 25.4% in 1974.

TABLE NO. 20

PROJECTIONS OF EMPLOYMENT AND UNEMPLOYMENT DURING 1970-74

(thousands)

YEAR	EMPLOYED POPULATION	LABOUR FORCE	ARMED FORCES	UNEMPLOYMENT
1970	2,847.6	4,398.4	270.0	1,280.8
1971	2,995.2	4,546.0	270.0	1,280.8
1972	3,150.9	4,701.7	270.0	1,280.8
1973	3,314.4	4,865.2	270.0	1,280.8
1974	3,486.0	5,036.8	270.0	1,280.8

10.3.5 Population Growth

According to the 1965 census, the total population of Iraq was 8.097 millions, compared to 6.340 millions in 1957, and 4.826 millions in the 1947 censuses. As the figures of the 1947 census were not very reliable, we have considered only the 1957 and 1965 censuses as the bases for the calculation of population trends in the period 1957-65, and thereafter the projections for the period 1966-74. Such an attempt,

however, has to be based on the level of fertility and mortality within the age composition of the population. Recently a report on the population of Iraq was being prepared by the United Nations experts [137], and it estimated the birth and death rates for the period 1965-80 as well [illegible] as for 1957-65. Accordingly the annual rate of [illegible]t was estimated for each year of the whole period. On the bases of these given rates and on the figures of the 1957 and 1965 censuses, the projected total population for the period 1969-74 is as follows.

Year	TOTAL POPULATION*	ANNUAL RATE OF GROWTH
1969	9,205,185	-
1970	9,498,362	3.18
1971	9,809,921	3.28
1972	10,136,027	3.32
1973	10,474,591	3.34
1974	10,827,596	3.37

10.4 ESTIMATION OF THE GROSS INCREMENTAL CAPITAL-OUTPUT RATIOS

10.4.1 The Theoretical Framework

The general proposition of the Harrod-Domar macro-economic growth model (359) may be re-stated as follows. Assuming the constancy of the technical progress and population growth, then the increase in output can be considered as a fixed linear function of increments to the real

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* Including Iraqis abroad.

(359) Harrod, R.F. [47] and Domar, E. [29].

capital stock. Hence, the concept-capital-output ratio implies the technical and linear relationship between capital stock and the production level.(360) Mathematically this relationship can be expressed as follows. Denote the capital-output ration by COR, capital stock at period t by K_t and the level of output at period t by O_t, then we have:-

$$K_t = COR.O_t \qquad \ldots (1)$$

or

$$COR = K_t/O_t \qquad \ldots (2)$$

Similarly,

$$K_{t+1} = COR.O_{t+1} \qquad \ldots (3)$$

By subtracting equation (1) from equation (3), we get

$$K_{t+1} - K_t = COR(O_{t+1} - O_t) \qquad \ldots (4)$$

Now assuming net investment is I_t, equation (4) can be rewritten as follows.

$$I_t = COR(O_{t+1} - O_t) \qquad \ldots (5)$$

Theoretically, I_t is to be considered as a net investment at period t, i.e. investment for replacement is excluded. This implies, as A. R. G. Heesterman stated: "Replacement is there dealt with in the same way as inter-industry deliveries; it is assumed to be a fixed proportion of the current output. Or it is exogenous."(361)

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(360) A highly simple version of the Harrod-Domar growth model in a continuous form may be stated as follows. Giving fixed capital-output ration(COR) and saving-output ratio(s), then a unit of capital will produce R 1/COR units of saving (net investment or addition to capital stock). Mathematically $S_t = sO_t$, $I_t = COR.\Delta O_t$, $S_t = I_t$, when S_t is total saving at period t.

(361) Heesterman, A. R. G.[48]

For practical reasons I_t might be considered as gross investment, i.e. it includes capital consumption or investment on depreciation. The immense practical concern with economic growth led to the wide utilisation of these ratios in growth models. As a result the practical experiences show that there are big variations in the ratios among the different sectors of the economy, and they depend on the pattern of sectoral allocation of total investment.(362) Bearing in mind that any small change in these ratios can lead to big changes in capital requirements, the aggregated ratios have to be disaggregated on a sectoral level. Mathematically equation (5) can be disaggregated as follows.

$$I_{i,t} = (ICOR)_i \ (O_{i,t+1} - O_{i,t}) \qquad \ldots (6)$$

$$i = 1,2,\ldots,n$$

where subscript i refers to the economic sectors and n is the total number of them

The concept of incremental or marginal capital-output ratio (ICOR) is - from the theoretical point of view - the same as the average capital-output ratio concept. However, in practice the ICOR is widely used compared to COR. The reason is as follows. From the economic point of view the utilisation of ICOR is more relevant as it reflects rather recent technological changes, From the statistical point of view as the calculations required are much easier to estimate than COR.

10.4.2 On the Defence of using the Gross Incremental Capital-Output Ratios

Theoretically, it is rather difficult to accept the basic assumption on which the concept of ICOR is based, that is to relate the change in output

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(362) Higgins, B. [51] pp. 642-653.

uniquely to investment and ignoring the contribution of other factors of production. These ratios are of a technical nature, and they depend on the technology of production and the utilisation of the existence capacity in the system; thus any change of these ratios is dependent on the technical changes that might have taken place. In Iraq - as in most underdeveloped countries - investment is mainly made for the purposes of expanding the output capacities and for replacement, but not for substitution. That is to say that in Iraq the impact of technological development for the last two decades and its prospects at least during the plan's period is not substantial. In this respect a recent study on the Iraqi economy revealed that "most types of investment have recently been made and some years will lapse before they are replaced. At the same time expansion investments in the existing industries are not always made in the most up-to -date equipment; in most cases it was found that they are either similar to the existing ones or only slightly more advanced. This also applies to machinery and equipment for replacement purposes."(363) Hence the assumption of a constant capital-output relationship in Iraq holds.

10.4.3 Statistical Sources and Assumptions

(i) The Available Statistical Data

Statistical data on national accounts and GFCF are provided from different statistical sources. GNP figures for the period 1953-69 are provided by Dr. K. Hasseeb [41] & [42] Dr. W. Rasaputram [109] and the C.S.O. [75]. The methodology and operational arrangements used

(363) Sueliman, M. [119] p. 42.

by Hasseeb to estimate GNP for 1953-62 were also used in the C.S.O.'s estimations for the period 1965-69.[364] Except for slight differences that arise from the adaptation of rather different arrangements for the 1963 and 1964 estimations,[365] the available estimations of GNP for the period 1953-69 constitute a uniform long time series adequate for the purposes of this study (see Table No. 40). GFCF figures for the period 1953-69 are provided by Dr. J. Hashim [44] & [45] and the C.S.O. [73]. It was found, however, that C.S.O. estimations are not more than extrapolation based heavily on Hashim's estimations. Although these sources provide a uniform series of GFCF, few adjustments have been made in order to break down some of the aggregated figures to fit in our sectors classification of the economy (see note on Table No.)

(ii) Assumptions and Calculations

In deriving the ICOR many problems arise, i.e. the treatment of the existing fluctuations of the net increase in output in some sectors and for some different lengths of time, problems associated with the different gestation periods of investment in different economic activities. To smooth out the figures of the net increase in output and to alleviate to a great extent the effects of having different gestation periods, it was found that the best estimates can be achieved by obtaining the average

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(364) C.S.O. [75]

(365) Rasaputram, W. [109]

of each series; increment output and gross investment.(366)

The second type of difficulty arising is that some extraordinary economic measures and political events affected the level of production and investment. Thus the following assumptions are made considering only the normal figures.

(i) The year 1963 was not a normal one in the sense that economic development was badly affected to a great extent by political factors. It is therefore completely excluded from our consideration.

(ii) The development of the agricultural sector was affected by the introduction and the implementation of the Agrarian Reform Law in 1959, and it was introduced in late 1958. As a result a great deal of damage was done by the landlords to agricultural output and means of production, i.e. trade, construction and dwelling, were affected by the political situation. Economic activities in these sectors were limited not by ordinary economic measures and factors, but were affected by the prevailing extraordinary political atmosphere. Thus this is also excluded from our consideration.

(iii) Manufacturing industries were affected greatly by the nationalisation of the major industries in 1964. The direct consequences of these measures - during the period of takeover - were the general decline in output level in this sector as a whole. Thus we have excluded 1964 also from our consideration.

(366) Mathematically, the general formula applied, is as follows.

$$(ICOR) = \frac{\sum_{t=1954}^{1969} (GFCF)_{i,t}}{15} \div \frac{\sum_{t=1954}^{1969} \Delta X_{i,t}}{15} \qquad \begin{matrix} (i = 1,2,\ldots,13) \\ (t \neq 1963) \end{matrix}$$

(iv) Trade, banking and insurance activities were badly affected by the Middle East Crisis in 1967 and into 1968. Thus, 1968 is excluded from our consideration in estimating the ICOR of these sectors.

(v) Data on the existing numbers and the rent of housing in Iraq are not adequate, if not available. The value added for the ownership of dwellings sector was arrived at by the following primitive sampling approach.(367) This is not an unusual practice in national accounts statistics but, however, these estimates reflect a rather unrealistic economic phenonomenon because although about 320 million ID in investment has been spent during the period 1953-69 on this sector, the value added increased on average by almost zero during the same period.(368) It was also found that for the purposes of estimating the ICOR, the government measures of reducing the rents by 25% in mid-1964 and by another 25% at the end of 1966 have to be considered because more than 90% of the existing houses' rents were affected during the period 1964-69. For these reasons the available figures for 1964-69 are adjusted by considering the effect of the 25% rise in rent in mid-1964 and at the end of 1969. The adjusted figures are:-

YEAR	VALUE ADDED million ID
1964	16.70
1965	18.44
1966	21.81
1967	20.85
1968	22.75
1969	23.57

(367) See Rasaputram, W. [109] pp. 132-134

(368) See Table No. 40

On the basis of the above assumptions, the gross ICOR of the Iraqi economic sectors is estimated as follows.

SECTOR	ICOR (over the period 1953-69)
1. Agriculture	1.278
2. Crude oil	
3. Mining and quarrying (excl. crude oil)	.291
4. Oil refining	2.169
5. Manufacturing industries	4.304
6. Electricity, gas and water	3.139
7. Banking and insurance	.318
8. Trade (wholesale and retail)	.797
9. Transportation	10.653
10. Construction	1.374
11. Dwellings	19.519
12. Public administration	1.815
13. Services	.442
The whole economy	2.458

10.5 ESTIMATION OF LABOUR-OUTPUT RATIOS

The ratios of labour (number of employees) to output are used to reflect approximately the relations between employment and output level. The utilisation of these parameters is not significant from a theoretical economic point of view. The reasons are:- (i) the justification for using such a relation is of a political and not an economic nature; (ii) the corresponding constraint is not a binding one, and it serves only to estimate the employment level at any given level of output .

10.5.1 Statistical Sources and Assumptions

(i) Employment by economic sectors

For the purposes of deriving an estimate of population in employment distributed by economic sectors, it has been found that statistical sources in this field are either lacking, inadequate or incomplete.(369) However, this difficulty necessitates us relying on various sources and estimates with a great deal of qualitative judgements.

Before 1960 labour force surveys had never been carried out except in the estimates of employment in agriculture,(370) and the Industrial Census of 1954.(371) Since then a considerable improvement has been achieved in employment statistics,(372) and recent studies show a steady progress in this field.(373) Thus we have limited ourselves to the period 1960-69. On the basis of various statistical sources, the available estimation and studies of employment, we have estimated the number of employees classified by economic sectors. There were two main problems in this process:- (i) to break down some of the figures(374) available in order to fit them in with our classification of the economic activities; (ii) to treat some cases where the available figures are either of incomplete

(369) Such a problem has also been emphasised by recent studies on manpower and on other related economic aspects. See, for example, U.N. Studies Sueliman, H. A.[119] ...

(370) Ministry of Economics, Statistical Department, "Agricultural and Husbandry Census of 1952-53", Baghdad, 1954.

(371) Ministry of Economics, Statistical Department, "Industrial Census of 1954", Baghdad, 1955.

(372) For example, monthly statistical industrial surveys and statics on civil employment and salaries paid, which are currently conducted by C.S.O.

(373) For example, Dr. H. Sueliman [119], Dr. S. Al-Shaikhly [8] and the United Nations experts' studies [137], [138], [139] and [140].

coverage or are underestimated. To deal with these problems we have tried to reconcile different statistical sources, and in some cases subjective judgement and commonsense have been used. It is also assumed that because of its insignificance employment in the dwellings sector is assumed to be nil. The armed forces are completely excluded from our estimation.

TABLE NO.21

POPULATION IN EMPLOYMENT DISTRIBUTED BY ECONOMIC SECTORS (1960-69)

(numbers in thousands)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Agriculture	1679.0	1702.0	1726.0	1750.0	1754.0	1758.0	1761.0	1764.0	1768.0	1772.0
Crude oil Mining & quarrying	13.2	13.2	12.4	11.6	12.6	13.1	13.6	14.1	15.0	15.0
	.4	.4	.4	.4	.4	.4	.4	.4	.5	.5
Oil refining	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.7
Manufacturing industries	110.6	111.6	113.6	115.5	127.5	132.4	137.4	137.4	143.3	145.3
Electricity, gas, water	7.4	8.3	9.2	9.4	12.0	12.2	12.4	12.6	12.8	12.9
Banking, insurance	5.5	6.0	6.5	7.0	8.0	8.3	8.6	8.7	9.0	9.0
Trade	94.5	99.0	103.5	108.0	112.0	118.7	121.4	126.3	131.0	136.0
Transportation	158.0	176.0	198.0	223.0	234.3	249.7	254.4	260.4	265.7	271.1
Construction	42.0	44.0	45.0	47.0	47.2	61.0	70.0	59.1	59.0	60.0
Public administration	129.2	134.2	139.2	144.2	149.2	173.4	165.3	169.8	171.8	173.8
Services	115.8	115.8	115.8	115.8	115.8	97.6	109.7	115.2	118.2	111.2
TOTAL	2358.0	2412.9	2472.0	2534.4	2575.5	2627.4	2656.8	2670.6	2697.0	2709.5

SOURCE: compiled from

(i) Suellman, H. A. "Industrial Productivity in Iraq with Special Reference to Selected Firms, 1953-63". A Ph.D. thesis submitted to the University of London, S.O.A.S., June 1967.

(ii) U.N./S.F. Ström, N., "Manpower in Iraq - Supply and Requirement", U.N.S.F., Report No. 1, Ministry of Planning, Baghdad, June 1969.

(iii) U.N./S.F., "Manpower in Iraq - Employment Trends, 1960-69", U.N.S.F. Report No. 12, Ministry of Planning, Baghdad, June 1969.

