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**The role of transportation networks in the development  
and integration of the seven emirates forming the United  
Arab Emirates, with special reference to Dubai.**

by

**Jamal M. Al-Mehairi**

A thesis submitted in fulfilment of the requirements  
for the degree of Doctor of Philosophy

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**Department of Geography  
University of Durham  
England  
1993**



**21 OCT 1993**

## Abstract

The United Arab Emirates (UAE), formerly the Trucial States, is a political entity unusual in the Arab world. Many aspects of the seven emirates which make up the UAE have changed considerably since independence on 2 December 1971. The politics and economy of the UAE differ markedly from the time before oil was exported. As the state's principal source of revenue, oil has transformed the country, allowing development and diversification, and ranking the UAE amongst the top income countries in the world.

This thesis uses the transport sector as an indicator of development across all sectors of the state. Various aspects of the transport sector are examined in order to obtain a fuller perspective. The overall integration of the emirates into one state is thus evaluated.

The evolution of the road network is evaluated in Chapter 2. It is found that topography and other physical features were principal factors in the line of former caravan routes. In turn, caravan routes are the principal factor influencing the line of the modern road network, and in particular the coast to interior orientation. The large and rapid expansion of the transport sector has come about in part because of the establishment of the federal state, and the concomitant need to link the UAE's major centres of population. Also, as the UAE has risen in world significance, international road and air links have been strengthened.

Physical problems are identified in Chapter 3 as a major obstacle to development and the construction of roads. Prosperity due to oil has tended to allow most of these problems to be overcome. However, the lack of road maintenance and the absence of an integrated roads policy have inevitable consequences for the comprehensive integration of the state.

The Emirate of Dubai is chosen as a case study, because it is a major transport node for the UAE. Dubai is not only a trade and redistribution centre for the region, but has also attempted to realise the full global potential of its transport infrastructure. Chapter 4 examines the significance of the transport sector for the economic activity of Dubai, and shows that in order to strengthen international transport links air and sea port activity has been a principal focus. Moreover, Dubai has developed the new dimension of Sea-Air transport, which is already proving financially successful, and is set to expand further.

Chapter 4 thus has a subject matter quite unlike the other key chapters as its purpose is to examine the way in which Dubai has exploited its geopolitical location as a means to income diversification via the earnings capacity of being an international transport and exchange centre.

The role played by transport for commercial firms doing business in Dubai is examined in Chapter 5. It is shown that transport factors, such as the location of roads and ports, exercise considerable influence over the location of businesses in general, and those within Dubai CBD in particular. It is also shown that the nationality of firms,

and therefore with which other countries they tend to trade, influences the extent and nature of their use of Dubai's transport infrastructure. Nationality of firms also influences the importance they place on the transport systems of the other emirates, particularly those on the east coast of the UAE.

The social and political developments and implications consequent upon this internal road expansion are investigated in Chapters 6 and 7, with Chapter 8 explaining the way in which transport policies have affected spatial aspects of the UAE. In particular, it is shown that, as a result of the development of its transport system, Dubai City has expanded more rapidly than any other UAE city.

Finally, conclusions are drawn suggesting that the development of the transportation system in the UAE has been dependent on political, social and commercial development, yet these have been equally dependent on the development of the transportation infrastructure. The investigation of this interrelationship is the thesis' essence, but the realisation by Dubai of the earning capacity of its global location as a transport node forms an important, if discrete, qualifying analysis.

# Table of Contents

<b>Declaration</b> .....	13
<b>Acknowledgements</b> .....	14
<b>Dedication</b> .....	16
<b>Chapter One</b>	
<b>Introduction</b> .....	17
1.1 Introduction .....	17
1.2 The significance of the study .....	18
1.3 Aims of the research .....	21
1.4 Methodological issues .....	22
1.5 Problems encountered .....	24
1.6 Thesis structure .....	26
1.7 Previous studies .....	27
1.8 The significance of the local and global location of the UAE .....	28
<b>Chapter Two</b>	
<b>The history of transport in the United Arab Emirates</b> .....	34
2.1 Introduction .....	34
2.2 Before the arrival of vehicular routes .....	36
2.2.1 Caravan Routes which lead across the Oman promontory from the Arabian Gulf to the Gulf of Oman .....	43
2.2.2 Routes which linked the Trucial States with Buraimi Oasis .....	47
2.2.3 Routes which run westward through the Al Dhafra zone linking Buraimi with Qatar and Saudi Arabia .....	49
2.2.4 Caravan routes linking together coastal towns .....	50
2.3 Physical environment and route formation .....	51
2.4 Beginnings of the modern road network .....	55
2.4.1 Road networks influenced by natural resources .....	59
2.4.2 Federal goals and the road network .....	66
2.4.3 Road network development in response to international demands .....	72

2.5	Public transport	75
2.5.1	Private public transport	77
2.5.2	Government public transport	77
2.6	Maritime transport	78
2.7	Air transport	87
2.8	The development of transport policies	94
2.9	Conclusion	100

### **Chapter Three**

#### **Physical factors and problems associated with the location of roads in the UAE** . . . . . 105

3.1	Introduction	105
3.2	Climatic factors	106
3.2.1	Temperature	107
3.2.2	Rainfall	112
3.2.3	Fog	115
3.2.4	Weather conditions in relation to road accidents	118
3.3	Physiographic controls	118
3.3.1	The Hajjar Mountain problem	119
3.3.2	Sand dune formation in the UAE	129
3.3.3	Road maintenance	134
3.4	Conclusions	136

### **Chapter Four**

#### **External transport links and economic development in Dubai** . . . . . 139

4.1	Introduction	139
4.2	Characteristics of economic activity in Dubai	140
4.2.1	Traditional economic activities in Dubai	140
4.2.2	Modern economic activities	142
4.2.2.1	Commerce	144
4.2.2.2	Industry	147
4.2.3	The oil industry in Dubai	150
4.2.4	Other industries	153

4.3	Development of trade activity through seaports and the airport in Dubai	155
4.3.1	Sea transport system	160
4.3.1.1	Port of Rashid	163
4.3.1.2	The Creek	166
4.3.1.3	The Port of Jebel Ali	167
4.3.1.4	The Port of Hamriyah	170
4.3.2	Air transport system	173
4.3.3	Sea-air transport	176
4.3.3.1	Dubai Cargo Village	180
4.4	Conclusion	186

## Chapter Five

	<b>The relationship between commercial activity and the transport systems of Dubai</b>	<b>191</b>
5.1	Introduction	191
5.2	Survey methods	192
5.2.1	The questionnaire	192
5.2.2	The sample	193
5.2.3	The reliability of the questionnaire	195
5.2.4	Data analysis; statistical procedures	195
5.3	Impact of spatial aspects on the location of commercial establishments in Dubai	196
5.3.1	Market factors	198
5.3.2	Road factors	201
5.3.3	Ports factors	204
5.3.4	Other locational factors	205
5.4	Nationality and the location of commercial firms	206
5.5	Trade activity and the location of commercial firms	208
5.6	Commercial firms and their imports and exports through the transport system of Dubai	210
5.7	Nationality of commercial firms and the use of the transport system	213
5.8	Types of trade activity and use of the transport system in Dubai	215
5.9	The use of vehicles in the distribution of goods	219

5.10 Commercial firms in Dubai and their use of the Emirates transport systems .....	222
5.11 Destination of goods throughout Dubai Emirate .....	224
5.11.1 The Central Business District (CBD) of Dubai .....	228
5.12 Movement of goods destined to the other Emirates .....	232
5.13 Movement of goods destined to the Gulf region .....	234
5.14 Development of the transport system and its impact on the commercial firms .....	238
5.15 Conclusion .....	240

## **Chapter Six**

### **Impact of the improvement of transport on social development in the Emirates. .... 242**

6.1 Introduction .....	242
6.2 Population of Dubai Emirate .....	243
6.3 Population growth in the UAE and car ownership .....	245
6.3.1 Car ownership in Dubai .....	248
6.3.1.1 Car ownership and nationality in UAE .....	249
6.3.1.2 Car ownership and family size .....	253
6.3.1.3 Car ownership and income .....	255
6.4 Car ownership by districts in Dubai 1991 .....	256
6.5 Population mobility types in the Emirates .....	259
6.5.1 Type of mobility by mode of travel .....	263
6.5.2 Purposes of trips .....	267
6.6 The impact of roads on the social structure in the U.A.E. ....	270
6.6.1 The impact on the Health sector .....	273
6.6.2 The impact on schools .....	279
6.7 Conclusion .....	281

## **Chapter Seven**

### **The impact of politics on the transport system of the UAE .....**

7.1 Introduction .....	284
7.2 The political importance of the United Arab Emirates .....	285
7.2.1 Oil sector and transport .....	286
7.2.2 Strategic location and transport system .....	290

7.3	External and internal political boundaries of the UAE and their relationship to the location of roads .....	292
7.3.1	Al Ain-Dubai road .....	295
7.3.2	Ras al Khaimah - Fujairah Road .....	298
7.3.3	International boundaries and road location .....	300
7.3.3.1	Concerning the Al Ain and Oman boundary .....	301
7.3.3.2	Relating to the Dubai - Hatta Road .....	304
7.4	The impact of the Gulf War upon the transport system in UAE .....	306
7.4.1	The impact of political development upon the international sea and air transport of Dubai Emirate .....	307
7.5	Conclusion .....	311

## **Chapter Eight**

	<b>The impact of transport policies on the expansion of settlements and land use with particular reference to Dubai Emirate .....</b>	<b>314</b>
8.1	Introduction .....	314
8.2	Transport policies in the UAE .....	318
8.3	Transport policies and settlement in the UAE .....	324
8.3.1	The impact of transport policies on the expansion of Dubai City .....	325
8.3.1.1	First Master Plan, 1960 .....	326
8.3.1.2	Second Master Plan, 1971 .....	327
8.3.2	The expansion of settlements and the road network in Dubai .....	328
8.4	Transport and land use .....	338
8.4.1	Trips and land use .....	342
8.5	Conclusion .....	346

## **Chapter Nine**

	<b>Conclusions .....</b>	<b>348</b>
	Further studies .....	358
	<b>Bibliography .....</b>	<b>361</b>
	<b>Appendix .....</b>	<b>372</b>

## Table of Tables

Table 1.1	Growth in transport availability and use for movement into and out of the U.A.E. Comparative data for 1978 and 1989 .....	30
Table 2.1	Estimated income of Abu Dhabi at the beginning of the twentieth century .....	39
Table 2.2	Road Construction in the UAE .....	71
Table 2.3	Development in Commercial Ports from 1975 to 1995 .....	82
Table 3.1	The rainfall of Dubai emirate from 1979 to 1990 .....	112
Table 3.2	Characteristics of road construction in the mountainous areas in the UAE .....	127
Table 3.3	The 'Detour Index' of the Emirates road network .....	128
Table 4.1	The economic activity sectors in the Dubai Emirate in 1985, according to the urban and rural work force .....	143
Table 4.2	Industrial activities in Dubai Emirate in 1985 .....	148
Table 4.3	Characteristics of Dubai's ports in 1990 .....	160
Table 4.4	Container port traffic of selected developing countries in 1986, 1987. ....	162
Table 4.5	Economic activity of Port of Rashid in Dubai 1988-1990 .....	163
Table 4.6	Countries of origin and destination of all craft using the Port of Hamriyah during 1988 .....	171
Table 4.7	Passengers' movement within the UAE's transport system in 1989. ....	174
Table 4.8	Sea - Air volume (tonnes) and routes from Far East in 1986-1987. ....	179
Table 4.9	Average of time and cost using Sea Air from Far East to Europe in 1986-1987 .....	184
Table 5.1	Distribution of the target population and sampled population according to the types of firms. ....	194
Table 5.2	National ownership of firm, by type of trade activity. ....	195
Table 5.3	Factors which are effects on the location of the commercial companies in Dubai. ....	197
Table 5.4	Annual expenditure of Commercial Firms in Dubai in 1991. ....	206
Table 5.5	Nationality and patterns in the importance of road, market and port to the location of commercial firm, by percentages. ....	207

Table 5.6	Trade activity and patterns in the importance of road, market and port to the location of commercial firm, (by percentage). . . . .	209
Table 5.7	Stated reasons for different transport methods used by commercial firms in Dubai . . . . .	211
Table 5.8	Proportion of firms, by different nationality groups, which make use of Sea, Road and Air transport in their import and export structure . . . . .	214
Table 5.9	Proportion of firms, by different categories of trade activity, which make use of Sea, Road and Air transport in their import and export structure . . . . .	216
Table 5.10	Cross correlation of the transport system in exports and imports by the commercial companies in Dubai . . . . .	217
Table 5.11	Distribution of goods by means of ownership of vehicles, by percentage . . . . .	221
Table 5.12	Use of the transport system in the other Emirates by the commercial firms in Dubai in 1991, by percentage . . . . .	224
Table 5.13	Population, employment, area and density characteristics in Dubai Central Business District, 1985 . . . . .	228
Table 5.14	Comparison of movement in the CBDs of Dubai and other world cities . . . . .	229
Table 5.15	Destination of goods from Dubai to other Emirates cities in 1991 . . . . .	232
Table 5.16	Re-exports by mode of transport from Dubai in 1989 . . . . .	235
Table 5.17	Number of local and foreign trucks cleared outward at Dubai Customs Land Transport in 1989 . . . . .	236
Table 5.18	Destination of Goods from Commercial Firms in Dubai in 1991 (all modes of transport) . . . . .	237
Table 5.19	Responses of commercial firms to the recent development in the transport system in Dubai Emirate in 1991 . . . . .	239
Table 6.1	Population of UAE and Dubai Emirate . . . . .	244
Table 6.2	Rates of car ownership in some countries in 1983 . . . . .	252
Table 6.3	Car ownership and nationality in Dubai in 1985 . . . . .	253
Table 6.4	Car ownership and family size in Dubai in 1990 . . . . .	254
Table 6.5	Monthly income by percent for national and non-national families in Dubai Emirate in 1985 . . . . .	256
Table 6.6	Car ownership in Dubai Emirate districts in 1991 . . . . .	257

Table 6.7	Percentage of persons transported by transport vehicles in 1980 in the UAE .....	265
Table 6.8	Trips by transport modes in Dubai Emirate in 1991 .....	266
Table 6.9	Percentage of private car/bus and taxi in movement by trip purposes in Dubai in 1990 .....	268
Table 8.1	The transport projects of the Dubai government in the other Emirates and Oman .....	320
Table 8.2	Extent of growth in urban area of Dubai from 1900 to 1985 .....	329
Table 8.3	Dubai City: the general divisions of land-use in 1985 .....	340
Table 8.4	Distribution of car trips to different land use locations, Emirate of Dubai 1985 .....	344
Table 8.5	Distribution of trips to different land use location, origins of which are external to the official city area, in Dubai City in 1985 .....	345

## Table of Figures

Figure 1.1	The Main Transportation System of the UAE .....	20
Figure 1.2	Population Growth by Emirate, 1968-1990 .....	31
Figure 2.1	Types of Local Transhumance of the Bedu in UAE Showing the Relationship with Caravan Routes .....	37
Figure 2.2(a)	The Caravan Routes in the Northern Emirates .....	41
Figure 2.2(b)	The Caravan Routes in the South of Emirates .....	42
Figure 2.3	The Evolution of Caravan Routes and the Effects of Physical Features .....	53
Figure 2.4	The Evolution of the Modern Road Network in UAE, 1965-1990 .....	58
Figure 2.5	Road network evolution in the Abu Dhabi Emirate .....	61
Figure 2.6	Development of Oil Production in Abu Dhabi from 1964 to 1975 .....	64
Figure 2.7	The Transpeninsular Road (1967) .....	70
Figure 2.8	Passenger Movement within Emirates Airports from 1974 to 1990 .....	91
Figure 2.9	Total Expenditure on Roads Projects .....	98
Figure 3.1	Network for Abnormal Loads in Dubai, Sharjah and Ajman .....	108
Figure 3.2	Network for Abnormal Loads in the UAE .....	110
Figure 3.3	Temperature Variation in the Emirates of Abu Dhabi and Sharjah .....	111
Figure 3.4	Rain erosion on the slope of embankments on the road of Manama - Ras al Khaimah .....	114
Figure 3.5	Dhaid - Shuiab Road. Linking the Northern Region with the Southern Region .....	116
Figure 3.6	The average of foggy days in the Emirates .....	117
Figure 3.7	The old caravan routes used wadi Ham in the Eastern region of the Emirates .....	120
Figure 3.8	Dhaid - Fujairah Road .....	123
Figure 3.9	The bridges over main wadis in the mountain region in the Eastern Emirates .....	124
Figure 3.10	Schematic cross-section, leading from the west coast to east coast of the UAE showing the spatial differential of the landscape affecting design and the cost of road construction .....	126

Figure 3.11	Percentage distribution of road network within the four topographical divisions of the UAE .....	131
Figure 3.12	Roads in the desert area in the UAE .....	132
Figure 4.1	Import trade development in Dubai from 1964 to 1990 .....	145
Figure 4.2	Locations of industry in the Emirate of Dubai .....	149
Figure 4.3	Oil production and exporting for UAE and Dubai Emirate from 1969 to 1984 .....	151
Figure 4.4	Development of expenses on Dubai Municipality projects from 1985 to 1989 .....	152
Figure 4.5(a)	Development of Re-export by means of transport, Emirate of Dubai 1986-1990 .....	157
Figure 4.5(b)	Development of non-oil exports by means of transport, Emirate of Dubai 1986-1990 .....	158
Figure 4.6	Exports by mode of transport system in Dubai in 1989 (by value) .....	159
Figure 4.7	Port Rashid-Dubai Port Plan 1990 .....	164
Figure 4.8	The Containers terminals in the Port of Rashid; showing behind it the hinterland of the port (Diera and Bur Dubai) .....	165
Figure 4.9	Port of Jebel Ali .....	168
Figure 4.10	Cargo activity through Jebel Ali Port, from 1980 to 1990 .....	169
Figure 4.11	Cargo cleared through the Port of Hamriya from 1980 to 1987 .....	172
Figure 4.12	Cargo movement within the Emirates' Airports from 1974 to 1990 .....	175
Figure 4.13	Comparison of the Sea-Air transport movement in both Dubai and Sharjah in 1990 .....	178
Figure 4.14	Dubai cargo village .....	181
Figure 4.15	Sea-Air transport activity through the Dubai Airport .....	183
Figure 4.16	Movement of Sea-Air transport system through Dubai, by tonnes in 1991 .....	187
Figure 5.1	Selected land use and activity patterns .....	200
Figure 5.2	The traditional local small boats <i>Abra</i> ply between Diera and Bur Dubai .....	202
Figure 5.3	Zonal generations and attractions .....	203
Figure 5.4	The use of the transport system by the commercial companies in their exports and imports in Dubai Emirate in 1991 .....	212

Figure 5.5	Commercial transport truck routes in Dubai city .....	220
Figure 5.6	The containers landed at the Port of Fujairah during 1988 and destined for other Emirates and Gulf countries .....	225
Figure 5.7	The main districts of the Emirate of Dubai .....	226
Figure 5.8	Destination of goods to CBD of Dubai, by percentage .....	231
Figure 5.9	Internal goods distribution in the UAE commodities produced in Dubai as distributed by weight (1991) .....	233
Figure 6.1	Economic activity of the population of Dubai in 1985 in urban-rural areas of Dubai .....	246
Figure 6.2	Development of car ownership and population growth in the UAE within the period of 1978-1990 .....	250
Figure 6.3	Development of car ownership and population growth in Dubai 1978-1991 .....	251
Figure 6.4	Car ownership in Dubai Emirate districts in 1991 .....	260
Figure 6.5	Traffic movement amongst the UAE's cities, traffic volumes in one day (0600-1800 o'clock) in 1980 .....	262
Figure 6.6	Passengers trip distribution by transport means in urban area of Dubai in 1985 .....	264
Figure 6.7	Traffic flow along the Dubai and Sharjah road .....	269
Figure 6.8	Comparative purposes of trips within Dubai, Al Ain and Abu Dhabi. Percentage proportions for each city. ....	271
Figure 6.9	The distribution of social services along the Al Ain - Abu Dhabi Road .....	275
Figure 7.1(a)	The foreign trade of the UAE, from 1985 to 1989. Non oil exports by value. ....	288
Figure 7.1(b)	The foreign trade of the UAE, from 1985 to 1989. Oil exports. ....	289
Figure 7.2	The internal boundaries of the UAE .....	293
Figure 7.3	Dubai-Al Ain road near Al Faqqa border point between the two emirates .....	296
Figure 7.4	The proposed road between Ras al Khaimah and Dibba (Fujairah). ....	299
Figure 7.5	Location of the major road between the UAE and Saudi Arabia before and after the agreement of 1974 .....	302
Figure 7.6	The alignment of road networks in the Eastern areas of the UAE, showing the impact of the international border area. ....	303