(iv) Central Bank of Iraq, "Annual Report, 1968", Statistics and Research Department, Baghdad, 1970.

(v) Central Bank of Iraq, "Bulletin of the CBI", New Series. No. III, 1969, iv.

(vi) Al-Shaikhly, S. "Manpower Planning in Iraq", Baghdad, 1969.

(vii) C.S.O., "Monthly Industrial Survey - (1960-69)", Ministry of Planning, Baghdad.

(viii) C.S.O., "Annual Abstracts - 1960-68", Ministry of Planning, Baghdad.

(ii) Calculations of labour-output ratios

Using the available data on output by sectors, as it has been mentioned in Section 5.2 , the LOR's are derived by utilising the following formula to reflect the constant relation between the employment and output level during the period 1970-74.

$$LOR_i = \frac{\sum_{t=1960}^{1969} (EMP_{i,t}/X_{i,t})}{10} \qquad \begin{matrix} i = 1,2,\ldots,13 \\ i \neq 11 \end{matrix}$$

where,

EMP is the number of employees;

X is the output level (at 1966 constant prices).

Accordingly, the LOR's of different sectors are estimated as follows.

SECTOR	LOR
Agriculture	11.953
Crude oil	.051
Mining and quarrying	.143
Oil products (refining)	.215
Manufacturing industries	2.189
Electricity, gas and water	1.315
Banking and insurance	.633
Trade	2.465
Transportation	4.300
Construction	2.186
Public administration	1.929
Services	2.258

CHAPTER XI RESULTS AND CONCLUSIONS

The investigation of the theoretical propositions as well as the results provided by the study show that the economic growth of underdeveloped countries depends as much on their ability to reallocate efficiently their resources to new uses and thus change their economic structure, as it depends on their efforts to increase investment and other resource inputs. Such an attempt, however, cannot be practically achieved by the free market mechanism, nor by the "intuitive" planning approach. The practical approach is to utilise a formal and comprehensive development model, such as the one proposed by this study, focussing on the interrelationships between the objectives and the policy instruments at different levels of economic activities. The model provides the decision-maker with alternatives expressed in quantitative terms. It is the basis on which a consistent, efficient and feasible plan can be drawn up. The empirical results and conclusions derived for the Iraqi economy are significant not only in proving the necessity of adopting such a quantitative approach for dealing with development planning, as outlined in Chapter V, but also they are to be seriously considered in future economic policy decisions. The study offered enough evidence to conclude that at all levels of the Iraqi economy investment decisions taken by the Iraqi policy-maker are not economically efficient because they are generally based on "commonsense", "personal" judgements or at the best on partial quantitative analysis. One of the significant results disclosed by the study is that although Iraq is rich in oil it still needs more capital and foreign exchange for the desired

rate of economic growth, contrary to the "popular" notion that its domestic resources are in surplus. The analysis of the structure of the Iraqi economy and its planning experience show also that there is a wide scope for efficiency improvements through the utilisation of the various quantitative techniques co-ordinated in a coherent comprehensive planning model. To secure maximum economic and social benefits, the economic structure would best be determined by such an approach.

The results, however, particularly those derived from the multi-sectoral model and the evaluation of certain development projects, hinge upon the reliability of statistics. This is by no means the case to blame "statistics" for possible "unrealistic" conclusions appearing from "incomplete" mathematical specification of the economic relations or due to misinterpretation. On the contrary, since the statistical system will never develop unless there is an effective demand for more detailed data, the application of the model provides a good opportunity to define and point out the statistical requirements and deficiencies for the purpose of acquiring a better understanding of planning problems.

The results and conclusions derived in this Chapter pertain to the Iraqi economy, but nevertheless they also implicitly serve to clarify some aspects of the theoretical propositions given in Part I of the study, and particularly Chapter VI. It is noticeable that the numerical results obtained from the multi-sectoral model are examined within the framework proposed in Chapters VII and VIII, and thus a strategy for the Iraqi economic development is outlined at the end of this Chapter.

In general the empirical results obtained for the Iraqi economy are useful not only in examining the economic development problems, but also they serve as evidence that even in Iraq, where statistical data are imperfect, it is possible to press them into service in order to apply the mathematical models in dealing with development planning problems.

11.1 THE GROWTH OF THE IRAQI ECONOMY, 1969-74

In the period 1952-69, the Iraqi economy has experienced a high rate of growth. On average the GNP grew at an estimated rate of 6.7% annually, the NI at a rate of 6.4% and the per capita income at a rate of 2.1%. The main factor for this remarkable development was that taxes on crude oil exports (production) provided Iraq with substantial amounts of financial resources by which the state carried out heavy investment programmes and increased its consumption expenditures without a foreign exchange problem. During this period total oil revenues accounted for about 1,795 million ID, and since 1952 the Government emerged to play a dominant role in economic development by channelling 70% of these revenues into a "project-by-project" type of development programmes during the period 1952-58. After 1958 the state allocated 50% of oil revenues plus a considerable amount of investment from other internal and external sources for its development plans. It is interesting to note that after 1958 Iraq had recourse to a considerable amount of foreign loans, totalling about 76 million ID in 1969. Over the whole period the private sector was playing an inactive role in economic

development. Prior to 1958, private activities were mainly concentrated in agriculture and instead of utilising the opportunity of benefitting from the development policy of the DB then, the "few" landlords were mainly concerned with hoarding, speculation and conspicuous consumption instead of concentrating on productive activities. After 1958 the failure of the private sector to take a leading part in economic activities was partially due to the Government policies which resulted from the unstable political conditions, and partially due to the lack of private entrepreneurship. However, the scope of achieving higher growth rates was possible at least by improving the government investment policies.

During the period 1969-74 the study revealed that such a high rate of development is not in prospective. The burden of government consumption expenditures on public administration, defence, and on social services will be the major negative factor restricting this development. In addition to this, the Government investment policy is still not efficient enough to bring about the maximum economic and social benefits. It appears that the 7.1% annual compound growth rate of national income projected by the National Development Plan for the period 1969-74 is an overestimate. The results show that the economic and social targets of the plan cannot be realised by the anticipated level of investment. In fact the minimum level of investment, as estimated by the multi-sectoral model, has to be between 999 and 1,009 million ID, while the plan estimation was 920 million ID. Even with this level of investment, employment would not increase at a satisfactory rate, i.e. at least to

absorb the new increase in labour force. To achieve this target, total investment has to be about 1139 million ID. However, these two minimum levels of investment estimated on particular assumptions concerning the projected (maximum and minimum) Iraqi exports and government consumption expenditures would produce only 4.3% to 5.2% annual compound growth rate of GNP, national income would increase by 3.4% to 5.5 % annually and per capita income at a rate of 0.8%-1.6 %. However, other alternatives based on the possibilities of increasing the investment level would produce higher rates of growth. It is found that the GNP may increase up to 1,258 million ID in 1974 (at the 1969 prices) against 928 million ID in 1969, i.e. it may grow up to 6.2% annually during the period 1969-74. Similarly national income would increase from 827 million ID in 1969 to 1,081 million ID in 1974, i.e. at 5.5 % annual compound growth rate. Accordingly per capita income will be 99.8 ID in 1974, i.e. it would grow at a 2.1% rate of growth.

The results show that the Iraqi planner has many alternatives to choose from to arrive at the desired and possible rate of growth (to be discussed later on). The choice, however, is preconditioned not only by introducing political stability and establishing efficient institutional mechanism, but more fundamentally the planner must follow the same investment policy, consumption, imports, as briefly outlined in the following Sections.

Generally the results show that unless substantial efforts are made by the state as well as the private sector to increase and efficiently allocate investment, the present growth of the Iraqi economy may be badly affected.

11.2 INVESTMENT POLICY, 1969-74

A good development plan evaluates a number of alternatives and its efficiency depends on the choice it makes out of these alternatives. In Iraq, development plans since 1969 tended to emphasise the overall balance between the investment projects. But at the same time little attention has been given to the problems of economic efficiency. A consistent plan is not necessarily one which ensures an efficient allocation of the available resources amongst the productive sectors because efficiency has to be considered in the context of the economic and social targets, the technological conditions and the interrelationship between different sectors of the economy. This calls for the quantifying of the interlocking relationships among the variables of the economic system. In Iraq planning experience shows that the relative priority of agriculture versus industrial development, for example, is at the best being judged on the basis of personal judgement and commonsense. Such an approach may involve not only "inefficiency" but also the risk of misjudgements compared to the quantitative approach of analysis. The application of a partial quantitative technique is not also sufficient to achieve economic efficiency on the national level. This has been practised in national economic planning in Iraq. In formulating the National Development Plan (1969-74), for example, capital-output ratios are utilised to estimate total capital requirements associated with the desired level of output. The question is to what extent this plan will succeed in achieving an optimal allocation of capital by economic sectors. Because quantitative analysis has not been fully utilised to

determine the relative priorities of different sectors in relation to the objectives of the plan the answer is not definitely positive. On the micro- level investment decisions are not linked with the sectoral and overall analysis and moreover no clear and well-defined criteria (criterion) are considered when taking these decisions.

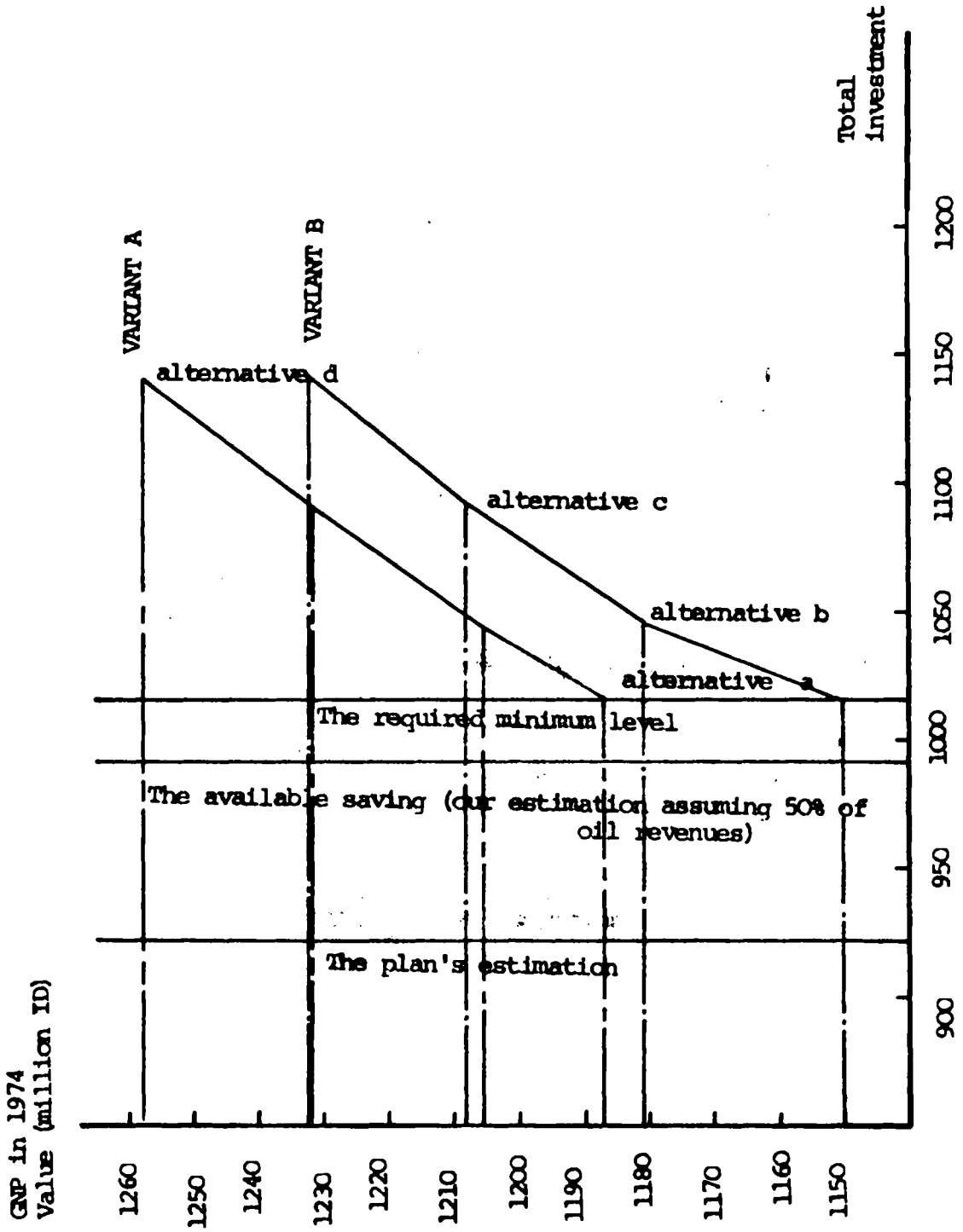
In this Section many alternatives are proposed to formulate the Iraqi investment policy during the period 1969-74. Each alternative is based on different assumptions determining the "feasible area" of the Iraqi economic development.

11.2.1 Investment Levels

Total financial funds allocated to investment for the period 1969-74 were estimated by the National Development Plan to be about 1,143 million ID. Our initial estimation of the available financial resources, based also on allocation of 50% of oil revenues to investment, is about 1,214 million ID. Total investment in crude oil and sulphur extraction is estimated at 152 million ID, and 71 million ID goes to the amortization and rate of interest on foreign loans and to "internal" loans. Thus, excluding investment on crude oil and sulphur extraction, only 990 million ID according to our estimation would go to capital accumulation over the period 1969-74. This level of investment is, however, not enough to realise either a reasonable overall growth rate of the economy or a minimum employment growth. The plan is not feasible with this investment capacity.

By the multi-sectoral model, it is estimated that total minimum investment (excluding crude oil and sulphur extraction) required to realise

FIGURE 5: Change of GNP (at the target year, 1974) in relation to diffeasent levels of investment.



a minimum level of final demand is about 1,060 million ID. This level would generally produce only a 4.3% annual rate of growth of GNP. However, the employment level would be far less than planned. Nevertheless the Government can increase the level of investment up to about 1,200 million ID by allocating 70% of oil revenues for financing the investment projects. In this case the GNP would grow at about 6.2% annually and employment would increase by 780 to 846 thousands in 1974, which is more than the required minimum level. The implications of devoting 70% of oil revenues to investment are mainly as follows:-

(i) the Government has to reduce its consumption expenditures;

(ii) the Government should increase taxes on non-oil sources;

(iii) it has to rely on external resources, i.e. foreign loans to supply additional imports.

Since there is little scope to finance investment from foreign sources, the only policy the Government has to adopt is to reduce its consumption expenditures and to increase taxes on non-oil sources.