Figure 7.7	The alignment of the Dubai-Hatta-Oman road, illustrated by its course passing through different political zones. ....	305
Figure 7.8	The impact of the Gulf War upon the Sea Transport activity in the Port of Rashid .....	308
Figure 7.9	Passenger and cargo movement during the Gulf War in Dubai International Airport from 6/90 to 3/91 .....	310
Figure 8.1	Dubai transportation planning model 1991. ....	323
Figure 8.2(a-f)	Aerial photographs for the development of urban area of Dubai City (1960-1981) .....	331-334
Figure 8.2(g)	Historical evolution of the urban area of Dubai .....	335
Figure 8.3	The pattern of urban land use of Dubai City in 1985 .....	339
Figure 8.4	Beni Yas road car parks parking demand analysis .....	343

## **Declaration**

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*To the memory of my father*

# Chapter One

## Introduction

### 1.1 Introduction

The people of the United Arab Emirates (UAE) have experienced enormous transformations in a variety of fields, including economic, social and political matters. These transformations have all taken place within the brief lifetime of the country, which gained its independence in 1971. The purpose of this chapter is to introduce the aims, objectives, methodological issues and the problems which were encountered in preparing this thesis, and to outline the areas of study.

This chapter shows how the growth of oil production and its revenue have boosted the whole economy, and consequently the development of the UAE, with the aim and effect of increasing gross domestic product (GDP), as well as making other changes in the UAE community. This growth is represented in the economic and commercial sectors, and through the change in settlement and land use activity. There has also been an increase in the population, associated with the expansion in transportation facilities. These latter are represented by the seaports, airport and the road network, and are spread amongst the emirates of the UAE. Indeed, they have become a significant factor in the further development of the UAE, and the integration of its constituent emirates. As the expansion of the transport infrastructure has focused in particular on the Emirate of Dubai, that has been the particular focus of this thesis.

This introductory chapter is divided into sections as follows: the significance of the study, objectives of the study, methodological issues, problems encountered, the structure of the thesis, and the significance of the local and global location of the UAE.

## **1.2 The significance of the study**

The bonding in 1971 of the seven sheikhdoms, formerly termed the *Trucial States*, into one modern federal state prompted the infrastructural development which has changed a great many features of the UAE.<sup>(1)</sup> The economic and political processes of development and integration have concentrated on providing social services, for which roads and road-building are priorities.

Economic development has led to an increase in the population through people drifting into the UAE from other countries in their search for employment. As a result, occupations in urban and rural UAE areas have grown rapidly, and settlements have grown into villages and major towns. Social changes have impacted on life-style, with transport being part of both cause and effect.

Transport policies have been amongst the most significant policies in the creation of the UAE as a single state. They have facilitated the social integration of the people. Paradoxically, these policies have not been federalised: each emirate has developed its own transport policy.

This study examines the development of the UAE from two perspectives: the United Arab Emirates as a whole; and Dubai Emirate in particular. Dubai is the foremost emirate in terms of rapid development in all fields, and more precisely in trade and in the transport sector.

At the UAE level the following points are of significance:

1. The rapid growth in the development of the transport system of the UAE has impacted on various spatial features of the Emirates.
2. Transport policies have been associated with the main objectives of the federation process of the UAE. Each emirate technically has its own transport policy

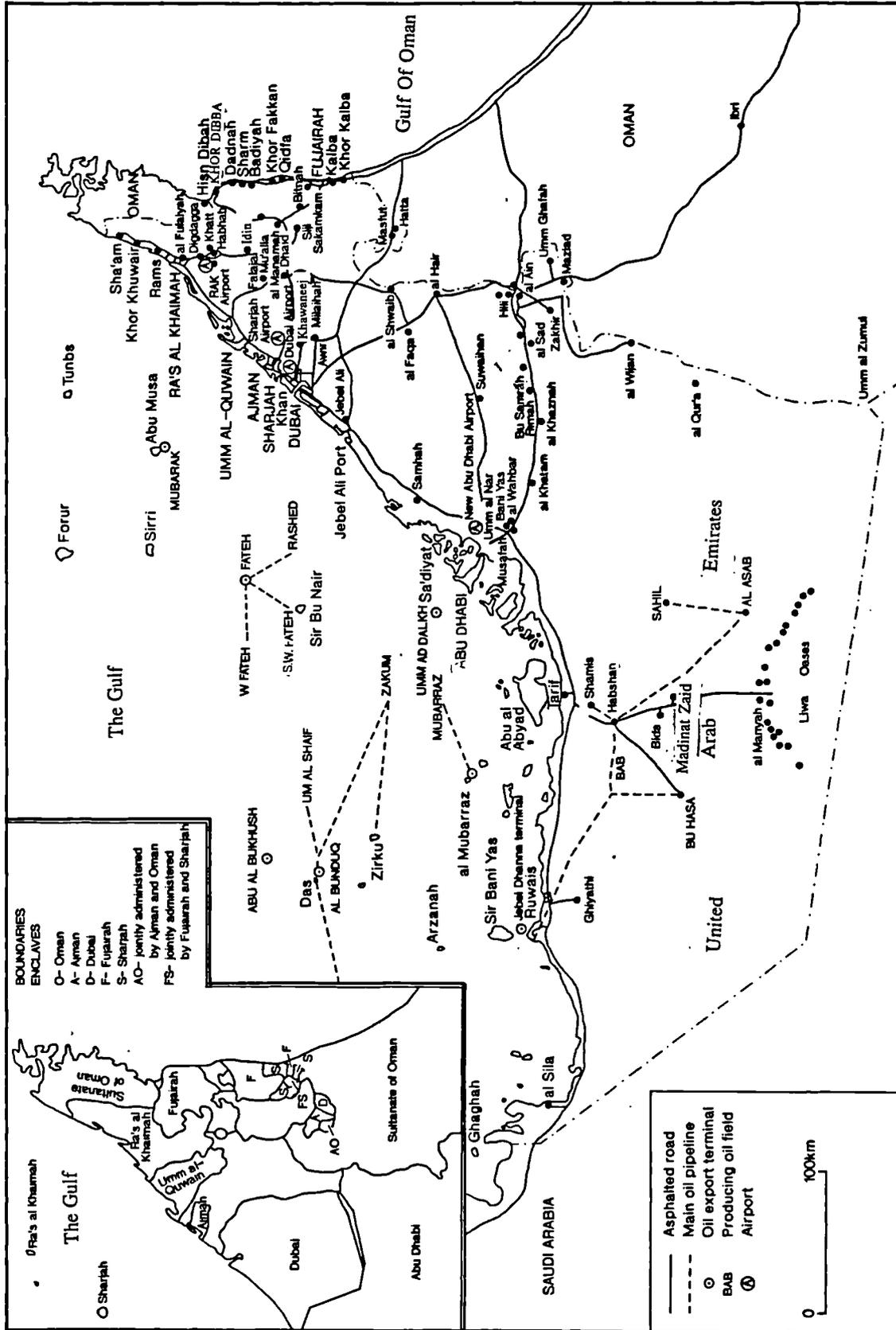
and thus each emirate has its own transport system. However, the interests of individual emirates are not always best served through the interests of the UAE.

3. The strategic location of the Emirates is significant for the development of the transport system as an international system, notably the seaports, airports and the road network (Figure 1.1).

The study concentrates on Dubai for several reasons. These points are the reason for selecting Dubai Emirate as a principal focus in this study:

1. Dubai Emirate is the major transportation node of the Emirates. This relates to the transportation facilities such as ports and the airport in terms of size, efficiency and flexibility compared with the other emirates, as well as to the efficiency of the sea transport sector which has led to increased regional and international cargo movement by commercial bodies.
2. In terms of commercial activity, Dubai is the UAE gateway to the major regional and international markets.
3. The efficient road network from Dubai to the other emirates and countries in the region offers a good case study for an evaluation of the impact of transport on the other spatial aspects such as settlement expansions, distribution of goods and other related factors.

Figure 1.1 THE MAIN TRANSPORTATION SYSTEM OF THE U.A.E.



The study investigates the role of the transport system which has been planned to stimulate a structural change of the UAE. The UAE is recognized as a suitable place for this type of study, because the rate of change is very high and the structural nature of the UAE, as seven emirates, suggests that the role of the transportation networks has played a potentially unique integrative role in the process of the state's economic, social, and political change. Therefore, a study such as this, concerned with the transport network, offers a vital indication of the growth of the UAE economy, and shows how such a network, especially a road network, can be used, and possibly also specifically not used, as interaction took place in the socio-political development of the state.

### **1.3 Aims of the research**

The aims of this research are to investigate and analyse the relationship between transportation networks and

1. locational aspects of the UAE, from the beginning of the modern period earlier this century to recent times;
2. economic, social and political change, and the extent to which the role of the transport sector has assisted in the whole integration of the UAE;
3. the expansion of settlements.

The study attempts to answer the following questions:

1. What are the main objectives of the federal government of the UAE regarding transport policy?
2. In what ways has the development of transport impacted on spatial distributions in the UAE?

3. How have physical geographical factors of the landscape of the UAE affected and shaped the modern road network? How have these physical factors impacted on construction cost, cost of maintenance, and the design of the road network in the UAE?
4. To what extent has the international transport system in Dubai impacted on the development of economic activity since the establishment of UAE, particularly in Dubai Emirate? To what extent are commercial firms in Dubai concerned with the international transport sectors in their activities ?
5. What is the social impact of transport development on the UAE population?
6. What are the main reasons for trip generation in the cities of Dubai, Al Ain, and Abu Dhabi, and how do these relate to the purposes and differences between the cities in terms of the geographical functions of each city?
7. What was the level of mobility of the local populations; for what purposes, from where and to where did that movement take place within the UAE?
8. How does the impact of road expansion increase settlement in the UAE and the urban areas of Dubai?
9. To what extent have political factors affected the location of roads? How do regional political changes influence the transport system in the UAE?

#### **1.4 Methodological issues**

Due to a dearth, though not absence, of data on the transport system in the UAE, more than one method was used to gather appropriate material. In addition to data collection and analysis, several fieldwork studies were carried out on location in the UAE.

Data collection was from the following sources:

1. Books and articles relating to the study of transport in the UAE and in the Gulf. These sources offer glimpses of the history of transport modes in the Emirates states.
2. Official statistical abstracts and reports published by the Federal Government and by governments of the individual emirates form a major component of the research. These secondary sources include documents from the Municipalities of Dubai, Abu Dhabi, Al Ain and Fujairah; the Department of Customs in Dubai; Dubai Chamber of Commerce and Industry; Fujairah Chamber of Commerce, Agriculture and Industry; Dubai Ports Authority; Dubai Civil Aviation; Dubai International Airport; Dubai National Travel Agency; Research and Studies in General Headquarter of Dubai Police; Port of Fujairah; Ministry of Public Works and Housing; Ministry of Interior; Ministry of Education; Ministry of Health.

The above official bodies were unable to provide sufficient information to complete this research. For this reason, and also because of the confidentiality of some of the data, direct field investigation was necessary to achieve the main objectives of the research.

3. A variety of other documents; see bibliography.

A number of fieldwork trips were carried out in the UAE for this study. Six trips were carried out by the researcher between 1988 to 1991 as follows: 15 April 1988- 29 September 1988; 24 March 1989-17 May 1989; 22 December 1989-13 January 1990; 23 March 1990-15 May 1990; 27 August 1990-29 September 1990; 10 July 1991-25 November 1991.

Fieldwork carried out in Dubai between July and November 1991 investigated the improvement in the international transport system and its impact on the commercial firms in Dubai. A questionnaire was distributed to a sample of commercial firms throughout Dubai City (see Chapter 5).

The questionnaire covered a number of points:

1. The role of transport components such as road, port or airport, in the location of commercial firms in Dubai.
2. The extent to which Dubai's policy of international commercial orientation is integrated with the transport development of Dubai Emirate.
3. The patterns of goods movement within Dubai, and from Dubai to other Emirates and to neighbouring countries, to examine the importance of the trade function of Dubai Emirate in terms of the international nature of the transport system in Dubai.
4. The main reasons for the utilisation by commercial firms based in Dubai of transport systems of emirates other than Dubai.

The questionnaire was distributed by arranging an appointment with each firm. A person of responsibility at each firm was interviewed to obtain the appropriate information.

The data collected from the fieldwork was coded and entered into a computer. Analysis of the data was carried out using the statistical software package SPSS. Harvard Graphics was used to graph the results. Frequencies, cross correlation and Kendall tests were used in the analysis.

## **1.5 Problems encountered**

Established in 1971, the UAE is a new and relatively undocumented state. Along with many other fields of study, therefore, a study of transport in the UAE might be expected to throw up a variety of problems, of which the dearth of primary data and of secondary published material are amongst the most significant. Equally important was the restriction on access to, and confidentiality of, many reports of studies and

official reports about transport in the UAE. Access to this data often required special permission from the minister or the chairman of the relevant authority. The bureaucratic procedures adopted by some official and private authorities were a major problem.

Problems were encountered during the 1991 fieldwork project concerned with 61 commercial firms and their relationships with the transport system of Dubai (see Chapter 5). Problems encountered during the distribution and collection of the questionnaire data included:

1. The unavailability to me of a team of student helpers on whom I had been expecting to be able to call. This unavoidably left the project dependent on one person.
2. Commercial firms considered this type of study a waste of their time because it resulted in no obvious benefits for them. This attitude prevailed despite an official letter supported by the Chairman of Dubai Chamber of Commerce and Industry.
3. Few commercial firms were familiar with any kind of investigation and understandably considered the questions asked an intrusion into their private affairs. Those which later refused to co-operate blamed lack of time. Most commercial firms refused to give details about their income or expenses.
4. In several firms neither Arabic nor English was spoken, which caused some difficulties in the data collection.
5. Many of commercial firms listed in DCCI have closed, or removed to another address.

Despite these major problems, few of which were unexpected, encountered during this part of the fieldwork in Dubai, the questionnaire and its analysis are regarded as a valuable and worthwhile component of the thesis, shedding valuable light on the motivations and opinions of a representative selection of firms.

## **1.6 Thesis structure**

This thesis consists of nine chapters, including the introductory Chapter 1 and the concluding Chapter 9.

Chapter 2 discusses the history of transport modes, and investigates the historical evolution of routes within the UAE since the establishment of settlements on the coast of the Trucial States. This chapter is recognized as a framework for the ensuing chapters, giving a background to the topic.

Chapter 3 investigates and examines the physical influences on the development of roads, such as climatic and physiographic problems, and their effects on the location of roads within the United Arab Emirates. In this chapter the actions of two geographical aspects have been illustrated: the physical characteristics of the landscape of the UAE, and road development as an essential factor of the infrastructure. Physical features are shown to have had different types of effects on road location, as when comparing the impact of the mountain ranges and the desert areas within the United Arab Emirates. The chapter describes the spatial consequences of the relationship between physical features and transport.

Chapter 4 attempts to study the development of the transport system, and in particular the seaports, as a contributing factor in the economic and urban development of Dubai Emirate, examining the new dimension in the transport system, as represented by the Sea-Air transport system in the UAE's economic development.

Chapter 5 deals with the study of the international transport system and its relationship with commercial activity in terms of spatial analysis. This analysis explains the locational factors which have influenced the activity of commercial firms. This chapter was the result of the main field investigation.

Chapter 6 evaluates the impact of the development of transport on the social development of the UAE. This is reflected in population mobility within the UAE, and the transformation of the traditional life of the population. The significant effects of the impact of transportation are seen in the dominant role played by private cars within the transport sector particularly as a means of enhancing the mobility of the population in the cities, and also in the role played by public transport between the emirates, which has its shortcomings.

Chapter 7 evaluates from a political perspective two major points: the formation of the internal and external boundaries of the UAE and its impact on road location; and the activities of the international transport system such as seaports and airports during the Gulf War.

Chapter 8 deals with the impact of transport in the expansion of settlement and land use in Dubai Emirate, there having been an enormous development in this aspect.

## **1.7 Previous studies**

Few studies of the geography of transportation in the Gulf area have been written. Historically, travellers who passed through this area mentioned the nature of the old routes which linked the old settlements, and how those routes helped the cities to develop. In the UAE many of these travellers gave very useful information about the type of transport modes in those times. Lorimer (1908), a famous traveller, mentioned generally the geography and historical nature of the Gulf countries, and the distribu-

tion of the old caravan routes in many countries including what is now the UAE; Melamid (1962) wrote about transportation in Eastern Arabia, and mentioned the camel caravans in the Trucial States (Wilkinson, 1964). The most effective body in the development and improvement of the emirates was the '*Trucial States Development Office*' (1965-1971), which produced many reports about road projects in the Trucial States.

In terms of development of air transport in this area Burchall (1933) mentioned some political aspects of commercial air routes which passed through the emirates in that time.

Recently, Saudi Arabia has been subjected to investigation and study by many Ph.D. theses, in particular focusing on transportation. For example, Abdo (1969) examined the development of transport and road transport in Saudi Arabia; planning problems in Makkah were investigated by Mekki (1988); Al Rakeiba (1991) focused on the movement of pilgrims in Makkah. In the other Gulf countries, only very few geographical studies have been written about transport: Walker (1982) studied seaports and development in the Gulf. Some papers have been written in Arabic in the geographical context, relating to the importance of transport in the Gulf area, such as Abdo (1989) and Din (1990).

## **1.8 The significance of the local and global location of the UAE.**

The United Arab Emirates was created on 2 December 1971, made up of the seven emirates of Abu Dhabi, Dubai, Sharjah, Ras al Khaimah, Ajman, Umm al Qaiwain and Fujairah. These emirates formerly comprised the Trucial States. The UAE covers approximately 77,700 sq.km., with a resident population which reached 1,622,393<sup>(2)</sup> in the 1985 census<sup>(3)</sup>. The UAE occupies just about the most strategically important location in the Middle East. The importance lies in its control of access between the

Arabian Gulf and the Gulf of Oman. The UAE has one of the world's highest *per capita* gross national product (GNP): US\$19,860 (1990). This has been due to a vast supply of oil, and the revenue from this vital source.

Historically, the UAE's economy has been largely based on pearling, commerce, small-scale fishing, date cultivation and small boat building. However, the pearl was the most important item of trade between the emirates and international markets:

*"The imposition of the British tracial system, and especially the 1853 Treaty of Perpetual Peace, provided a crucial degree of security for the pearlers. This, in addition to improved communications with India where the pearls were marketed, led to a significant expansion of the pearl trade through the nineteenth century and the first two decades of the twentieth."*<sup>(4)</sup>

That was before the discovery of oil in 1960s. This discovery brought about drastic structural changes both in the UAE economy and society. The UAE economy came to rely on the single-commodity export sector to base a supply structure for economic development policies.

Whilst the realisation that such a degree of dominance underpinning economic development can be dangerous was quickly achieved, diversification was less easy. By far the most dramatically successful diversification has been the UAE's, and especially Dubai's, decision to use transport, not just as a means of internal development, but as an income earner by establishing itself as a major global transport node. This air- and sea-borne trade is investigated within the thesis as the 'other side' of the role of transport in the UAE's development. Table 1.1 shows the rapid growth of activity in this part of the transport system of the UAE, indicating the importance of each component of the system - road, sea, and air - in the movement of passengers and goods.

**Table 1.1:  
Growth in transport availability and use for movement into and out of the  
U.A.E. Comparative data for 1978 and 1989.**

Transport means		No. of units			Passengers		Cargo	
					No.	% of total	Tonne '000	% of total
a) Land (Vehicles)	a: 1978	75889			198722	14.8	955771	17.3
	b: 1989	280216			598058	10.6	1612871	5.8
b) Sea (Ships)	a: 1978		8769		36391	3.9	4482188	81.1
	b: 1989		52773		159372	1.9	21675064	78.5
c) Air (Planes)	a: 1978			124996	1641733	81.2	85429	1.5
	b: 1989			127132	3270292	87.5	4308160	15.6
Total	a: 1978	75889	8769	124996	1876846	100.0	5523388	100.0
	b: 1989	280216	52773	127132	4027729	100.0	27596095	100.0

a) = all UAE registered vehicles.  
b) = ships involved in journeys from and to non UAE origins and destinations [i.e. a ship which enters and departs from a UAE port is recorded on 2].  
c) = Planes involved in journeys from and to non UAE origins and destinations [i.e. a plane which arrives and departs from a UAE airport is recorded on 2]

Source: Annual Statistical Abstracts, 1979 and 1990; Civil Aviation statistical abstracts 1979 to 1990.