Accordingly many investment alternatives are suggested as follows: Each alternative is to be considered with two possible levels, i.e. the maximum and minimum level of the exogenously projected exports and Government consumption expenditures.

Alternative	State	Total investment 1969-74 (excluding crude oil & sulphur extraction) million ID	Total investment at 1974 million ID
a	The minimum investment (solution of the multi-sectoral model)	999.04-1008.8	261.02-265.90
b	5% more than alternative a	1039.92	281.46

c	10% more than alternative b	1089.44	306.22
d	The maximum possible investment (including 70% of oil revenues)	1138.94	330.97
e	The projection of National Development Plan	920.39	221.69
f	The available financial resources (our projection - assuming 50% of oil revenues goes to investment)	990.40	265.70

Since the plan is not feasible on the bases of the last two alternatives, the planner may choose one of the first four. The decision will depend mainly on the state's ability to control its consumption expenditures and the social and political implications of the employment problem. In view of the economic and social targets of the National Development Plan, alternative d seems most preferable.

11.2.2 Investment Allocation

The realisation of the possible growth rates of the Iraqi economy, as presented in Section 1, is a precondition to an efficient allocation of investment. On a sectoral level a high proportion of total investment should go to the ownership of dwellings, petroleum products, agricultural and manufacturing industries. Investment expenditures on other sectors vary between "nil" as for construction and 6.1% to 7.5% of total investment for transport and communications sector.

TABLE NO. 22

INVESTMENT ALLOCATION IN 1974 AT 1969 MARKET PRICES

(Maximum Exports & Government Consumption Growth Rates - Variant A)

SECTOR	Minimum Investment Alternative a	%	5% of Alternative a Alternative b	%	10% of Alternative b Alternative c	%	Maximum Investment Alternative d	%
1. Agriculture	17.50	5.9	32.11	10.3	56.87	16.9	68.90	19.1
2. Crude oil	30.50	10.3	30.50	9.8	30.50	9.1	30.5	8.5
3. Mining & quarrying	2.09	.7	2.12	.7	2.12	.6	2.12	.6
4. Petroleum products	37.26	12.6	37.27	11.9	37.27	11.1	49.04	13.6
5. Manufacturing industries	35.60	12.0	35.60	11.4	35.60	10.6	35.60	9.9
6. Electricity, gas & water	5.56	1.9	5.59	1.8	5.60	1.7	5.60	1.6
7. Banking & insurance	-	-	.01	-	.01	-	.13	-
8. Wholesale & retail trade	7.30	2.5	8.33	2.7	8.33	2.5	8.27	2.3
9. Transportation	22.10	7.5	22.10	7.1	22.10	6.6	22.10	6.1
10. Construction	-	-	-	-	-	-	-	-
11. Ownership of dwelling	98.17	33.1	98.18	31.5	98.18	29.1	98.18	27.2
12. Public administration	21.30	7.2	21.30	6.8	21.30	6.3	21.30	5.9
13. Services	19.01	6.4	19.04	6.1	19.04	5.7	19.04	5.3
TOTAL	296.40	100	312.15		336.92		360.78	

TABLE NO. 23

INVESTMENT ALLOCATION IN 1974 AT 1969 MARKET PRICES

(Minimum Exports & Government Consumption Growth Rates - Variant B)

SECTOR	Minimum Investment Alternative a	%	5% of Alternative a Alternative b	%	10% of Alternative b Alternative c	%	Maximum Investment Alternative d	%
1. Agriculture	17.5	6.0	32.74	10.5	57.35	17.0	62.24	17.3
2. Crude oil	30.5	10.5	30.50	9.8	30.50	9.1	30.50	8.5
3. Mining & quarrying	2.09	.7	2.12	.7	2.12	.6	2.12	.6
4. Petroleum products	37.26	12.8	37.27	11.9	37.27	11.1	57.15	15.8
5. Manufacturing industries	35.60	12.2	35.60	11.4	35.60	10.6	35.60	9.9
6. Electricity, gas & water	4.84	1.7	5.11	1.6	5.11	1.5	5.09	1.4
7. Banking & insurance	-	-	.01	-	.01	-	.13	-
8. Wholesale & retail trade	7.30	2.5	8.19	2.6	8.33	2.5	7.33	2.0
9. Transportation	22.10	7.6	22.10	7.1	22.10	6.6	22.10	6.1
10. Construction	-	-	-	-	-	-	-	-
11. Ownership of dwelling	98.17	33.7	98.18	31.5	98.18	29.1	98.18	27.2
12. Public administration	21.30	7.3	21.30	6.8	21.30	6.3	21.30	5.9
13. Services	14.86	5.1	19.04	6.1	19.04	5.7	19.04	5.3
TOTAL	291.52		312.16		336.91		360.78	

The results presented in the tables overleaf help to draw up some important conclusions. Firstly, from the economic point of view there is a wide scope for developing agricultural and petroleum productive sectors, and any increase of investment funds above the requirements of other sectors for achieving a certain level of domestic activities (i.e. exports, government consumption, minimum level of gross output and private consumption) should be directed to these sectors. Secondly, no investment should be allocated to the construction sector and very limited amounts to the banking and insurance, electricity, gas and water, and trade activities. This means that whilst there exists an idle productive capacity in some sectors of the economy, some other sectors are lagging behind. Thirdly, it seems that private investment will be concentrated mainly in ownership of dwellings sector and less in the agricultural, services, trade and manufacturing industries sectors.

The distribution of investment over the plan's period (1969-74) is linearly approximated by utilising formula (VI-9), this could be replaced by the application of the dynamic version of the multi-sectoral model (see Chapter VI,). However, this proposed distribution is much more balanced compared to that experienced in Iraq.

11.3 THE DEVELOPMENT OF CONSUMPTION EXPENDITURES, 1969-74

As it has been shown earlier, the vast increase in oil revenues in the early 50's was accompanied by a high rate of consumption expenditures - particularly government expenditures - and this has affected unfavourably the pace of development up to 1969. Our planning model

proposes a healthier trend characterising consumption expenditures for the period 1969-74. In 1974, total consumption (both private and government) is estimated to be within the limits of 958 to 996 million ID, i.e. it will grow during the period 1969-74 at about 5% annually. The level of government consumption is exogenously projected to be between 317 and 351 million ID, i.e. it will increase at a rate of about 5.2% to 7.9% annually, whilst private consumption is estimated to be between 639 and 655 million ID, i.e. it will increase at a rate of 4.6% to 5.1% per annum. In view of the existing economic and social conditions the growth rates of private consumption seem reasonable, but on the other hand the state has to introduce suitable restrictions to reduce its consumption expenditures to the minimum level in order to increase the level of investment.

On the basis of different investment levels, government consumptions and exports, many alternatives for private consumption levels are derived by the multi-sectoral model, as shown in the tables overleaf.

From the results obtained in the tables two important conclusions can be derived: Firstly, the different levels of investments, exports and government consumption have produced almost the same level of private consumption. Secondly, except for demand on transport and communications, which shows a relatively high rate of growth during the period concerned, the development and allocation pattern of private consumption among different sectors of the economy, reflects to a great extent the economic and social conditions in Iraq.

TABLE NO.24

PRIVATE CONSUMPTION BY SECTORS IN 1974 AT 1969 MARKET PRICES

(Maximum Exports & Government Consumption Growth Rates - Variant A)

SECTOR	Minimum Investment Alternative a	%	5% of Alternative a (Alternative b)	%	10% of Alternative a (Alternative c)	%	Maximum Investment (Alternative d)	%
1. Agriculture	189.14	31.5	189.14	31.4	189.14	31.5	193.90	32.0
2. Crude oil	-	-	-	-	-	-	-	-
3. Mining & quarrying	.36	.1	.36	.1	.36	.1	.36	.1
4. Petroleum products	5.91	1.0	5.91	1.0	5.91	1.0	7.04	1.2
5. Manufacturing industries	183.56	30.6	183.56	30.5	183.56	30.5	183.56	30.3
6. Electricity, gas & water	13.06	2.2	13.06	2.2	13.06	2.2	13.06	2.2
7. Banking & insurance	11.68	1.9	11.67	1.9	11.67	1.9	11.67	1.9
8. Wholesale & retail trade	53.75	9.0	54.95	9.1	54.77	9.1	53.72	8.9
9. Transportation	94.38	15.7	94.17	15.7	94.09	15.6	93.96	15.5
10. Construction	-	-	-	-	-	-	-	-
11. Ownership of dwelling	27.00	4.5	27.00	4.5	27.00	4.5	27.00	4.5
12. Public administration	-	-	-	-	-	-	-	-
13. Services	21.65	3.6	21.700	3.6	21.700	3.6	21.70	3.6
TOTAL	660.49		601.52		601.26		605.77	

TABLE NO. 25

PRIVATE CONSUMPTION BY SECTORS IN 1974 AT 1969 MARKET PRICES

(Minimum Exports & Government Consumption Growth Rates - Variant B)

SECTOR	Minimum Investment Alternative a	%	5% of Alternative a (Alternative b)	%	10% of Alternative a (Alternative c)	%	Maximum Investment (Alternative d)	%
1. Agriculture	189.12	31.4	189.14	30.9	189.14	30.9	189.14	30.8
2. Crude oil	-	-	-	-	-	-	-	-
3. Mining & quarrying	.36	.1	.37	.1	.36	.1	.44	.1
4. Petroleum products	5.91	1.0	5.91	1.0	5.91	1.0	12.01	2.0
5. Manufacturing industries	183.56	30.5	183.56	30.0	183.56	30.0	183.56	29.8
6. Electricity, gas & water	13.06	2.2	13.06	2.1	13.06	2.1	13.06	2.1
7. Banking & insurance	11.73	2.0	11.68	1.9	11.67	1.9	11.72	1.9
8. Wholesale & retail trade	54.24	9.0	55.23	9.0	55.24	9.0	52.44	8.5
9. Transportation	94.87	15.8	94.63	15.5	94.53	15.5	94.50	15.4
10. Construction	-	-	-	-	-	-	-	-
11. Ownership of dwelling	27.00	4.5	27.00	4.4	27.00	4.4	27.00	4.4
12. Public administration	-	-	-	-	-	-	-	-
13. Services	21.65	3.6	31.0	5.1	31.10	5.1	31.10	5.1
TOTAL	601.50		611.68		611.57		614.97	

By changing the objective function of the multi-sectoral model, i.e. to maximise the private consumption instead of national income, the model gave us almost the same results, as is shown below:

Sector	Private Consumption Value in million ID
1. Agriculture	194.94
2. Crude oil	-
3. Mining & quarrying	.36
4. Oil refining	5.91
5. Manufacturing industries	183.56
6. Electricity, gas & water	13.06
7. Banking & insurance	11.67
8. Trade	53.91
9. Transport & communications	93.97
10. Construction	-
11. Ownership of dwellings	27.00
12. Public administration	-
13. Services	21.70
TOTAL	606.08

Thus if the government rationalises its consumption policy, there would be a wider scope for development.

11.4 ANALYSIS OF FOREIGN TRADE, 1969-74

During the period 1952-69 the development of foreign trade showed an alarming trend. Non-oil exports were deteriorating and imports were

TABLE NO. 26

PROJECTED IRAQI IMPORTS IN 1974
(Values in millions ID)

	ALTERNATIVES							
	1A	2A	3A	4A	1B	2B	3B	4B
(i) Competitive Imports								
- agricultural products	34.19	21.74	3.91	-	34.76	21.24	3.52	-
- oil products	2.7	3.15	3.89	-	.99	2.11	2.84	-
- manufacturing industries' products	70.95	74.54	80.08	82.77	69.99	74.74	80.30	81.11
TOTAL	107.85	99.43	87.88	82.77	105.74	98.09	86.66	81.11
(ii) Complementary Imports								
- Investment goods	92.17	97.63	106.22	114.49	90.48	97.64	106.22	114.92
- Consumption goods	79.49	79.54	79.53	79.76	74.71	75.22	75.21	75.38
- Intermediate demand	24.57	24.57	24.57	24.57	24.57	24.57	24.57	24.57
TOTAL	196.23	201.74	210.32	218.82.	189.76	197.43	206.00	214.87
GRAND TOTAL	304.08	301.17	298.20	301.59	295.50	295.52	292.66	295.98

TABLE NO. 27

(FOREIGN EXCHANGE)

BALANCE OF PAYMENTS in 1974 (million ID)

Item	Maximum Possible Level	Minimum Possible Level
Crude oil exports	419.5	419.5
Non-oil exports	40.945	35.904
Total exports	460.445	454.404
plus foreign loans	60.000	60.000
	520.445	514.404
minus net factor of income to abroad*	218.900	218.900
	301.545**	295.504**

*Includes 50% of the value of total oil exports i.e. 209.75 million ID plus 9.15 million ID amortaization of foreign loans plus rate of interest.

**The value of the exogenous complementary imports of government consumption is estimated at 49.805 if maximum and at 44.98 if minimum.

increasing consistently at relatively high rates. In principle this calls for both increasing exports, particularly non-oil products, and for rationalising imports to favour the more productive activities. In 1974, total exports are exogenously projected to be between 460.45 and 454.4 million ID (see Chapters VIII and X), while total imports are estimated by the multi-sectoral model to vary between 293 and 301 million ID. That is to say, during the period 1969-74, whilst exports would increase at about 2.2% to 2.4% per annum, total imports would increase at 9.8% to 10.7% per annum. The latter is a very high rate indeed. However, what is more important is the composition of imports which reflects the extent of their contribution to the capital accumulation process and at the same time it reveals the scope of adoption of import substitution policy by domestic products. In 1974, competitive imports comprise between 28% to 36% of total imports while complementary imports comprise between 64% to 72% of total imports. Competitive imports consist mainly of products of manufacturing industries and agricultural products, whereas complementary imports consist of capital goods (47% to 54%). consumption goods (34% to 41%), and commodities for intermediate demand (11% to 13%).

The general conclusions one can derive from the results obtained in the tables is that by increasing investment levels, imports will increase up to a level where any new increase of investment would only change the composition of total imports in favour of non-competitive imports, particularly the capital goods. This means that there is a wide scope of substituting competitive imports by domestic products, through new higher levels of investment. These results are, however,

derived on the assumption that all foreign exchange earning should be directed to increase the level of imports.

This assumption is justifiable for the fact that from the economic point of view there is no need for a surplus at a time when the economy needs to accelerate its capital accumulation growth and to improve the standard of living.

11.5 EMPLOYMENT LEVEL IN 1974

Since unemployment has been growing during the period 1960-69 at about 5% per annum, the model initially aims to absorb at least the new increase in the labour force. Accordingly the minimum level of employment is estimated to be 3.486 million in 1974. The results, however, show that if the investment policy is carried out as suggested in alternatives 3A and 3B, then unemployment will increase by 40 to 438 thousands, (see tables Nos 28&29). That is to say, in addition to the existence of widespread unemployment, even the new increase in labour force (population growth) will not find the opportunity to work. These results show that unless investment increases to its maximum level, i.e. allocating 70% of oil revenues in addition to private saving and other external sources, the unemployment will be the major factor restraining the economic and social development.

In 1974, however, employment in the agricultural sector will comprise about 63-70% of total employment, the results show a high correlation between total investment in agriculture and employment. The level of employment in other sectors remains more or less stagnant. This means that in order to increase employment in the country, the agricultural sector should be developed so as to absorb the idle labour force.

TABLE NO. 28

EMPLOYMENT IN 1974

(Alternatives of Variant A)

SECTOR	Investment Alternative a	Investment Alternative b	Investment Alternative c	Investment Alternative d
1. Agriculture	1955.6	2072.2	2303.9	2416.4
2. Crude oil	17.2	17.2	17.2	17.2
3. Mining & quarrying	1.5	1.5	1.5	1.5
4. Oil refining	6.4	6.4	6.4	6.4
5. Manufacturing industries	163.2	163.2	163.2	163.2
6. Electricity, gas & water	14.6	60 - 14.6 1629	14.6	14.6
7. Banking & insurance	9.0	9.0	9.0	9.0
8. Trade	158.6	161.8	161.8	161.8
9. Transportation	280.0	280.0	280.0	280.0
10. Construction	60.1	60.1	60.1	60.1
11. Public administration	215.7	215.7	215.7	215.7
12. Services	209.4	209.5	209.5	209.5
TOTAL	3091.3	3211.2	3442.9	3555.4

876.

TABLE NO. 29

EMPLOYMENT IN 1974

(Alternatives of Variant B)

SECTOR	Investment Alternative a	Investment Alternative b	Investment Alternative c	Investment Alternative d
1. Agriculture	1935.2	2078.2	2308.3	2354.1
2. Crude oil	17.2	17.2	17.2	17.2
3. Mining & quarrying	1.5	1.5	1.5	1.5
4. Oil refining	6.4	6.4	6.4	6.4
5. Manufacturing industries	163.2	163.2	163.2	163.2
6. Electricity, gas & water	14.3	14.4	14.4	14.4
7. Banking & insurance	9.0	-	-	-
8. Trade	158.6	161.3	161.8	158.7
9. Transportation	280.0	280.0	280.0	280.0
10. Construction	60.1	60.1	60.1	60.1
11. Public administration	215.7	215.7	215.7	215.7
12. Services	188.1	209.5	209.5	209.5
TOTAL	3049.3	3216.5	3447.1	3489.8

11.6 THE STRUCTURAL CHANGES OF THE IRAQI ECONOMY, 1969-74

In this section, an attempt is made to analyse the structural changes during the period concerned if the suggested investment policy is carried out. Since the study covers the period 1969-74, no indication on the reliability of the base-year coefficients and structural parameters in the projections of the economic structure can be given. The effects of technical changes, the changes in the sectoral composition of output and the changes in the capital formation structure (investment by origin) are presented by utilising input-output analyses and the results provided by the multi-sectoral model. However, some other aspects of the changes in the Iraqi economic structure are also given in Sections 1, 2, 3 and 4 of this Chapter.

11.6.1 The Effects of Technical Changes

It has been mentioned in Chapter IX, Section 1, that adjustments were made in the technological input-output matrix of 1966 in order to reflect as accurately as possible the inter-industry activities expected in operation during the period 1969-74. The significance of these adjustments reflecting the effects of technical changes on the structure of the economy over the period 1969-74 can be appraised in the light of the following main three aspects: Firstly, the general output and intermediate demand level of the commodities sectors like agriculture, manufacturing industries and construction, are not affected, whereas non-commodities sectors, such as banking and insurance, trade and services, are slightly affected. Secondly, the significant change is

TABLE NO. 30

The effects of the technical adjustments of the input-output coefficients on the level of intermediate demand and output at 1969

No.	Sector	Shair's estimations*			Our estimations	
		Final Demand	Inter-mediate Demand	Total Output	Inter-mediate Demand	Total Output
1.	Field crops	16480	45786	62266	45863	62343
2.	Vegetables	40975	966	41941	965	41940
3.	Fruits	10810	1267	12077	1268	12078
4.	Forestry	2246	1	2247	2	2250
5.	Animal products	96731	3736	100467	3738	100469
6.	Fishing	2107	-	2107	-	2107
7.	Crude oil	377879	2741	380620	2716	380595
8.	Natural gas	-	1647	1647	6500	6500
9.	Sulphur	250	-	250	-	250
10.	Other mining	345	5994	6339	5966	6311
11.	Grain milling	23293	6431	29724	6440	29733
12.	Cotton growing	1078	1454	2532	1455	2533
13.	Food processing	16295	7076	23371	7108	23403
14.	Drinks	7071	211	7282	231	7302
15.	Tobacco	11208	-	11208	-	11208
16.	Synthetic fibres	-551	1019	468	1019	468
17.	Textiles	-5112	15005	9893	15010	9898
18.	Jute	-1549	2542	993	2530	981

* Shair's estimations: Final Demand 475327

TABLE NO.30 - (continued)

19. Clothing	26502	1	26503	-	26502
20. Footwear	5140	73	5213	73	5213
21. Leather	-53	1975	1922	1974	1921
22. Woodwork	-6460	15715	9255	15713	9253
23. Furniture	12828	4332	17160	4343	17171
24. Packing	113	8047	8160	8008	8121
25. Paper	-5776	5776	-	5787	11
26. Printing	4096	1563	5659	1574	5670
27. Vegetable oil	13272	3616	16888	3616	16888
28. Oil refining	11592	21946	33538	21564	33156
29. Fertilisers	-487	487	-	490	3
30. Pharmaceuticals	-1870	3088	1218	3160	1290
31. Other chemicals	-5118	6754	1636	6785	1667
32. Non-metallic	3233	15661	18894	15728	18961
33. Metallic	-10178	18242	8064	18437	8259
34. Mechanical machinery	-	-	-	-	-
35. Electrical equipment	1555	-	1555	-	1555
36. Transport equipment	2969	9582	12551	9622	12591
37. Industries n.e.s.	312	36	348	38	350
38. Electricity, gas & water	13935	5481	19416	5588	19523
39. Banking & insurance	8238	4956	13194	5058	13296
40. Trade	61210	25504	86714	25458	86668
41. Transport	73278	22954	96232	23131	96409
42. Construction	64295	9756	74051	9791	74086

TABLE NO. 30 (continued)

43. Education	58616	-	58616	-	58616
44. Health	14363	-	14363	-	14363
45. Other services	13975	6089	20064	5991	19966
46. Dwelling	25919	-	25919	-	25919
47. Public administration	122848	-	122848	-	122848

241810
270191
512001

241712
512171

* see Chapter X, Section

NOTES

(i) Our estimations are based on the static input-output model.

(ii) To make the comparisons between Shair's estimations and ours possible the vector of the projected final demand of Shair's study is used only for this purpose.

(iii) The computations of our estimations are performed by computer programme No. 1 (see Appendix No. 1)

due to the establishment of new industries, i.e. the introduction of new technology such as the manufacturing of natural gas and chemical industries. Thirdly, the oil refining sector shows a significant backwardness in technology. This is of great importance because it reflects a trend of deficiency in the production technology of a very important public enterprise complex.

However the conclusions in the preceding table suggest that except for the effects due to the new industries (new technology) there would be no significant change in the production technology during the coming five years unless a drastic change in the structure of production takes place.

11.6.2 Changes in Capital Formation Composition

Excluding crude oil extraction and the oil refining sectors, in 1969 capital goods in economic activities originating from the manufacturing industries sector were estimated to be about 31% of total gross investment. The rest, i.e. 69%, originated from the construction sector. In 1974, this structure, assuming no change in technology, would change and the contribution of the construction sector to total gross capital formation would increase up to 78%.

Obviously, the reason for this change lies in the pattern of investment allocation among different activities, especially in the agricultural, ownership of dwellings and services sectors. However, since investment in crude oil extraction and petroleum products comprises about 22% of total investment in 1974, then the composition of the GFCF structure will finally depend on the type of capital goods

TABLE NO. 31

The Composition of Gross Capital Formation (fixed) - 1974

To all sectors of the economy* / From	ALTERNATIVES									
	1A		2A		3A		4A			
	Value	%	Value	%	Value	%	Value	%		
Manufacturing industries	48.17	21.7	55.17	22.7	66.15	24.8	71.49	25.6		
Construction	178.32	78.3	187.09	77.3	200.88	75.2	207.63	74.4		
	1B	%	2B	%	3B	%	4B	%	1969 Value	%
Manufacturing industries	46.62	21.0	55.19	22.8	66.18	24.8	67.89	25.1	49.69	31.4
Construction	175.06	79.0	187.08	77.2	200.84	75.2	203.14	74.9	10.81	68.6

* except for crude oil and oil product activities

FIGURE 6: Development of GFCF, 1953-69 (at current prices)

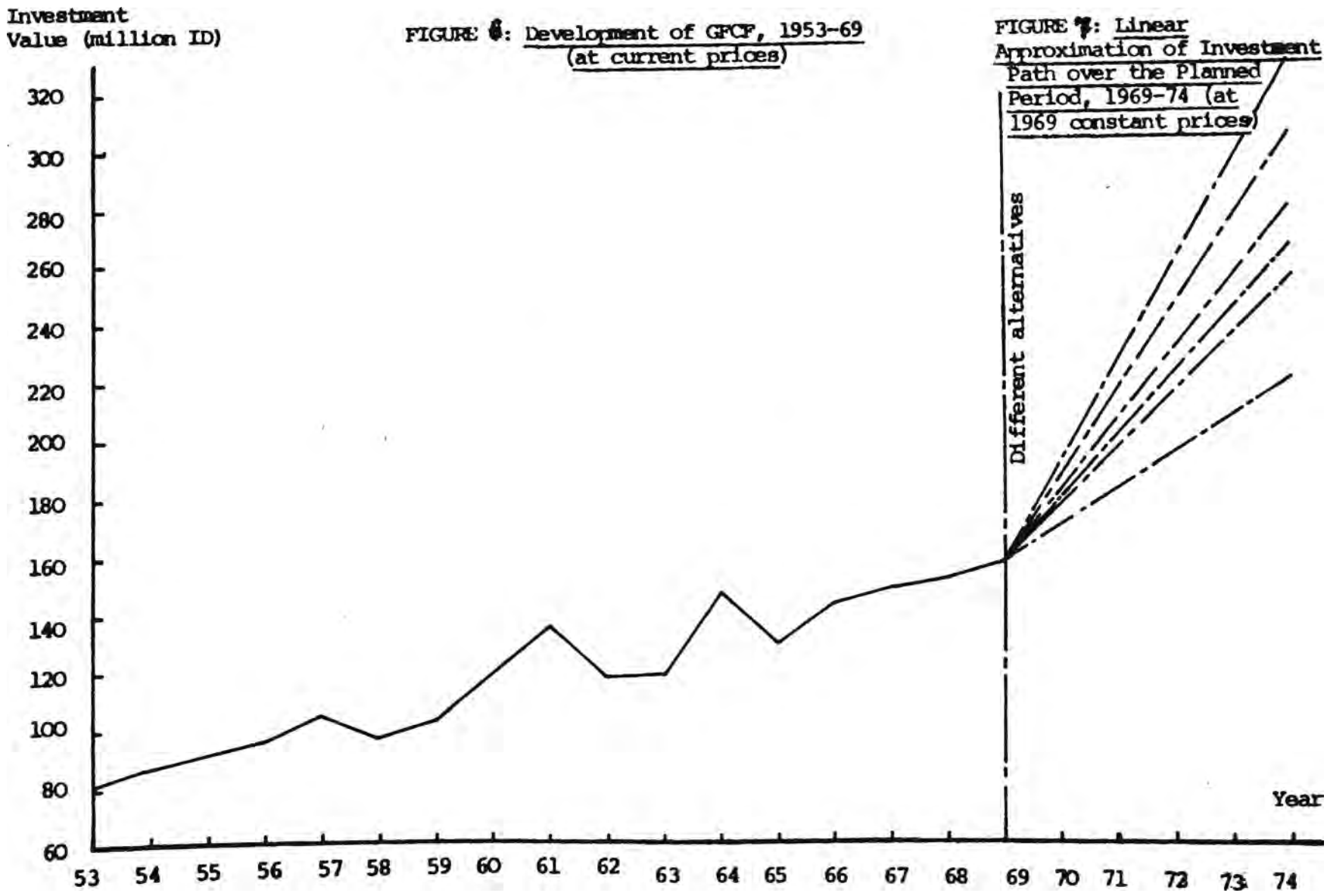


FIGURE 7: Linear Approximation of Investment Path over the Planned Period, 1969-74 (at 1969 constant prices)

used in these activities. Investment in these activities is "new" and thus no technical coefficients are available; therefore, the only general conclusion arrived at is that in 1974, the construction sector will be the prime source producing more than three quarters of fixed capital formation. It is also important to point out that as investment increases so the process of capital accumulation in Iraq will depend heavily on imports, as is shown in a previous Section.

11.6.3 Changes in the Composition of Gross Output, 1969-74

Associated with different proposed investment levels, gross output is expected to grow at different annual rates during the period concerned. The range, however, would be between 2.1% to 2.8%. In 1969, gross output was estimated at about 1443 million ID at current prices. This level would increase to about 1604 up to 1661 million ID. The increase is explained by the change in investment levels as well as in the level and the composition of final demand.