The rapid pace of economic change in the UAE has precipitated a dramatic increase in population over the past twenty years. Figure 1.2 shows the growth of population in each emirate from 1968 to 1990. The growth is made up of a small expansion in resident UAE nationals and a more variable immigrant population.

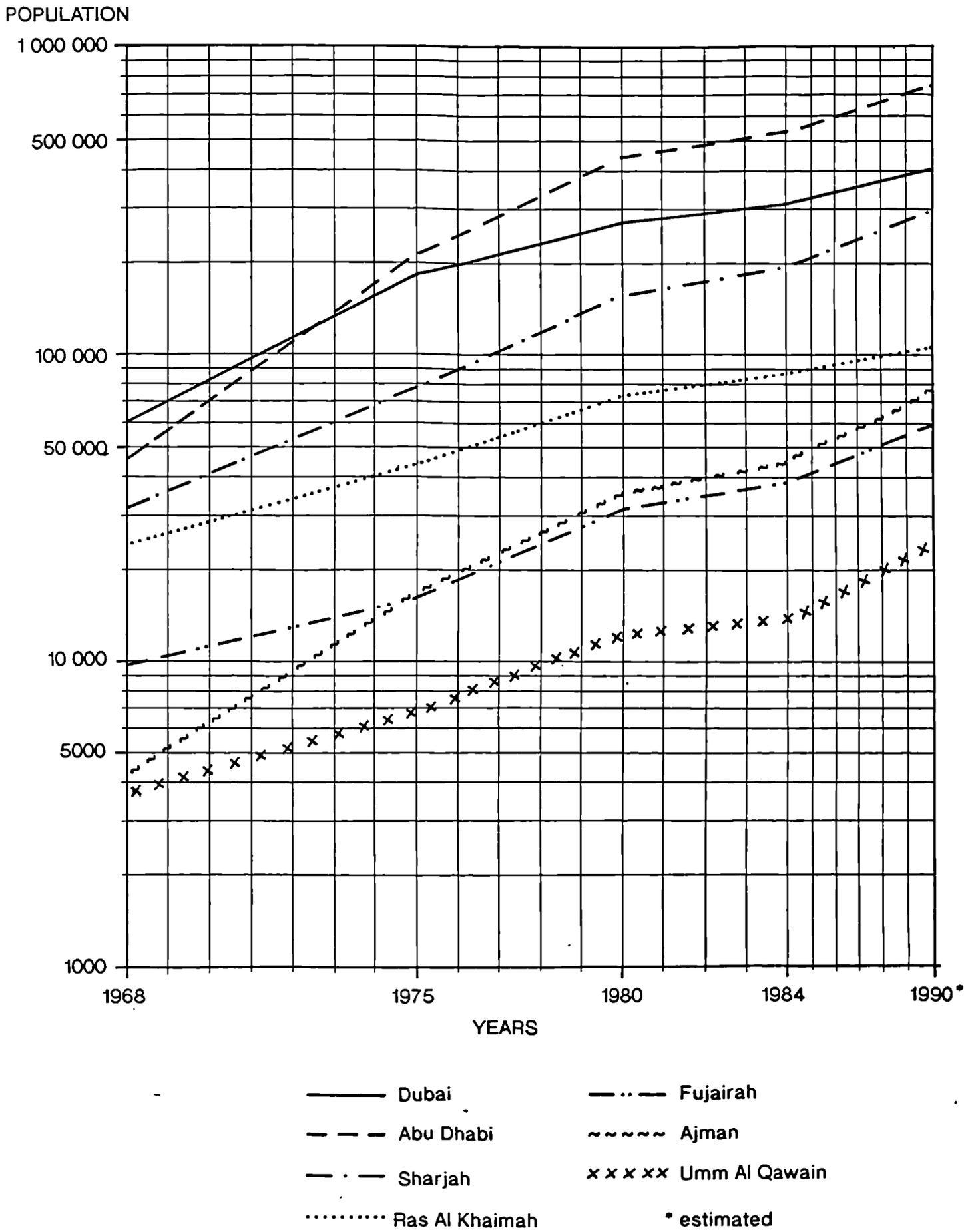
This rapid growth is nothing less than a reflection of the UAE's strategic importance which results from the relationship between its geographical location on the south coast of the Gulf and the political and economic development of the Gulf region.

From the geographical point of view the location of the UAE is influenced by two main factors:

1. The "inland factor" resulted from the influence of the land upon the life of the people of the UAE. A Bedouin community was made up of many tribes under a Sheikhdom system, out of which came the political structure of the UAE. The nature of the local community, as Arab and Muslim, led to a tentative integration with other Arabs and with the Muslim world as one society.

Figure 1.2

POPULATION\* GROWTH BY EMIRATE, 1968-1990



SOURCE: UAE Ministry of Planning

Population\* = citizens + non citizens

2. The "maritime factor" resulted from the influence of the sea on the local population. The UAE has a coast on two seas: the Arabian Gulf and the Gulf of Oman. This location lends a geopolitical importance to the UAE, particularly in the case of any real or anticipated hazard in the Gulf. The length of coastline is 730 km, a feature which has encouraged the local people to work with the sea either in the pearling trade or in commercial activity with other countries.

The physical nature of the east coast has assisted in the establishment of harbours. Two modern ports now serve the east coast: Khor Fakkan seaport which belongs to Sharjah Emirate, and Fujairah seaport. These two ports have not yet led to much development of their respective vicinities, maybe as a result of the lack of a strong infrastructure, but they are now expected to grow rapidly, partly because of the less 'vulnerable' location on the 'outer' Gulf and partly as a spin off from the rapid growth experienced in Dubai and the Gulf centres.

On the west coast, the physical nature of the coast has also assisted the establishment of harbours: creeks such as Dubai, Sharjah and Ras al Khaimah. Later, these creeks have been developed to make them more suitable to serve as prominent seaports and industrial ports, such as Jebel Ali Port in Dubai, and other ports on the west coast of the UAE. A global economic indicator might be the level of international trade passing through UAE ports, such has been the development of these west coast ports as a main gate to the world. Dubai as a major entrepot amongst the others of the Emirates is now established as an active port in international trade. Consequently this port has an influence extending across a hinterland which has now expanded to embrace, in many key respects, much of the whole of the UAE and beyond.

Thus, the significance of local and global location have affected the formation of the political integration of the UAE and the role of internal movement between places

in the UAE. The importance of the global factor in the international trade and strategic location of some parts of the UAE has boosted the role of the international transport system of the UAE which has focused mainly on the seaports and their position in the local economy as the major mode in this movement.

## References

1. See: Taryam, Abdullah Omran (1987), *The Establishment of the United Arab Emirates 1950-85*, Croom Helm, London; Al-Akim, H.H. (1989), *The Foreign Policy of the United Arab Emirates*, Sagi Books, London; Heard-Bey, F. (1982), *From Trucial States to the United Arab Emirates*, Longman, London.
2. The population includes citizens and non-citizens.
3. UNDP, *Human Development Report 1991*, United Nations Development Programme (UNDP), New York, 1991, p.119.
4. Peck, Malcolm C. (1986) *The United Arab Emirates: A Venture in Unity*, Croom Helm, London, p.92.

## Chapter Two

# The History of Transport in the United Arab Emirates

### 2.1 Introduction

This historical analysis of the evolution of the transport network relies on an examination of the interaction between the development of the transport system and economic development<sup>(1)</sup> which, in its broadest sense, includes factors such as population growth, and human activities impacting on the landscape which have influenced the evolution of transportation.

The purpose of this chapter is to discover the purposes, if any, which lie behind the history of transport policy in the UAE, from the earliest time of human settlement in this part of the Arabian Peninsula up until now, and the effects of geographical factors which have shaped the recent road network system. The mode of road transport development is connected to human and physical factors such as settlement, water resources and agriculture, and is affected by such physical environmental features as sand dunes, wells and wadis, some exerting a positive influence and others a negative one.

The main points will concentrate on an investigation of the history of the evolution of routes within the UAE since the establishment of settlement on the coast of Trucial Oman. Information has been derived from published and unpublished literature and such maps as exist of the routes, bearing in mind that, by the very nature of desert travel, many routes, even if important and having a precise origin and destination, frequently have had very imprecise alignments.

The major issues to be explored in this chapter are the relationship between the routes' location and the development of the Emirates, plus the influences of these routes, themselves the product of human activities, on economic and social changes. It starts with areas where there has not been any vehicular mode up to the present, follows the fluctuation of the routes' development, and the factors which have been the main reasons for the rapid road expansion into the interior of the United Arab Emirates. As a separate component, the transport policies both of the individual emirates and the federation will be examined to find out to what extent continuing integration has been a basic goal, using transport as a tool to achieve this process.

The material concerning roads policy development, which draws on historical data including some of the official reports by the TSDO Trucial State Development Office<sup>(2)</sup>, has also been evaluated in order to assess what was intended to be achieved.

Although dominated by the historical arguments underlying the development of land transport, the chapter will also introduce maritime and air transport development which were perceived to be the gateway to modernisation for the Emirates community from the 1940s, and discuss their consequences on the economic and social life of the community.

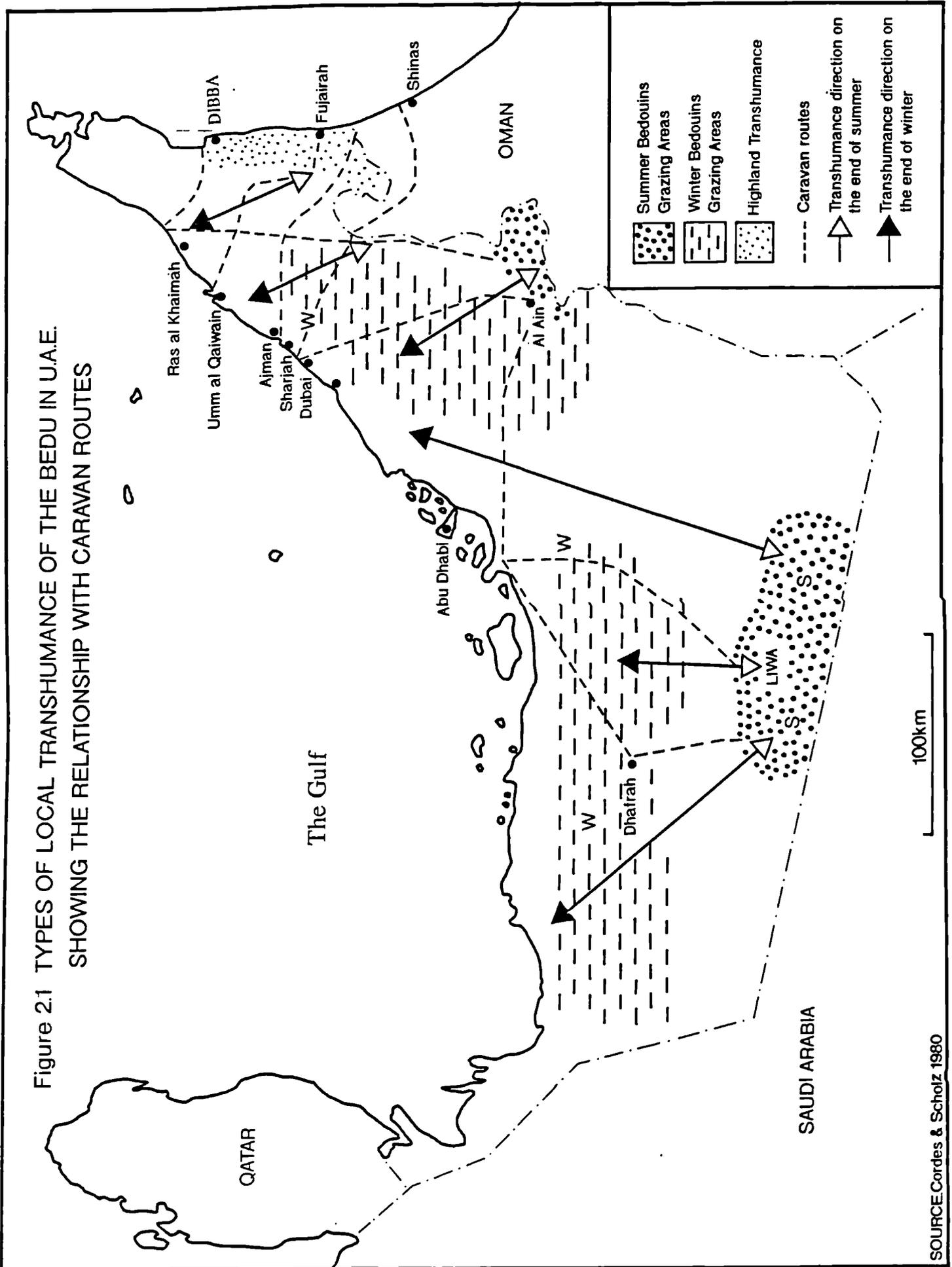
The prehistory of this area is illustrated by very old settlement in some places such as the *Hilli* civilisation in the Al Ain area, *Al Qusais* in Dubai, and *Umm an Nar Island* in Abu Dhabi. The old settlements of the southern Gulf were connected with ancient travel and trade movements between Eastern and Western countries, as discovered by the Danish Archaeological Expedition in 1958<sup>(3)</sup>, and others. These discoveries revealed many significant antiquities in parts of the UAE. They point to cultural and trade exchanges between, in particular, North West India and the Mesopotamian civilisation in Iraq, which passed along the coast of the Trucial States and changed both the landscape and ports. The consequences of this for the UAE are various, as will be seen.

## 2.2 Before the arrival of vehicular routes

Desert conditions dominate in the Emirates. There is a coastal plain of salt flats (sabkha) in the west of Abu Dhabi Emirate, as well as in some coastal areas in the north. Offshore, there are some low-lying islands such as Dalma, Sir Bani Yas, Zirku, Das and Halul. Inland, there are oases, such as Liwa, the major one, where dates, gardens and potable water can be found. Travellers have mentioned the nature of the landform of the Emirates as a semi-dry region affecting all aspects of life by its nature, and in turn influencing the behaviour of the people. Wilkinson (1964) described how, in the first decade of the nineteenth century, the population would move from the wells to the desert in winter, in order to find grazing lands, while in the summer migration was generated from the interior wells to Liwa for the date harvest.<sup>(4)</sup>

It is this movement which created some of the essential routes linking the major villages on the coast with other significant places, such as the cultivated areas inland (Buraimi and Al Ain), as well as places which have been utilised as defence points against enemy attack. In the north Emirates, as in the Abu Dhabi region, there were some significant routes linking some settlement places with others. Throughout the lands of the Emirates, there was Bedouin movement from one place to another which was influenced by the location of grazing lands for their sheep. However, although this transhumance was of a short distance only in some places, as can be seen in Figure 2.1, when compared with the location of routes generally, it seems that some of the caravan routes corresponded to the transhumance routes of the Bedouin; thus this traditional system can also be said to have affected the shaping of old routes.

Figure 2.1 TYPES OF LOCAL TRANSHUMANCE OF THE BEDU IN U.A.E. SHOWING THE RELATIONSHIP WITH CARAVAN ROUTES



Bedouin movement can be related to two main factors; the first is the physical factor illustrated by the sand dunes region surrounding Liwa, Al Ain and Buraimi oases, defined as the main area for Bedouin settlement, due to the availability of suitable grazing lands; the second aspect is the human factor illustrated by the fact that some tribes effectively prohibited rival caravans from passing across their land, or caravans were afraid of the bandits who roamed the routes in some places at that time. In such cases a route would be avoided and thus be automatically diverted in another direction for safety reasons. However, these hazards declined as a result of the increase in the central authority of the local sheikdoms, which not only forbade caravan attacks, but steadily eliminated them.

The most important method of transport in the Arabian peninsula and Emirates was the camel. The people were completely dependent upon the camel for all travel, and the camel caravan routes mostly ran via the water wells, in contrast to modern motor routes which run nearer the coast<sup>(5)</sup>. The people of this area utilised the camel not only for transporting themselves and their goods, but also for the provision of their milk and meat.

There are two kinds of 'economic camel': the 'passenger camel' which is distinguished by its small size, lightness and speed, and the 'cargo camel' which has a stockier body than the passenger camel. The role of the camel has now greatly declined throughout the Emirates, but there are still some isolated villages which use it as a mode of transport. However, in Abu Dhabi and Dubai, for instance, the function of the camel has been transferred to that of a racing animal; the racing camel is now a valuable animal. It is interesting to note that, whereas in the past the camel was used as a transport mode, nowadays the camel has itself become an article of goods transport rather than the means.

In summer periods there were seasonal trips by camel caravan from the coast inland and vice-versa, characterised as local trade trips, and annual holiday trips. These were generated from the main towns on the Western coast e.g. Abu Dhabi, Dubai, Sharjah and Ras al Khaimah, to Oman through the Buraimi and Al Ain areas. This movement was as a consequence of the diving season which ran from May to August.

Fifty years ago, these coastal towns were only semi-inhabited, because of the movement of women and a few male advisers to the inland oases, while most of the men spent four months pearl fishing. The pearl trade was the major trade due to the demand for pearls in Europe and India. It was the primary source of income at that time. For example, Table 2.1 shows the estimated income of the pearling industry in Abu Dhabi at the beginning of the twentieth century compared with the other main economic activity at that time, which was agriculture. The relative importance of pearling as a major source of revenue is clear to see.

**Table 2.1:**  
**Estimated Income of Abu Dhabi at the beginning of the twentieth century**

Source	Amount in Dollars
Pearling dues and taxes	62,000
Agriculture	10,000

Source: Wilkinson, J.C. (1977). p.26.

However, pearl fishing ports such as Abu Dhabi, Sharjah and Ras al Khaimah were not the only important settlements. General trade continued to develop alongside the pearl trade as indicated by Heard-Bey (1982):

*"The total value of the goods imported through the ports of the Trucial Coast was worth an average 2.5 million Rupees per year at the turn of the century, the biggest items being grain and pulse from India."<sup>(6)</sup>*

Thus Dubai was soon to become a major centre for trade activities along the coast (see Chapter 4). The majority of the land-based trade trips depended upon the exchange of tobacco, dried fish, vegetables and dates between the inland villages and main towns on the coast; these local shipments took days to arrive at their destination. The caravan routes alignment which linked the coastal places and the interior centres was generated as a result of the needs of the people located throughout the area. Thus the route was formed mainly by economic and political evolution, which was denoted by the movement of caravans, and by tribal control in places. Generally, it seems, coastal centres were linked with a specific oasis, depending on the prominence of the interior centres, such as the two main centres Al Dhaid and Buraimi. Naturally these trips combined shortness with safety bearing in mind the physical constraints. Some of these have now been developed into modern roads.

Amongst the travellers who described the routes of this area are Wellsted (1883), and Thesiger (1947-1959) who arrived at Buraimi, on the Trucial coast in 1947, and travelled towards Liwa oasis, where he described the life-style of the people. The alignment of caravan routes was influenced by many factors which affected their formation throughout the Emirates. Human factors included tribal conflict, tribal relationships between emirates, border conflicts, and rebellion of tribes against some sheikhdoms. Physical factors, such as relief and the availability of local water resources, also influenced the alignment of routes, especially in the mountainous areas.