Several conclusions can be drawn from the tables on pages 306 and 307. Firstly, as investment increases to its maximum level, so the contribution of the agricultural sector to gross output would considerably increase. This trend is an acceptable development since demand for agricultural goods is expected to increase as the standard of living rises. Secondly, in 1969 the contribution of the crude oil extraction sector to gross output was estimated to be 26.4%, whilst in 1974 it should decrease up to 25.4%, and if we exclude the "domestic" crude oil extraction activities, then this ratio will decrease to 24.7%. This goes to a certain extent to meet the need to

TABLE NO. 32

THE SECTORAL COMPOSITION OF GROSS OUTPUT IN 1974*

(Maximum exports & Government Consumption - Variant A)

	SECTORS	1969 Level		Investment Alternative a		Investment Alternative b		Investment Alternative c		Investment Alternative d	
1.	Agriculture	211.76	14.7	225.45	14.0	236.88	14.6	256.26	15.6	265.67	16.0
2.	Crude oil	380.50	26.4	422.70	26.2	422.70	26.0	422.70	25.7	422.71	25.4
3.	Mining & quarrying	6.02	.4	13.20	.8	13.30	.8	13.30	.8	13.30	.8
4.	Oil refining	21.82	1.5	39.00	2.4	39.00	2.4	39.00	2.4	44.43	2.7
5.	Manufacturing industries	198.49	13.8	206.69	12.8	206.69	12.7	206.69	12.6	206.69	12.4
6.	Electricity, gas & water	19.86	1.4	21.11	1.3	21.12	1.3	21.12	1.3	21.12	1.3
7.	Banking & insurance	16.86	1.2	16.86	1.0	16.90	1.0	16.90	1.0	16.90	1.0
8.	Trade	75.78	5.3	84.93	5.3	86.23	5.3	86.23	5.2	86.15	5.2
9.	Transport	120.51	8.4	122.58	7.6	122.58	7.5	122.58	7.4	122.58	7.4
10.	Construction	82.93	5.7	82.93	5.1	82.93	5.1	82.93	5.0	82.93	5.0
11.	Ownership of dwelling	21.97	1.5	27.00	1.7	27.00	1.7	27.00	1.6	27.00	1.6
12.	Public administration	211.39	14.7	233.13	14.4	233.13	14.3	233.13	14.2	233.13	14.0
13.	Services	74.98	5.2	118.45	7.3	118.50	7.3	118.50	7.2	118.5	7.1
	TOTAL	1442.87		1614.03		1626.96		1646.34		1661.11	

* Values in million ID

TABLE NO. 33

THE SECTORAL COMPOSITION OF GROSS OUTPUT IN 1974 *

(Minimum Exports & Government Consumption - Variant B)

SECTOR	Investment Alternative a		Investment Alternative b		Investment Alternative c		Investment Alternative d	
1. Agriculture	225.45	14.1	237.38	14.6	256.63	15.6	260.46	15.7
2. Crude oil	422.70	26.3	422.70	26.0	422.70	25.7	422.85	25.5
3. Mining & quarrying	13.20	.8	13.30	.8	13.30	.8	13.30	.8
4. Oil refining	39.00	2.4	39.00	2.4	39.00	2.4	48.17	2.9
5. Manufacturing industries	206.69	12.9	206.69	12.7	206.69	12.6	206.69	12.5
6. Electricity, gas & water	20.88	1.3	20.97	1.3	20.97	1.3	20.96	1.3
7. Banking & insurance	16.86	1.1	16.90	1.0	16.90	1.0	16.90	1.0
8. Trade	84.93	5.3	86.05	5.3	86.23	5.2	84.97	5.1
9. Transport	122.58	7.6	122.58	7.5	122.58	7.4	122.58	7.4
10. Construction	82.93	5.2	82.93	5.1	82.93	5.0	82.93	5.0
11. Ownership of dwelling	27.00	1.7	27.00	1.7	27.00	1.6	27.00	1.6
12. Public administration	233.13	14.5	233.13	14.3	233.13	14.2	233.13	14.1
13. Services	109.05	6.8	118.50	7.3	118.50	7.2	118.50	7.1
TOTAL	1604.40		1627.13		1646.56		1658.44	

* Values in million ID

lessen the dependence on the "foreign" crude oil extraction sector for its being the strategic factor in the development of the Iraqi economy. Thirdly, by increasing the investment level, the contribution of the manufacturing industries, construction, transportation and public administration sectors to gross output would decrease, whilst the contribution of services and petroleum products (mainly oil refining) will increase.

11.7 DEVELOPMENT STRATEGY FOR IRAQ

Having analysed the structural changes of the Iraqi economy since 1952 and in particular over the period 1969-74, the conditions surrounding the crude oil exports and production, the weakness of private activity, the growing dominant role of government in economic development, and the severe limitations on efficient allocation of resources, the following broad generalisations, and perhaps the outlines of a general strategy of public policy for promoting development during the next five years, 1969-74, at least, can be suggested.

Firstly; since oil revenue is the critical element in the process of growth and the crude oil exports and its production is beyond the government control and regulation, the economic policy should set as its main target to change the structure of the economy in such a way as to lessen its dependence on oil revenues. This implies the need for developing agriculture, "domestic" crude oil, and industrial sectors to secure a self-sustained growth in the future. Practically this means that at least 70% of oil revenues

should be devoted to capital accumulation. The government consumption on the other hand should be financed from taxes on non-oil sources. At the same time the economic potential of domestic raw materials, such as sulphur, should be exploited and directed to finance investment projects.

Secondly; to support the strategy of self-sustained growth, it is required to increase the level of exports, particularly from the agricultural sector, "national" crude oil production, and sulphur extraction, whereas non-complementary imports have to be reduced to their minimum levels. This policy should be directed to increase the level of investment by providing foreign currency from non-oil sources for importing the required capital goods.

Thirdly; since the rate of population growth is relatively high, and there exists unfavourable age structure and a low level of labour productivity, the employment problem must be of first priority in the targets of development plans. This target can be achieved by increasing the level of investment as suggested by this study; otherwise this problem would be a hindrance to development efforts.

Fourthly; however weak the role of private investment is, and whatever economic policy the government adopts, the private sector should be encouraged at this stage, through suitable incentives and measures, to contribute to overall development within the framework of the national development plan.

Fifthly; as a result of the lack of a clear and well-defined economic policy, the investment decisions on different levels were far from efficient. Economic decision-makers in the government often have rather primitive notions about development planning. The "socialist" ideology of the state is usually more concerned with the problems of ownership of the means of production, and has little to say specifically about decision-making and implementation. Thus the mechanism of the economic system should be defined in order to establish the criteria by which the relevant economic decisions are to be taken and carried out. Such an aim is prior to the implementation of any economic policy. Within the present political and social conditions this target can be practically achieved by the adoption of such a comprehensive planning model, as proposed by this study, in which the economic and social objectives of the society, as well as the government instruments, are defined and combined to produce an efficient, consistent and feasible detailed plan for economic development.

TABLE NO.34

SUMMARY OF THE RESULTS - I

(Values in million 1D)

Year 1974	Maximize Total Investment	Maximize National Income			Maximize Total Investment	Maximize National Income			Maximize Private Consumption
	Variant A				Variant B				Variant A Investment Alternative
	Investment Alternatives				Investment Alternatives				
	a	b	c	d	a	b	c	d	d
Private Consumption	600.49	601.52	601.26	605.97	601.50	611.68	611.57	614.97	606.08
plus Government Consumption	351.10	351.10	351.10	351.10	317.10	317.10	317.10	317.10	351.10
Total Consumption	951.59	952.62	952.36	957.07	918.60	928.78	928.67	932.07	957.18
plus Total Investment (GFCF)	296.40	312.16	336.92	360.78	291.52	312.16	336.92	360.78	359.81
plus Total Exports	460.45	460.45	460.45	460.45	454.40	454.40	454.40	454.40	460.45
minus Total Imports	301.56	301.17	298.20	301.59	295.50	295.52	292.66	295.48	301.59
minus Net Factor Income Abroad	218.90	213.90	218.90	218.90	218.90	218.90	218.90	218.90	218.90
equal Gross National Product at Market Prices	1187.98	1205.16	1232.63	1257.81	1150.12	1180.92	1208.43	1232.87	1256.95
minus Indirect Taxes plus subsidies	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00	105.00
minus Depreciation	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00
equal Net National Product at Factor Cost = National Income	1010.98	1028.16	1055.63	1080.81	973.12	1103.92	1131.43	1055.87	1079.95

TABLE NO. 35

SUMMARY OF THE RESULTS - II

	VARIANT A				VARIANT B			
	Investment Alternatives				Investment Alternatives			
	a	b	c	d	a	b	c	d
Crude oil exports	419.50	419.50	419.50	419.50	419.50	419.50	419.50	419.50
Non-oil exports	40.95	40.95	40.95	40.95	33.90	33.90	33.90	33.90
Total exports	460.45	40.95	40.95	40.95	454.40	454.40	454.40	454.40
Foreign loans	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Net factor of income abroad*	218.90	218.90	218.90	218.90	218.90	218.90	218.90	218.90
Competitive imports	107.85	99.43	87.88	82.77	105.74	98.09	86.66	81.11
Complementary imports**	193.71	201.74	210.32	218.82	189.76	197.43	206.00	214.37
Total import	301.56	301.17	298.20	301.59	295.50	295.52	292.666	295.48

* Net factor of income abroad includes 50% of total oil exports, i.e. 209.75 million ID, plus 9.15 million ID total amortization of foreign loans plus rate of interest.

**The maximum level of the exogenous complementary imports of government consumption is estimated at 49.805 million ID while the minimum level is estimated to be 44.98 million ID.

TABLE NO. 36

SUMMARY OF THE RESULTS - III

	1969	1974							
		VARIANT A				VARIANT B			
		Investment Alternatives				Investment Alternatives			
		a	b	c	d	a	b	c	d
National income (million ID)	827	1011	1028	1056	1081	973	1104	1131	1096
Population (million)	9205	10828	10828	10828	10828	10828	10828	10828	10828
Per capita income (ID)	89.8	93.4	94.9	97.5	99.8	89.9	92.7	95.2	97.5
Employment (million)		3091	3211	3443	3555	3049	3217	3447	3490

TABLE NO. 37

SUMMARY OF THE RESULTS - IV

	Values in 1969	Compound Rates of Growth, 1969-74							
		VARIANT A				VARIANT B			
		Investment Alternatives				Investment Alternatives			
		a	b	c	d	a	b	c	d
Private consumption	512	3.2	3.3	3.1	3.4	3.3	3.6	3.6	3.7
Government consumption	252	6.9	6.9	6.9	6.9	5.2	5.2	5.2	5.2
Total Consumption	764	4.5	4.5	4.5	4.6	3.7	3.9	3.9	4.0
Total investment (GFCF)	159	13.1	14.5	16.2	17.9	12.9	14.5	16.2	17.9
Crude oil exports	379	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Non-oil exports	29	7.2	7.2	7.2	7.2	4.4	4.4	4.4	4.4
Total exports	408	2.4	2.4	2.4	2.4	2.2	2.2	2.2	2.2
Competitive imports	78	6.8	4.9	2.4	1.3	6.3	4.7	2.2	.8
Complementary imports	130	18.5	18.2	18.0	18.4	17.9	17.9	17.7	17.9
Total imports	208	7.6	7.6	7.5	7.6	7.3	7.3	7.1	7.3
G.N.P.	928	5.1	5.4	5.9	6.2	4.3	4.9	5.4	5.9
National income	827	4.1	4.4	5.0	5.5	3.3	4.0	4.5	5.0
Per capita income	89.8	.8	1.1	1.6	2.1	.1	.5	1.1	1.6
Population (thousands)	9205	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Employment (thousands)	2710	2.7	3.5	4.9	5.5	2.3	3.5	4.9	5.2
Gross Output	1443	213	2.4	2.7	2.8	2.1	2.4	2.7	2.8

TABLE NO. 38

THE VALUES OF THE DUAL VARIABLES

SUMMARY OF THE RESULTS -- V

No. of the constraints		To minimise total investment		To maximise national income: Minimum exports & government consumption	
		Max. exports & government consumption	Min. exports & government consumption	Investment 5% more than the minimum	Investment 10% more than the minimum
1	Production Sector 1	-	-	1.1653	1.000
4	" " 3	.30499	.30499	.94240	2.4097
5	" " 4	-	-	1.1653	1.000
6	" " 5	-	-	1.1653	1.000
7	" " 6	3.2228	3.2228	2.5548	2.1886
8	" " 7	-	-	.94240	.95057
9	" " 8	-	-	.94240	.95057
10	" " 9	-	-	.94240	.95057
11	" " 10	-	-	-	-
12	" " 11	19.729	19.729	10.582	9.0517
13	" " 12	-	-	-	-
14	" " 13	.46701	.46701	.94240	.95057
15	Foreign exchange	-	-	.16534	-
16	Financial capacity	-	-	.11296	1.1098

No. of the constraints		To minimise total investment		To maximise national income	
		Minimum exports & government consumption			
		Max. exports & government consumption	Min. exports & government consumption	Investment 5% more than the minimum	Investment 10% more than the minimum
41	Private consumption (minimum level) C_1^p	-	-	.22294	.04930
42	" C_3^p	.30499	.30499	-	1.4591
43	" C_4^p	-	-	.22294	.0493
44	" C_5^p	-	-	.22294	.0493
45	" C_6^p	3.2228	3.2228	1.6124	1.2381
46	" C_7^p	-	-	-	-
47	" C_8^p	-	-	-	-
48	" C_9^p	-	-	-	-
49	" C_{11}^p	19.729	19.729	-	8.1011
50	" C_{13}^p	.46701	.46701	.59604	.65335
51	Investment (minimum level) I_1	1.0001	1.0001	-	-
52	" I_5	1.0047	1.0047	.78504	.67675
53	" I_8	1.0586	1.0586	-	-
54	" I_9	1.0020	1.0020	.62943	.52534

No. of the constraints			To minimise total investment		To maximise national income	
					Minimum exports & government consumption	
			Max. exports & government consumption	Min. exports & government consumption	Investment 5% more than the minimum	Investment 10% more than the minimum
55	Investment (minimum level)	I_{11}	-	-	-	-
56	"	I_{12}	1.000	1.000	.58193	.49790
57	"	I_{13}	-	-	-	-
58	Output (minimum level)	X_1	-	-	-	-
61	"	X_3	-	-	.70545	2.2062
62	"	X_4	-	-	-	-
63	"	X_5	-	-	-	-
64	"	X_6	-	-	-	-
65	"	X_7	.0054787	.0054787	.72421	.76381
66	"	X_8	-	-	-	-
67	"	X_9	-	-	-	-
68	"	X_{10}	-	-	-	-
69	"	X_{11}	-	-	-	-
70	"	X_{12}	-	-	-	-
71	"	X_{13}	-	-	.46864	.54284
72	Employment (minimum level)		-	-	-	-

No. of the Constraint			Investment 10% more than the minimum	To max. national income Max. exports & government consumption Investment maximum level	Investment maximum level	To max. private Consumption Min. exports & government consumption Investment maximum level
1	Production Sector	1	1.000	.93592	1.0618	.94459
4	"	" 3	2.4097	2.5019	.91392	2.6960
5	"	" 4	1.000	.93592	.91392	1.0294
6	"	" 5	1.000	1.2963	1.7414	1.1210
7	"	" 6	2.1886	2.0420	2.3304	2.0557
8	"	" 7	.95057	.93592	.91392	.94459
9	"	" 8	.95057	.93592	.91392	.94459
10	"	" 9	.95057	.93592	.91392	.94459
11	"	" 10	-	-	-	-
12	"	" 11	9.0517	6.8876	6.7489	7.7194
13	"	" 12	-	-	-	-
14	"	" 13	.95057	.93592	.91392	.94459
15	Foreign exchange		-	.29629	.74143	1.1210
16	Financial capacity		1.098	.89668	.73430	-
41	Private consumption (minimum level)	C_1^p	.04943	-	.14793	-
42		C_3^p	1.4591	1.566	-	1.7514
43		C_4^p	.04943	-	-	0.08480
44		C_5^p	.04943	.36037	.82751	.17644
45		C_6^p	1.2381	1.1061	1.4165	1.1112