Figure 2.2 (a,b) indicates the early routes which linked some principal settlements laterally, and with the hinterland and the caravan routes along the western coast. Lorimer (1908)<sup>(7)</sup> mentioned three groups of caravan routes which linked the Trucial Coast with the interior, and a group of coastal routes:

Figure 2.2(a) THE CARAVAN ROUTES IN THE NORTHERN EMIRATES

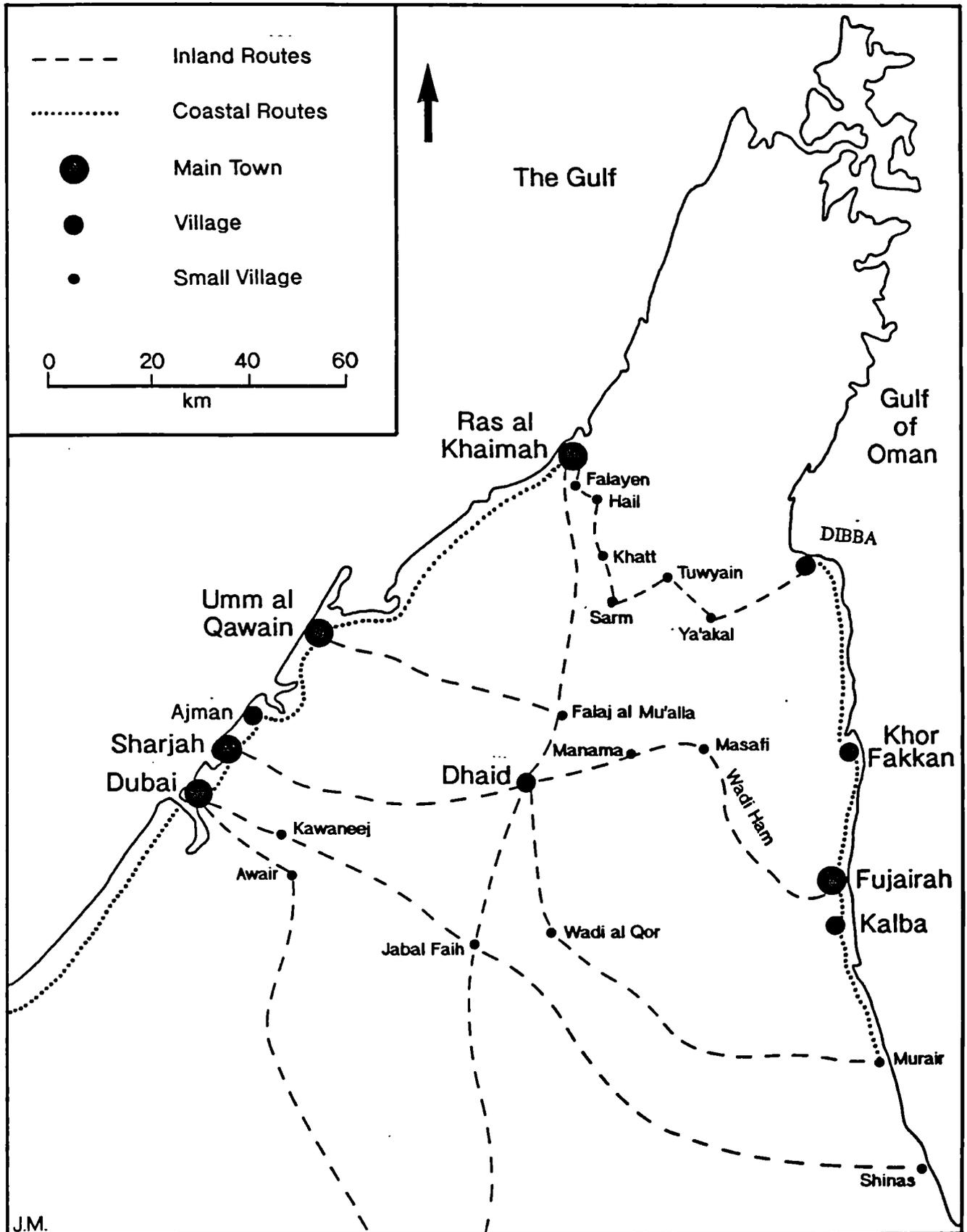
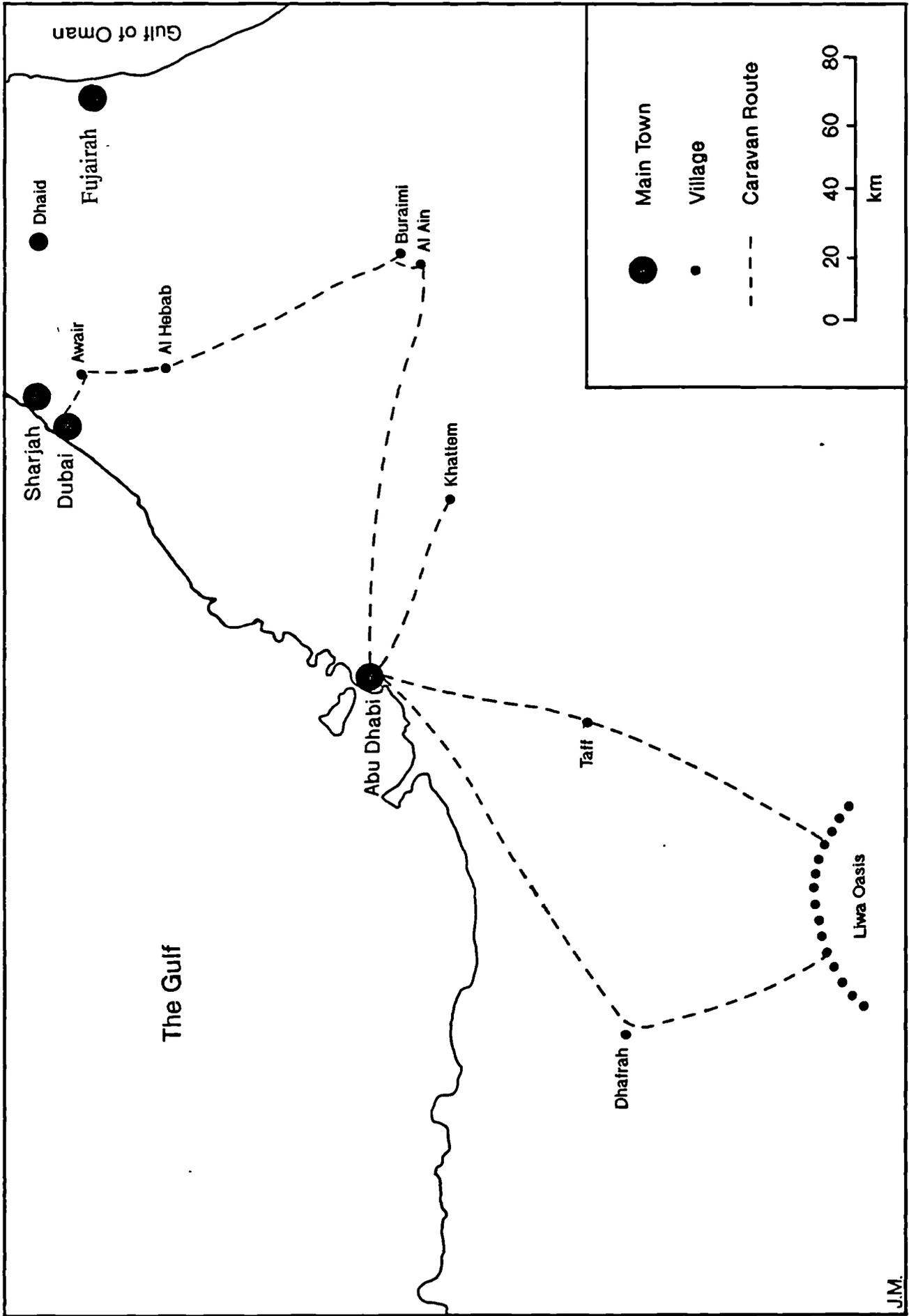


Figure 2.2(b) THE CARAVAN ROUTES IN THE SOUTH OF EMIRATES



J.M.

- a) routes which led across the Oman promontory from the Gulf to the Gulf of Oman;
- b) routes which linked the Trucial States with Buraimi Oasis;
- c) routes which ran westward through Dhafrah, providing access from the eastern parts of Trucial Oman and from the Buraimi oasis to Qatar and Al Hasa.
- d) routes which linked each coastal town with others.

The alignment of these routes was influenced by two main factors: physical factors, such as wadis, sand dunes and mountains, etc.; and human factors, such as the interaction of human activities between the towns, tribal domination in some areas, or attacks by some Bedouin tribes, e.g. one of Fujairah's caravans was attacked by the Awamir tribe<sup>(8)</sup>. In this area several routes were formed which depended on economic, political and social needs varying from long established seasonal holiday movement to tribal wars.

## **2.2.1 Caravan Routes which lead across the Oman promontory from the Gulf to the Gulf of Oman**

### **2.2.1.1 Route from Ras al Khaimah to Eastern Coast (Dibba)**

This route linked two different zones: Ras al Khaimah on the west coast and Dibba village on the east coast which was the main entrepot of the east coast before 1900. The establishment of this route resulted from two pre-existing factors: the economic function of the Ras al Khaimah community was dependent on trade, fishing, date gardens and vegetable production, and the political relationships between Ras al Khaimah and Dibba as one territory in the Qawasimi Empire (see Chapter 7).

This route penetrated a number of different landscapes. For its first ten miles the route followed the west coast. There followed a zone of sand dunes to Khatt village

(24 km), passing through Falaiyah and Hail, and between Khatt and Muhtaraqah village. Here the route was aligned to include some watering places, Saram and Tuwiyain and Ya'akal, which indicated the effect of the water factor on the route formation. In this area, the route climbs to 150 metres above sea level. Next it entered the Hajjar mountain range travelling along Wadi al Qaliddi for four miles, and then descending to the east coast (Dibba) for two miles. Traffic was light, dependent on market activities between these places. The type of goods carried were vegetables, fruit and handmade crafts. The mode of transport was by such pack animals as donkeys and camels. Despite its lightness, trade movement on the route resulted in some integration between these two regions.

Traditionally, Ras al Khaimah's settlement pattern was one of large villages, served by small market centres and subservient to Ras al Khaimah 'town' which, at the start of the twentieth century, had a population of approximately 1,000<sup>(9)</sup>, and was the main centre of Qawasimi power. Until the middle of the twentieth century, Dibba was part of the unified Qasimi area of control but was lost to the Ras al Khaimah part of that family by 1921. This trade route represents, therefore, both a continuation of *past* links and an attempt by Ras al Khaimah to maintain links with the separated (and divided) settlement of Dibba. Dibba, largely because of its ambiguous and disputed political status, has declined as a trade centre since the beginning of the twentieth century, but has maintained some exchange trade e.g. textiles, dry food and livestock which pass through these places from North Arabia to India and East Asia. This movement also exists between Dibba and the south of the east coast, generated from Ras al Khaimah, as a surplus production area, to Dibba.