No. of the Constraint			Investment 10% more than the minimum	Investment maximum level	Investment maximum level	Investment maximum level
46	Private consumption (minimum level)	C_7^p	-	-	-	-
47		C_8^p	-	-	-	-
48	"	C_9^p	-	-	-	-
49	"	C_{11}^p	8.1011	5.9517	5.8340	6.7748
50	"	C_{13}^p	-	-	-	-
51	Investment (minimum level)	I_1	-	-	-	-
52	"	I_5	.67675	.60977	.67383	.62606
53	"	I_8	-	-	-	-
54	"	I_9	.52534	.46202	.52527	.47672
55	"	I_{11}	-	-	-	-
56	"	I_{12}	.49790	.39982	.41021	.43511
57	"	I_{13}	-	-	-	-
58	Output (minimum level)	X_1	-	-	-	-
61	"	X_3	2.2062	2.3331	.74500	-
62	"	X_4	-	-	-	1.7514

No. of the Constraint			Investment 10% more than the minimum	Investment maximum level	Investment maximum level	Investment maximum level
63	Output (minimum level)	X_5	-	-	-	.084804
64	"	X_6	-	-	-	.17644
65	"	X_7	.76381	.77754	.74625	1.1112
66	"	X_8	-	-	-	-
67	"	X_9	-	-	-	-
68	"	X_{10}	-	-	-	-
69	"	X_{11}	-	-	-	-
70	"	X_{12}	-	-	-	6.7748
71	"	X_{13}	.54284	.55075	.48385	-
72	Employment (minimum level)		-	-	-	-

TABLE NO. 39

A MULTISECTORAL MODEL FOR THE IRAQI ECONOMY - VARIANT B

No.	Private consumption	Investment	Complementary imports (in terms of output)	Competitive imports	≤	Constants
	1	1011	2223	3536	40	
1	Objective function					
2 14	Balanced relations					
15	Foreign exchange constraint					
16	Financial capacity constraint					
17 40	Investment definition constraints					
41 50	Private consumption constraints					
51 57	Investment lower bounds					
58 71	Output constraints					
72	Employment constraint					

Constraints

| | | |

| | | |

| | | |

0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.0000	2.0000 -5	-1.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	6.8630 -2	0.0000	-1.0000	0.0000	0.0000	0.0000
7.5300 -2	1.0788 -1	0.0000	0.0000	-1.0000	0.0000	0.0000
0.0000	7.7600 -3	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	4.6000 -3	0.0000	0.0000	0.0000	-1.0000	0.0000
0.0000	1.1000 -3	0.0000	0.0000	0.0000	0.0000	-1.0000
0.0000	7.4300 -3	0.0000	0.0000	0.0000	0.0000	0.0000
8.3170 -1	1.6627 -1	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.8150	4.4200 -1	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000

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A P P E N D I X I

Computer Programmes

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JOBSAADI/ABSS/PROG1/SS00/15                    12/03/70   10.21.59
                  *CARDLIST
                  *TABLES
                  *XEQ
JOB ORGANISER ENTERED  10.22.06        12/03/70
                  *CHAIN1
                  *FORTRAN
EGTRAN COMPILER          MARK NO. 302      DATE  12/03/70          TIME 10.22.08
      DIMENSION BIM9(47,47), UN(47,47), AIM9(47,47),
     1OUTP(47),CNT(47),EINT(47),FD(47)
      READ 4,((AIM9(I,J),J=1,47),I=1,47)
 4    FORMAT(11F6.4/11F6.4/11F6.4/11F6.4/3F6.4)
      READ 120,(FD(I),I=1,47)
      READ 120,(EINT(I),I=1,47)
 120  FORMAT(10F8.1/10F8.1/10F8.1/10F8.1/7F8.1)
      DO 16 I=1,47
      DO 16 J=1,47
       IF(I.NE.J) 10
           UN(I,J)=1
       GO TO 16
 10    UN(I,J)=0
 16    CONTINUE
       DO 20 I=1,47
       DO 20 J=1,47
 20    BIM9(I,J)= UN(I,J) - AIM9(I,J)
       EPS=10**(-6)
       CALL INV (47,BIM9,EPS,DELTA)
       PRINT 30,((BIM9(I,J),J=1,47),I=1,47)
 30    FORMAT(1X,10F8.5/10F8.5/10F8.5/10F8.5/7F8.5/)
       DO 40 I=1,47
      CNT(I)=0.0
 40    OUTP(I)=0
       DO 50 I=1,47
       DO 50 J=1,47
       OUTP(I)= OUTP(I)+BIM9(I,J)*FD(J)
 50   CNT(I)=CNT(I)+AIM9(I,J)*EINT(J)
      PRINT 60,(OUTP(I),I=1,47)
      PRINT 60,(CNT(I),I=1,47)
 60       FORMAT(10X,1F14.5)
       CALL EXIT
       END
```

```
EGTRAN COMPILER     MARK NO. 302          DATE 12/03/70   TIME 10.22.15
      SUBROUTINE INV(N,A,EPS,DELTA)
         DIMENSION A(N,N),B(100),C(100),IZ(100)
      DELTA=1.0
      DO 100 J=1,N
  100 IZ(J)=J
      DO 105 I=1,N
      K=I
      Y=A(I,I)
      IP=I+1
      IF(I.EQ.N)110
      DO 101 J=IP,N
      W=A(I,J)
      IF(ABS(W).LE.ABS(Y))101
      K=J
      Y=W
  101 CONTINUE
  110 DELTA=DELTA*Y
      IF(ABS(Y).GE.EPS)102
      PRINT 103
  103 FORMAT(1X,8HSINGULAR)
         RETURN
  102 Y=1.0/Y
      DO 104 J=1,N
      C(J)=A(J,K)
      A(J,K)=A(J,I)
      A(J,I)=-C(J)*Y
      B(J)=A(I,J)*Y
  104 A(I,J)=B(J)
      A(I,I)=Y
      J=IZ(I)
      IZ(I)=IZ(K)
      IZ(K)=J
      DO 105 K=1,N
      DO 105 J=1,N
      IF(K.EQ.I.OR.J.EQ.I)105
      A(K,J)=A(K,J)-B(J)*C(K)
  105 CONTINUE
      DO 106 I=1,N
  109 K=IZ(I)
      IF(K.EQ.I)106
      DO 108 J=1,N
      W=A(I,J)
      A(I,J)=A(K,J)
  108 A(K,J)=W
      IP=IZ(I)
      IZ(I)=IZ(K)
      IZ(K)=IP
      DELTA=-DELTA
       GO TO 109
  106 CONTINUE
      RETURN
      END
```

```
JOBSAADI/AESS/PROG2/SSOO/2                          13/05/70     12.14.50
                *XEQ
                *CARDLIST
                *TABLES
                *SUBFILEPHAMLIBRARY
JOB ORGANISER ENTERED 12.14.57                13/05/70
                *CHAIN1
                *FORTRAN
EGTRAN COMPILER          MARK NO. 302              DATE    13/05/70 TIME 12.15.0
       DIMENSION ATM9(47,47),FLOW(47,47),GFLOW(13,13),GIM9(13,13),
     1 UN(13,13)
     1OUTP(47),11(47),GINV(13,13),GDF(13,ONT(13),GOUTP(13),COUTP(13)
       READ 4,((ATM9(I,J),J=1,47),I=1,47)
  4     FORMAT(11F6.4/11F6.4/11F6.4/11F6.4/3F6.4)
       READ 6,(OUTP(I),I=1,47)
  6     FORMAT(10F8.1/10F8.1/10F8.1/10F8.1
        READ 444,(IT(I),I=1,47)
 444    FORMAT(4012/712)
         READ 448,(GDF(I),I=1,13)
       READ 448,(GOUTP(I),I=1,13)
 448    FORMAT(8F9.1/5F9.1)
        DO 10 I=1.47
        DO 10 J=1,47
  10    FLOW(I'J)=ATM9(I'J*OUTP(J)
        PRINT 20,((FLOW(I,J),J=1,47),I=1,47)
  20    FORMAT(IX,7F14.5/7F14.5/7F14.5/7F14.5/7F14.5/7F14.5/5F14.5/)
        DO 30 I=1,13
        DO 30 J=1,13
  30    GFLOW(I,J)=0.0
        DO 40 I=1,47
        DO 40 J=1,47
        M=IT(I)
        N=IT(J)
  40    GFLOW(M,N)=GFLOW(M,N)+FLOW(I,J)
         PRINT 50,((GFLOW(I,J),I=1,13),J=1,13)
  50      FORMAT(IX,7F14.5/6F14.5/)
        Do 60 I=1'13
        DO 60 J=1,13
  60    GIM9(I,J)=GFLOW(I,J)/GOUTP(J)
        PRINT 70,((GIM9(I,J),J=1,13)I=1,13)
  70    FORMAT(IX,13F7.5)
        DO 80 I=1,13
         DO 80 J=1,13
        IF(I.NE.J)90
        UN(I,J)=1
         GO TO 80
  90    UN(I,J)=0.0
  80    CONTINUE
        DO 100 I=1,13
        DO 100 J=1,13
 100    GINV(1,J)=UN(I,J)-GIM9(I,J)
       CALL MBOIA(GINV,13,13)
        PRINT 110,((GINV(I,J),J=1,13),I=1,13)
```

```
110      FORMAT(1X,13F8.5)
         DO 120 I=1,13
         CNT(I)=0.0
120      COUTP(I)=0.0
         DO 130 I=1,13


         DO 130 J=1,13
130      COUTP(I)=COUTP(I)+GINV(I,J)*GDF(J)
         DO 135 I=1,13
         DO 135 I=1,13
135      CNT(I)=CNT(I)+GINV(I,J)*COUTP(J)
         PRINT 140, (COUTP(I),I=1,13)
         PRINT 140,(CNT(I),I=1,13)
140      FORMAT(10X,1F14.5)
         CALL EXIT
         END
```

A P P E N D I X II

Statistical Data

Table No. 40

National Income & Gross National Product of Iraq

by Industrial Origin in Million ID at Current Prices, 1953 up to 1969

Sectors	1953	1954	1955	1956	1957	1958	1959	1960	1961 /cont.
1. Agriculture, Forestry & Fisheries	71.50	84.72	65.32	89.23	111.57	92.76	82.01	97.84	116.98
2. Crude Oil	128.91	149.53	161.16	152.45	113.10	175.43	190.00	208.07	209.03
3. Mining & Quarrying	0.89	0.93	1.56	1.64	1.74	1.85	1.81	1.68	2.15
4. Petroleum Products (Oil refining)	1.91	2.46	3.45	4.19	4.99	5.74	6.45	7.79	9.39
5. Manufacturing Industries	17.83	19.42	23.47	27.88	30.26	31.05	38.38	46.61	50.12
6. Electricity, Gas & Water	1.46	1.78	2.17	2.53	2.68	2.78	2.97	3.62	4.96
7. Banking & Insurance	3.23	3.63	4.49	6.28	6.60	7.40	8.20	8.69	11.06
8. Wholesale & Retail Trade	17.85	20.68	21.48	26.90	29.67	27.52	26.23	32.55	36.58
9. Transport, Communication & Storage	21.37	22.06	24.56	27.55	29.92	30.61	34.29	39.72	45.95
10. Construction	11.27	17.21	21.29	24.83	27.68	29.83	28.72	23.08	23.88
11. Ownerships of Dwellings	11.61	11.90	12.15	12.47	12.80	12.51	11.58	11.89	12.13
12. Public Administration & Defence	18.29	20.80	24.34	28.12	32.06	37.57	45.65	45.71	51.46
13. Services	16.83	19.25	21.26	24.83	26.99	29.65	33.33	38.11	41.37
Gross Domestic Product at Factor Cost	322.95	374.37	386.70	428.90	430.06	484.70	509.62	565.36	615.06
Minus Net Factors Income Payments Abroad	57.63	67.66	71.18	65.49	46.40	78.45	85.73	95.33	94.20
Gross National Product at Factor Cost	265.32	306.71	315.52	363.41	383.66	406.25	423.89	470.03	520.86
Minus Depreciation	21.37	22.69	26.24	38.65	30.94	32.21	32.27	32.90	36.62
National Product at Factor Cost (National Income)	243.95	284.02	289.28	334.76	352.72	374.04	391.62	437.13	484.24

/cont.... Sectors	1962	1963	1964	1965	1966	1967	1968	1969
1. Agriculture, Forestry & Fisheries	140.38	109.30	148.10	162.70	172.73	181.39	190.46	198.08
2. Crude Oil	210.23	242.50	266.90	283.62	298.66	264.41	328.16	333.08
3. Mining & Quarrying	1.86	1.90	1.90	4.90	5.77	5.44	5.65	5.95
4. Petroleum Products (Oil refining)	9.67	10.10	10.40	13.26	14.27	14.58	16.41	17.72
5. Manufacturing Industries	55.41	54.10	53.00	52.53	57.63	68.42	71.01	76.70
6. Electricity, Gas & Water	5.54	5.20	7.70	9.80	12.35	13.38	15.79	18.14
7. Banking & Insurance	11.38	12.80	7.70	12.03	14.60	14.73	15.04	16.26
8. Wholesale & Retail Trade	38.56	35.90	44.50	50.65	56.43	56.55	60.28	64.26
9. Transport, Communication & Storage	47.02	48.80	54.95	56.10	57.82	60.60	64.58	67.68
10. Construction	19.64	20.30	18.70	23.93	27.91	26.69	29.36	32.29
11. Ownerships of Dwellings	12.45	12.40	14.80	14.19	14.54	15.10	15.85	16.65
12. Public Administration & Defence	59.76	67.40	81.20	97.85	104.17	105.54	116.53	128.56
13. Services	46.52	49.90	51.40	49.42	51.33	55.86	60.59	63.53
Gross Domestic Product at Factor Cost	658.42	670.60	.20	830.98	888.21	882.69	989.71	1038.95
Minus Net Factors Income Payments Abroad	93.87	108.10	123.70	129.60	137.70	122.60	156.80	159.40
Gross National Product at Factor Cost	564.55	562.50	637.50	701.38	750.51	760.09	832.91	879.55
Minus Depreciation	38.06	37.20	41.70	42.09	44.98	45.30	50.00	52.74
National Product at Factor Cost (National Income)	526.49	525.30	595.80	659.29	705.53	714.79	782.91	826.81

Source: As in Table No. 41

TABLE NO. 41

NATIONAL INCOME AND GROSS NATIONAL PRODUCTS OF IRAQ BY INDUSTRIAL ORIGIN IN MILLIONS ID AT 1966 CONSTANT PRICES (1953-69)

SECTORS	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
1. Agriculture	85.22	106.43	76.66	98.71	121.93	99.63	85.42	102.13	125.25	148.24	111.64
2. Crude oil extraction	153.65	187.85	184.18	168.64	123.61	188.43	197.92	217.19	223.80	222.00	247.70
3. Mining & quarrying	1.01	1.17	1.78	1.81	1.90	1.99	1.89	1.75	2.31	1.96	1.94
4. Oil products(refining)	2.23	3.09	3.94	4.63	5.45	6.17	6.72	8.13	10.05	10.21	10.32
5. Manufacturing ind.	21.25	24.40	26.82	30.84	33.07	33.35	39.98	48.65	53.66	58.51	55.26
6. Electricity, gas, water	1.74	2.24	2.48	2.80	2.93	2.99	3.09	3.78	5.31	5.85	5.31
7. Banking, insurance	3.85	4.56	5.14	6.95	7.21	7.95	8.54	9.07	11.84	12.02	13.07
8. Trade, wholesale & retail	21.28	25.98	24.55	29.76	32.43	29.56	27.32	33.98	39.16	40.72	36.67
9. Transportation	25.47	27.71	28.07	30.48	32.70	32.88	35.72	41.46	49.20	49.65	49.85
10. Construction	13.43	21.62	24.33	27.47	30.25	32.04	29.92	24.09	25.57	20.74	20.74
11. Ownership of dwellings	13.83	14.95	13.94	13.79	13.99	13.44	12.06	12.41	12.99	13.15	12.66
12. Public administration	21.8	26.13	27.82	31.10	35.04	40.35	47.55	47.72	55.09	63.10	68.85
13. Services	20.06	24.18	24.30	27.46	29.50	31.84	34.72	39.78	44.29	49.12	50.97
GDP at factor cost	384.92	470.31	442.01	474.44	470.01	520.62	530.85	590.14	658.52	695.27	684.98
+ net factor income from abroad	68.69	85.00	81.42	72.44	80.71	84.26	89.30	99.51	100.85	99.12	110.41
- net factor income abroad	316.23	385.31	360.59	402.00	419.30	436.36	441.55	490.63	557.67	596.15	574.57
GNP - depreciation	25.47	28.50	29.98	31.69	33.81	34.60	33.61	34.34	39.21	40.19	38.00
NNP = NI	290.76	356.81	330.61	370.31	385.49	401.76	407.94	456.29	518.46	555.96	536.57

SECTORS	1964	1965	1966	1967	1968	1969
1.	148.10	169.13	172.73	167.03	182.26	186.87
2.	266.90	294.82	298.66	243.47	314.03	314.23
3.	1.90	5.09	5.77	5.01	5.41	5.61
4.	10.40	13.78	14.27	13.43	15.71	16.72
5.	53.00	54.60	57.63	63.00	67.95	72.36
6.	7.70	10.19	12.35	12.32	15.11	17.11
7.	7.70	12.51	14.60	13.56	14.39	15.34
8.	44.50	52.65	56.43	52.07	57.68	60.62
9.	54.90	58.31	57.82	55.80	61.80	63.85
10.	18.70	24.88	27.91	24.58	28.09	30.46
11.	14.80	14.75	14.54	13.90	15.17	15.71
12.	81.20	101.71	104.17	97.18	111.51	121.28
13	51.40	51.38	51.33	51.44	57.98	59.98
GDP at factor cost	761.20	863.80	888.21	812.79	947.09	980.14
+ net income from abroad	123.70	134.72	137.70	112.89	150.05	150.38
- net factor income abroad						
GNP	637.50	729.08	750.51	699.90	797.04	829.76
- depreciation	41.70	43.75	44.98	41.71	47.84	49.75
NNP = NI	595.86	685.33	705.53	658.19	749.20	780.01

SOURCES: Compiled from:
Hasseeb, K., [41]
Hasseeb, K., [42]
Hasseeb, K., [43]
Rasaputram, W., [109]
"National Income of Iraq 1962-65 - Technical Note on the Estimation of National Income of the Republic of Iraq", in Ministry of Planning - C.S.O., "National Income of Iraq - Selected Studies", Baghdad, 1970.

Ministry of Planning, C.S.O., "National Income Estimations 1965-69", Preliminary report, Ministry of Planning, Baghdad, 1970.

TABLE NO. 42

GROSS DOMESTIC FIXED CAPITAL FORMATION OF DIFFERENT SECTORS OF THE IRAQI ECONOMY FOR THE YEARS 1953-69 (AT CURRENT PRICES (VALUE IN MILLION ID)

SECTOR	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
1. Agriculture	10.2	10.9	11.4	12.1	18.4	15.6	12.5	12.6	14.9	11.2	7.9	11.3	11.0
2. Crude oil extraction	9.1	9.7	10.2	10.7	5.0	5.9	15.0	22.9	22.6	5.0	1.1	.5	.6
3. Mining & quarrying	.1	.1	.1	.1	-	-	.1	.2	.2	-	-	-	-
4. Oil refining	2.7	2.7	2.7	2.7	1.6	.6	4.2	.2	1.6	.5	.9	3.2	2.8
5. Manufacturing industries	7.5	8.1	8.6	9.2	15.2	12.9	7.2	8.8	11.2	20.4	20.9	23.8	23.6
6. Electricity, gas & water	4.5	4.8	5.1	5.3	6.4	8.9	5.0	7.8	5.0	4.9	.5	1.4	7.0
7. Banking & insurance	.6	.6	.6	.7	.8	.9	.8	.5	.9	1.2	.1	.3	1.1
8. Trade - wholesale & retail	1.9	2.0	2.1	2.2	3.2	2.1	2.2	2.2	3.0	2.9	4.8	5.6	6.6
9. Transportation	18.3	19.3	20.4	21.5	23.6	21.9	20.6	25.5	32.1	28.9	24.4	25.2	20.1
10. Construction	1.4	1.5	1.6	1.7	2.9	2.1	1.8	1.3	1.9	1.6	1.5	1.4	1.8
11. Ownership of dwelling	15.8	16.7	17.7	18.6	19.0	17.0	22.3	23.1	25.8	24.2	22.4	25.0	27.1
12. Public administration	2.5	2.6	2.8	2.9	3.1	2.5	2.7	3.2	4.1	5.1	20.7	24.1	18.3
13. Services	7.6	8.0	8.5	8.9	7.1	7.5	9.2	11.9	13.9	13.3	14.7	25.8	11.4
TOTAL	82.2	87.0	91.8	96.6	106.3	97.9	103.6	120.2	137.2	119.2	119.9	147.6	131.4

TABLE NO. (continued)

		1966	1967	1968	1969
1.		13.9	18.4	20.7	17.5
2.		.4	.3	.3	.3
3.		-	-	-	-
4.		1.5	.7	.3	.3
5.		34.9	32.8	34.5	35.6
6.		5.2	16.6	10.5	10.8
7.		.2	.2	.6	.7
8.		6.8	6.4	7.1	7.3
9.		23.0	19.6	17.6	22.1
10.		2.1	2.0	2.2	2.2
11.		29.1	24.1	29.0	29.9
12.		19.9	19.0	20.7	21.3
13.		7.7	9.8	10.5	10.8
	TOTAL	144.7	149.9	154.2	159.0

SOURCES:
1. Hashim, J. M. "Capital Formation in Iraq for 1957-62", a Ph.D. dissertation submitted to the London School of Economics, July 1966.
2. Hashim, J. M., "Domestic Capital Formation in Iraq, 1957-69", unpublished paper in private circulation, Ministry of Planning, June 1970.
3. Ministry of Planning, C.S.O. Preliminary Report "Gross Domestic Fixed Capital Formation in the Iraqi Republic 1953-69", April, 1970.

NOTES: 1. The methodology of Dr. Hashim's estimations in are being used by the S.C.O.'s estimations as well. Thus in this respect the above compiled figures are uniform for the years 1953-69.

2. In the original statistics sectors 4 and 5 being one sector (manufacturing industries) the breakdown of the aggregated figures were based on the following:
   (i) for the years 1963-69 the values of capital formation of the oil refining being derived directly from the monthly industrial statistics;
   (ii) for the years 1957-62 derived from Hashim's estimation;
   (iii) for the years 1953-56 being derived by getting the accumulated figures of this sector at 1969 (29.1) then the difference between this value and total values estimated for the years

NOTES (continued)

1957-69 is divided by 4 (1953-56 to get the average as an approximate value for each year of the period 1953-56.

3. It is assumed that crude oil sector consists of about 99 per cent of the mining and quarrying sector - as it appears in oil statistics - and on this assumption we derive the values of both sectors 2 and 3 separately.

4. It was not possible to separate some of the government services which were accounted in public administration for the period 1963-69, see Table No. 6 in S.C.O.

TABLE NO. 43

GDFCF OF DIFFERENT SECTORS OF THE IRAQI ECONOMY FOR THE YEARS 1953-69

(AT 1956 CONSTANT PRICES)

SECTOR	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
1. Agriculture	11.9	13.4	12.7	13.1	19.7	16.4	12.7	12.8	15.6	11.6	7.9	11.1
2. Crude oil extraction	10.6	12.0	11.4	11.6	5.3	6.2	15.3	23.4	23.7	5.2	1.1	.5
3. Mining & quarrying	.1	.1	.1	.1	-	-	.1	.2	.2	-	-	-
4. Oil refining	3.1	3.3	3.0	2.9	1.7	.6	4.3	.2	1.7	.5	.9	2.9
5. Manufacturing industries	8.8	10.0	9.6	10.0	16.3	13.6	7.3	9.0	11.7	21.1	20.9	21.5
6. Electricity, gas & water	5.2	5.9	5.7	5.7	6.8	9.3	5.1	8.0	5.2	5.1	.5	1.4
7. Banking & insurance	.7	.7	.7	.7	.8	.9	.8	.5	.9	1.2	.1	.3
8. Trade - wholesale & retail	2.2	2.4	2.3	2.4	3.5	2.2	2.2	2.2	3.1	3.0	4.8	5.5
9. Transportation	21.3	23.8	22.8	23.2	25.2	23.0	21.0	26.0	33.6	29.9	24.4	24.7
10. Construction	1.6	1.8	1.8	1.8	3.1	2.2	1.8	1.3	2.0	1.7	1.5	1.4
11. Ownership of dwellings	18.4	20.5	19.8	20.1	20.3	17.9	22.7	23.6	27.0	25.0	22.4	24.5
12. Public administration	2.9	3.2	3.1	3.1	3.3	2.6	2.7	3.3	4.3	5.3	20.7	23.6
13. Services	8.8	9.8	9.5	9.6	7.6	7.9	9.3	12.2	14.6	13.7	14.7	25.3
TOTALS	95.6	106.9	102.5	104.3	113.6	102.8	105.3	122.7	143.6	123.3	119.9	144.7

TABLE NO. (continued)

SECTOR	1965	1966	1967	1968	1969
1.	11.4	13.9	18.3	20.4	17.1
2.	.6	.4	.3	.5	.5
3.	-	-	-	-	-
4.	2.9	1.5	.7	.3	.2
5.	24.5	34.9	32.5	34.0	29.9
6.	7.3	5.2	16.5	10.2	10.6
7.	1.1	.2	.2	.5	.6
8.	6.9	6.8	6.4	7.0	7.2
9.	20.9	23.0	19.5	17.3	21.6
10.	1.9	2.1	2.0	2.2	2.2
11.	28.2	29.1	23.9	28.6	29.3
12.	19.0	19.9	18.9	20.4	20.8
13.	11.8	7.7	9.8	10.3	10.6
TOTALS	136.5	144.7	149.0	151.9	155.7

SOURCE: As for Table 42.

TABLE NO. 44

CLASSIFICATION OF GROSS DOMESTIC FIXED CAPITAL FORMATION BY TYPE OF ASSETS 1953-69 (AT CURRENT PRICES)

(Values in million ID)

	Total 1+2+3+4+5+6	Machinery & Equipment 1	Furniture & fixture 2	Total 1 + 2	Non-residential building 3	Other construction & work 4	3 + 4	Transportation Equipment 5	Residential Building 6
1953	82.2	13.9	2.2	16.1	11.8	32.4	44.2	6,1	15.8
1954	87.0	14.7	2.4	17.1	12.5	34.3	46.8	6.4	16.7
1955	91.8	15.5	2.5	18.0	13.2	36.2	49.4	6.8	17.6
1956	96.6	16.3	2.6	18.9	13.9	38.1	52.0	7.2	18.5
1957	106.3	23.3	2.4	25.7	16.0	38.6	54.6	7.0	19.0
1958	97.9	17.8	2.5	20.3	13.5	39.9	53.4	7.2	17.0
1959	103.6	15.0	2.9	17.9	15.3	42.3	57.6	5.8	22.3
1960	120.2	16.6	3.7	20.3	13.7	53.4	67.1	9.7	23.1
1961	137.2	20.4	3.6	24.0	20.2	55.6	75.8	11.6	25.8
1962	119.2	22.5	3.5	26.0	19.6	39.8	59.4	9.6	24.2
1963	119.9	23.5	2.6	26.1	23.0	41.9	64.9	6.5	22.4
1964	147.6	23.3	2.1	25.4	35.0	54.2	89.2	8.0	25.0
1965	131.4	25.9	3.9	29.8	19.2	46.2	65.4	9.1	27.1
1966	144.7	34.0	4.3	38.3	15.5	45.7	61.2	16.1	29.1
1967	149.9	35.4	4.1	39.5	19.0	55.6	74.6	11.7	24.1
1968	154.2	35.4	4.7	40.1	19.5	55.5	75.0	10.1	29.0
1969	159.0	36.2	4.9	41.1	19.9	56.9	76.8	11.2	29.9

2018.7 431.6

SOURCES: 1. Hashim, J. M., "Capital Formation in Iraq for 1957-62", a Ph.D. dissertation submitted to the London School of Economics, University of London, July 1966.

2. Hashim, J. M. "Domestic Capital Formation in Iraq for 1957-69", unpublished paper in private circulation, Ministry of Planning, June 1970.

3. Ministry of Planning, C.S.O., "A Preliminary Report on Gross Domestic Fixed Capital Formation in the Iraqi Republic, 1953-69", April 1970.

TABLE NO. 45

The input-output technology matrix of the Iraqi economy (of 47 sectors)

SOURCE: Shair, K., "The Input-output Coefficient", mimeographed, Ministry of Planning, Baghdad, February 1969.

NB: The index of sectors is given in Table No. 30.

	1	2	3	4	5	6	7	8
1.	0.0894	-	-	-	0.0914	-	-	-
2.	-	0.0229	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	0.0038	-
8.	-	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-	-
10.	-	-	-	-	-	-	-	-
11.	-	-	-	-	-	-	-	-
12.	-	-	-	-	-	-	-	-
13.	-	-	-	-	-	-	0.0007	-
14.	-	-	-	-	-	-	0.0001	-
15.	-	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-	-
17.	-	-	-	-	-	-	-	-
18.	-	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-	-
21.	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	-	-
23.	-	-	-	-	-	-	0.0004	-
24.	-	-	-	-	-	-	-	-
25.	-	-	-	-	-	-	-	-
26.	-	-	-	-	-	-	0.0001	-
27.	-	-	-	-	-	-	-	-
28.	0.0285	0.0322	0.0271	-	-	0.2492	0.0013	-
29.	0.0036	0.0052	0.0039	-	-	-	-	-
30.	-	-	-	-	-	-	-	-
31.	-	-	-	-	-	-	0.0023	-
32.	-	-	-	-	-	-	0.0001	-
33.	-	-	-	0.0227	-	-	0.0048	0.0063
34.	-	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-	-
36.	-	-	-	-	-	-	-	-
37.	-	-	-	-	-	-	-	-
38.	-	-	-	-	-	-	-	0.0066
39.	-	-	-	-	-	-	0.0016	-
40.	0.0118	0.0123	0.0147	0.0272	0.0048	-	0.0045	-
41.	0.0051	0.0057	0.0087	0.0089	0.0024	-	0.0046	0.0075
42.	-	-	-	-	-	-	-	-
43.	-	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-	-
45.	-	-	-	-	-	-	-	-
46.	-	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-	-



	9	10	11	12	13	14	15	16
1.	-	-	0.7622	0.8384	-	0.0106	0.1606	-
2.	-	-	-	-	0.0002	-	-	-
3.	-	-	-	-	0.0541	-	-	-
4.	-	-	-	-	-	-	-	-
5.	-	-	-	-	0.0939	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-	-
10.	-	-	-	-	-	-	-	-
11.	-	-	-	-	0.2752	-	-	-
12.	-	-	-	-	-	-	-	-
13.	-	-	-	-	0.1634	0.3272	0.0017	-
14.	-	-	-	-	-	0.0079	-	-
15.	-	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-	-
17.	-	-	-	-	0.0001	-	-	0.0200
18.	-	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-	-
21.	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	-	-
23.	-	-	-	-	-	-	-	-
24.	-	-	0.0172	0.0083	0.0629	0.0516	0.0373	0.0144
25.	-	-	-	-	-	0.0008	0.0019	-
26.	-	-	-	-	0.0001	0.0019	0.0015	-
27.	-	-	-	-	0.0018	-	-	-
28.	-	0.0998	0.0096	0.0013	0.0229	0.0140	0.0014	-
29.	-	-	-	-	-	-	-	-
30.	-	-	-	-	-	-	-	-
31.	0.0250	-	0.0035	-	0.0016	0.0260	0.0006	0.1762
32.	-	-	0.0002	-	0.0010	-	-	-
33.	0.0400	-	0.0140	0.0026	0.0018	0.0039	0.0030	0.0400
34.	-	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-	-
36.	-	-	-	-	-	-	-	-
37.	-	-	-	-	-	-	-	-
38.	0.0500	-	0.0053	0.0022	0.0045	0.0055	0.0083	0.0720
39.	-	-	-	-	0.0010	0.0036	0.0010	-
40.	-	-	0.0308	0.0099	0.0178	0.0379	0.1506	0.0144
41.	-	-	0.0308	0.0096	0.0178	0.0377	0.0723	0.0144
42.	-	-	-	-	0.0007	0.0041	0.0022	-
43.	-	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-	-
45.	-	-	-	-	-	-	-	-
46.	-	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-	-

	17	18	19	20	21	22	23	24
1.	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-
5.	0.0678	-	-	-	0.4528	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-	-
10.	-	-	-	-	-	-	-	-
11.	-	-	-	-	-	-	-	-
12.	0.1470	-	-	-	-	-	-	-
13.	0.0020	-	-	-	-	-	-	-
14.	-	-	-	-	-	-	-	-
15.	-	-	-	-	-	-	-	-
16.	0.1030	-	-	-	-	-	-	-
17.	0.0612	0.1088	0.5196	0.0469	0.0031	-	0.0070	-
18.	-	0.0483	0.0026	0.0037	0.0031	-	-	0.2941
19.	-	-	-	-	-	-	-	-
20.	-	-	-	0.0140	-	-	-	-
21.	-	-	-	0.3786	-	-	-	-
22.	-	-	-	-	-	0.4953	0.5070	0.1470
23.	-	-	-	-	-	-	-	-
24.	0.0040	-	0.0013	0.0005	0.0025	-	-	-
25.	0.0006	-	-	-	0.0025	0.0021	-	0.1471
26.	0.0008	-	-	-	-	-	-	0.0735
27.	-	-	-	-	-	-	-	-
28.	0.0081	0.0060	0.0003	0.0055	0.0075	0.0016	-	-
29.	-	-	-	-	-	-	-	-
30.	-	-	-	-	-	-	-	-
31.	0.0601	-	-	0.0081	0.1393	0.0375	-	0.0294
32.	-	-	-	-	-	-	0.0070	0.0441
33.	0.0159	0.0091	0.0003	0.0083	0.0119	0.0134	0.2238	0.1471
34.	-	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-	-
36.	-	-	-	-	-	-	-	-
37.	-	-	0.0010	-	-	-	-	-
38.	0.0168	0.0181	0.0016	0.0067	0.0031	0.0070	-	-
39.	0.0016	0.0030	-	0.0005	0.0013	-	-	-
40.	0.0227	0.0151	0.1235	0.0439	0.0412	0.0416	0.1119	0.0735
41.	-	-	-	-	-	0.0204	-	-
42.	0.0007	-	0.0009	0.0025	0.0025	-	-	-
43.	-	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-	-
45.	-	-	-	-	-	-	-	-
46.	-	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-	-

	25	26	27	28	29	30	31	32
1.	-	-	0.1898	-	-	-	-	-
2.	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	0.0001
5.	-	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	0.0383	-	-	-	-
8.	-	-	-	-	0.0253	-	-	-
9.	-	-	-	-	0.1110	-	-	-
10.	-	-	-	0.0010	-	-	0.0032	0.0013
11.	-	-	-	-	-	-	-	-
12.	-	-	-	-	-	-	-	-
13.	-	-	0.0012	0.0002	-	0.0821	-	-
14.	-	-	-	-	-	-	0.0809	-
15.	-	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-	-
17.	-	-	-	-	-	-	-	-
18.	-	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-	-
21.	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	0.0587	-
23.	-	-	-	-	-	-	-	-
24.	0.0250	-	0.0416	0.0005	0.0295	-	0.0587	0.0378
25.	-	0.6207	-	-	-	-	-	0.0023
26.	-	-	0.0020	0.0002	-	-	-	0.0006
27.	-	-	0.2082	-	-	-	0.0349	-
28.	-	0.0034	0.0039	0.0118	-	0.0082	0.0063	0.1073
29.	-	-	-	-	-	-	-	-
30.	-	-	-	-	-	-	-	-
31.	0.0100	0.0149	0.1041	0.0069	0.0200	0.0657	0.0833	0.0043
32.	-	-	-	-	-	-	-	0.0450
33.	0.0900	0.0069	0.0055	0.0146	0.0295	-	0.0063	0.0345
34.	-	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-	-
36.	-	-	-	-	-	-	-	-
37.	-	-	-	-	-	-	-	-
38.	0.0400	0.0076	0.0039	0.0001	0.0555	0.0021	0.0087	0.0111
39.	-	-	0.0070	0.0002	-	-	0.0119	0.0027
40.	-	0.0168	0.0254	0.1650	0.0147	0.0021	0.0087	0.0665
41.	0.0850	0.0168	0.0254	0.0175	0.0147	0.0021	0.0079	0.0332
42.	-	-	0.0007	0.0010	-	-	0.0056	0.0003
43.	-	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-	-
45.	-	-	-	-	-	-	-	-
46.	-	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-	-

	33	34	35	36	37	38	39	40
1.	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	-	-
8.	-	-	-	-	-	0.0750	-	-
9.	-	-	-	-	-	-	-	-
10.	0.0009	-	-	-	0.0344	-	-	-
11.	-	-	-	-	-	-	-	-
12.	-	-	-	-	-	-	-	-
13.	-	-	-	-	-	-	-	-
14.	-	-	-	-	-	-	-	-
15.	-	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-	-
17.	-	-	-	-	-	0.0004	-	-
18.	-	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-	-
21.	-	-	-	-	-	-	-	-
22.	0.0039	-	-	0.0020	-	-	-	-
23.	-	-	-	-	-	-	-	-
24.	0.0019	0.0009	-	-	-	-	-	0.0412
25.	-	-	-	-	-	-	-	-
26.	-	-	-	-	-	0.0035	0.0004	0.0041
27.	-	-	-	-	-	-	-	-
28.	0.0058	0.0003	0.0241	0.0191	0.0069	0.0720	-	-
29.	-	-	-	-	-	-	-	-
30.	-	-	-	-	-	-	-	-
31.	0.0031	-	0.0029	0.0006	0.4345	0.0046	-	-
32.	0.0007	-	-	-	0.0069	-	-	-
33.	0.0482	-	0.0096	0.0024	-	0.0655	-	-
34.	-	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-	-
36.	-	-	-	-	-	-	-	-
37.	-	-	-	-	-	-	-	-
38.	0.0061	0.0024	0.0193	0.0067	0.0138	0.0260	0.0017	0.0074
39.	0.0010	-	-	-	-	-	-	0.0411
40.	0.0207	0.0025	-	-	0.0276	0.0035	-	-
41.	-	0.0025	0.0482	0.0478	-	0.0035	-	0.1210
42.	-	-	-	-	-	-	-	-
43.	-	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-	-
45.	-	-	-	-	-	-	-	-
46.	-	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-	-

	41	42	43	44	45	46	47
1.	0.0119	-	-	-	-	-	-
2.	-	-	-	-	-	-	-
3.	-	-	-	-	0.0001	-	-
4.	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-
6.	-	-	-	-	-	-	-
7.	-	-	-	-	-	-	-
8.	-	-	-	-	-	-	-
9.	-	-	-	-	-	-	-
10.	-	0.0640	-	-	-	-	-
11.	-	-	-	-	-	-	-
12.	-	-	-	-	-	-	-
13.	0.0037	-	-	-	0.0050	-	-
14.	-	-	-	-	-	-	-
15.	-	-	-	-	-	-	-
16.	-	-	-	-	-	-	-
17.	-	-	-	0.0091	0.0001	-	-
18.	-	-	-	-	-	-	-
19.	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-
21.	-	-	-	-	-	-	-
22.	0.0006	0.0136	-	-	0.0005	-	-
23.	0.0002	0.0563	-	-	-	-	-
24.	-	-	-	-	-	-	-
25.	-	0.0001	-	0.0016	0.0017	-	-
26.	0.0019	-	0.0025	0.0061	-	-	-
27.	-	-	-	-	-	-	-
28.	0.1037	0.0204	0.0004	0.0027	0.0003	-	-
29.	-	-	-	-	-	-	-
30.	-	-	-	0.2200	-	-	-
31.	0.0034	0.0135	-	-	0.0004	-	-
32.	-	0.1933	-	-	-	-	-
33.	0.0006	0.1000	0.0001	0.0011	0.0028	-	-
34.	-	-	-	-	-	-	-
35.	-	-	-	-	-	-	-
36.	0.0998	-	-	-	-	-	-
37.	-	-	-	0.0008	-	-	-
38.	0.0067	0.0003	0.0057	0.0200	0.0050	0.0053	
39.	-	0.0023	-	-	0.0214	-	-
40.	-	0.0553	-	-	0.0051	-	-
41.	-	0.0553	0.0050	0.0206	0.0051	-	-
42.	0.0340	-	0.0168	0.0009	0.0076	0.2000	-
43.	-	-	-	-	-	-	-
44.	-	-	-	-	-	-	-
45.	-	-	0.1000	0.0090	-	-	-
46.	-	-	-	-	-	-	-
47.	-	-	-	-	-	-	-

TABLE NO. 46

GROWTH OF POPULATION, LABOUR FORCE AND EMPLOYMENT, 1960-69

Year	Civilian Employed Population	Annual Increase Per cent	Labour Force	Annual Increase Per cent	Total Population	Armed Forces	Unemployment	Annual Increase
1960	2.358	-	3.299	-	6.885	.200	.941	-
1961	2.413	2.3	3.381	2.5	7.098	.210	.968	2.9
1962	2.472	2.4	3.467	2.5	7.321	.215	.995	2.8
1963	2.534	2.5	3.557	2.6	7.554	.220	1.023	2.8
1964	2.576	1.6	3.651	2.7	7.798	.220	1.076	5.2
1965	2.627	2.0	3.747	2.6	8.047	.230	1.120	4.1
1966	2.657	1.1	3.868	3.2	8.308	.230	1.211	8.1
1967	2.670	.5	3.994	3.3	8.580	.240	1.323	9.3
1968	2.697	1.0	4.124	3.3	8.860	.260	1.427	8.9
1969	2.710	.5	4.260	3.3	9.149	.270	1.551	8.6

SOURCE: See Chapter VI, Section 6 and Chapter X, Section 3.4.

TABLE NO. 47

NOMINAL CAPITALS OF IRAQI COMPANIES AND TOTAL OF FOREIGN CAPITALS THEREIN AND PERCENTAGE AT THE END OF 1968

Sector	Total of Nominal Capitals (1)	Total Contribution of Foreign Capitals with Iraqi Capitals (2)	Percentage (1) : (2)
Industry	36,568,220	2,261,087	6.18
Agriculture	270,000	10, 150	3.75
Construction	2,051,900	256,435	12.49
Transport	854,000	36,240	4.24
Commerce	12,079,670	2,839,129	23.50
Banking	5,600,000	1,299,650	23.20
Insurance	6,700,000	140,061	.20
Services	1,978,310	312,130	1.77
Mixed	1,191,600	407,190	3.41
	67,293,700	7,562,072	11

SOURCE: Republic of Iraq - Ministry of Planning - C.S.O., "Annual abstract of Statistics - 1969", Zahra Press - Baghdad, undated.