There was little development along the route between Ras al Khaimah and Dibba because of its physical nature, which was rough, narrow and dangerous apart from a few small villages alongside it which still use it today, and make some primitive

handicrafts. The journey time was between two and three days from one end to the other by animal transport. Of all these early coast-to-coast routes, it remains the least 'developed' today.

### **2.2.1.2 Route from Umm al Qaiwain to Fujairah**

Typically in this area, the caravan routes were drawn towards the location of wells for use as rest points on the way. Thus a specific physical feature created the route formation and ordered the movement of the caravans; the resultant route became an effective trade alignment between these points.

This route linked two or three main points beginning from Umm al Qaiwain to Falaj al Ali (Falaj al Mu'alla) 26 km southeast of Umm al Qaiwain and ending in Fujairah on the east coast. Umm al Qaiwain was distinguished as a vessel building, fishing and pearl industry town; these crafts are still the major source of income for Umm al Qaiwain.

This route was not established as a result of interaction between Umm al Qaiwain and Fujairah, but between Umm al Qaiwain and Falaj al Mu'alla, which was the main cultivation area in the interior of this emirate. From there the route continued to Fujairah which was one of the major east coast population centres.

The course of this route followed some wells, such as Umm an Naghul well, to the village of Falaj al Mu'alla. Lorimer (1908) mentioned this route as causing "*..no difficulties to camel transport..*"<sup>(10)</sup> This is because, although the beginning of this route is sandy as far as the Fujairah border, where the mountain range begins, there were a lot of wadis, so the caravans could cross it without practical difficulty.

This route's development had some environmental impact as it justified the establishment of settlement beside it, namely the village of Al Dhaid within the oasis of

the same name, which evolved as the main nucleation in the interior of the northern Emirates.

### **2.2.1.3 Route from Sharjah to Murair**

In the early twentieth century, Sharjah was the largest and most important town on the coast of Trucial Oman<sup>(11)</sup>. Its population of 15,000 people lived in the town and its suburbs. The main trade centre within the town had an estimated 200 shops. Its significance was related to its natural harbour location. The main economic activities were the pearling industry and trade.

The reasons for the generation of this route were related to the relationship between Sharjah and Al Dhaid village as a major cultivation centre at the centre of many routes. Because Al Dhaid is a part of Sharjah territory and was distinguished as a gathering point for all caravans, Sharjah naturally encouraged its growth, whereas Murair village grew in importance due to its connection with Sharjah, because of increase of movement of goods. The distance between Sharjah and Murair is 112 km. There were two points at which the caravans diverted to link up with places on the way: Al Dhaid village, and Wadi-al Qor, and thence to Murair on the east coast of Oman. There were some important wells on the way from which the caravan's camels drank: Zibair well and Tahil well, and after Al Dhaid, Wushah well. The main goods carried were dried fish, tobacco and vegetables.

### **2.2.1.4 Route from Dubai to Shinas town**

The importance of this route was due to the past relationships, going back two centuries, between the people of the Emirates and Oman, which practised similar traditional customs. There was much in common: customs, national cloth, language, culture. The former name of the Emirates coast was the Oman coast.

Dubai town was a major entrepot on the Gulf which has long served all the lateral settlement centres. This route links Dubai with Muscat in Oman through Shinas port, which was distinguished as a transit point between these places. There were significant villages and wells such as Matinah, Khawaneej, and Jabal al Fayah, 60 km from Dubai, in addition to the Hatta oasis. This route later developed as the main road from Dubai market as a supply centre for Oman, one of the major consumers of Dubai's goods, as will be shown in later chapters.

## **2.2.2 Routes which linked the Trucial States with Buraimi Oasis**

### **2.2.2.1 Route from Dubai to Buraimi Oasis**

This was a very important route linking Dubai, the major trading city, with the interior, where Buraimi and the surrounding villages were important agricultural areas. Between 1920 and 1950 a twice-monthly caravan travelled from Dubai to Buraimi carrying goods such as textiles from British mills, rice and wheat. The returning caravans carried coal, tobacco and dates. These were brought from the same areas of Buraimi and Oman, carried by caravans along the routes which link Buraimi oasis with those areas of Oman near Buraimi.

Buraimi and Al Ain cities were holiday places in the summer, especially during the pearl-diving period. Many women and some men used to spend four months in the summer there with their relatives in Al Ain and Buraimi. During the summer, the monsoon winds which blow along the coast of north Oman penetrate the Hajjar mountains towards these places, and cause monsoon rains. There were plenty of date gardens and vegetable farms here, the harvest of which was taken to the markets of the coastal cities, thus representing a major income for them after the pearl-diving season.

This route, therefore, became important both as a trade route and a holiday route. Using camel transport, the time taken for the journey was between six and eight nights. Stopping points changed from one caravan to another, depending upon the demand of Buraimi market, but usually included such villages as Awir and Hibab both of which belong to Dubai, and Badu'al Hilli and Al Faqqa'a, before descending to Buraimi oasis. Since then, this route has continued in its importance because of the expansion in some of the agricultural areas along its path. It also has provided good access for lateral Bedouin places, both to the coast or inland.

#### **2.2.2.2 Route from Ras al Khaimah to Buraimi Oasis**

The physical terrain caused this route to have a distinctive alignment, requiring caravans to pass around the foot of hills and the Hajjar mountains.

The significance of this route is that it joins two regions which were mutually dependent upon each other according to the differentiation in their geographical functions: Ras al Khaimah area, as a coastal centre and as a northern agriculture region in Trucial Oman, linked with Buraimi oasis as an interior market. This relationship led to interaction between them. The length of this route is 200 km, and the caravan had to spend 6 to 8 nights along this route at recognised stopping points. The main items carried were dry food especially rice, and domestic goods. Caravans travelled towards wadi Jiri and then followed the western edges of the wadi, across the Al Dhaid oasis towards Buraimi, passing by some other wells. This former camel route has now been superseded by a modern road (see Chapter 3).

#### **2.2.2.3 Route from Abu Dhabi to the Buraimi Oasis**

There were two major settlement centres with which Abu Dhabi linked: Liwa oasis and Buraimi Al Ain oasis. Abu Dhabi island suffered from problems of drought

before 1950. Consequently there was no cultivation on the island. Thus evolved Abu Dhabi's dependence on Al Ain as a major source of agricultural production, and as a part of Buraimi village where the caravans gathered, because the soil of Al Ain is more suitable for arable farming than that at Liwa, which lies in the desert. This need of Abu Dhabi caused the establishment of a particular route linking these places, following many wells for a distance of 160 km.

### **2.2.3 Routes which run westward through the Al Dhafra zone linking Buraimi with Qatar and Saudi Arabia**

There were various routes to Liwa oasis, due to its significance as the original land of the Bani Yas tribe, which dominated the southwest region of the Emirates. The routes connected Al Dhafra and some small adjacent villages, but these routes were not fixed routes due to the tribes surrounding them, especially the Awamir tribe who adapted themselves to life in the desert and attempted to control the routes throughout that region. There is little information available concerning these routes, although some official documents have mentioned Liwa in connection with the coastline:

*"Every year some of the younger men of al-Jiwa (Liwa) journey northwards to the Persian Gulf where they meet pearling vessels on which they are employed during the summer."* <sup>(12)</sup>

Sand dunes form everywhere in the Dhafrah region, creating a major physical barrier against organised movement, and ensuring that the camel was the only means of transport to reach there. This mode of transport still dominated until as late as 1958 in the Abu Dhabi area, as indicated by Melamid:

*"In Trucial Oman motor trails connect Al Liwa oasis to the track running from Dubayy (Dubai) to Barakah. Until 1958, Trucial Oman troops associated with the British Army and stationed in Al Liwa had been supplied monthly by camel caravan."* <sup>(13)</sup>

#### **2.2.4 Caravan routes linking together coastal towns**

The coastal strip along the western Emirates consists of salt flats, creeks and sand dunes. These features dominate from *Sabkhat Mutti* to Ras al Khaimah. On the east coast, movement was affected by the mountainous terrain which confined the routes to the coast, such as between Fujairah, Khor Fakkan and Dibba. Socio-economic factors also influenced the movement. For instance, the relationships between Abu Dhabi and Dubai as one Bani Yas tribe were strongly influenced not only by social aspects, and family relationships, but also by special relations between Dubai and the northern Emirates, particularly concerning their economic activities.

Little has been written about these routes, but information was collected from some of the older men<sup>(14)</sup> who knew the coastal routes. These cannot be defined as particular routes, because of the nature of the landscape and the inconsistency of political relationships. However, it is known that these routes ran parallel to the coastline, and were usually altered by the ebb and flow action of the tide. There was less movement than on the coastal-interior caravan routes, because of the economic and social similarity between the coastal towns, except that Dubai, as the major port, generated a lot of goods from itself towards either coastal towns or interior centres.

In concluding this analysis of the evolution of caravan routes, significant points have emerged. As a result of the movement of caravans from western coastal centres to the interior, nucleated centres were established such as:

- 1) Al Dhaid oasis as an agriculture zone and interior market for exchange trade.
- 2) Buraimi oasis as a focal point (cultivation, market and resting place) for all caravans which ran from coast to coast.

The old routes which were formed among these places can be seen to represent a first step in the establishment of a road network in the Emirates. These routes provided the opportunity for movement, with the type of movement, its direction, and the physical factors influencing their formation. It is now necessary to consider which of these old routes have been used to develop modern transport links, and the reasons why such developments have taken place.

### **2.3 Physical environment and route formation**

The development of all these early routes was characterised by similar motives. Firstly, the aim was to link their termini as efficiently as was possible, given the technological limitation and socio-political realities of the day. Secondly, was the need to choose the line of least resistance in terms of the physical environment, always assuming that that was strategically expedient. Whilst, as we shall see later (Chapter 3), physical constraints have ceased to be a major influence in the creation of the new UAE transport network, it is important to discuss these physical factors in relation to the early evolution of these routeways.

Following the above comments about individual routes, this section seeks to summarise the physical features of the pre-vehicular routes, and thus to evaluate how the physical environment affected the formation of the caravan routes between the west coast and the east coast, and to the inland destinations of the Emirates, thereby creating a structure for the next chapters referring to recent road development.

The landscape of the Emirates is distinguished by three topographical elements:

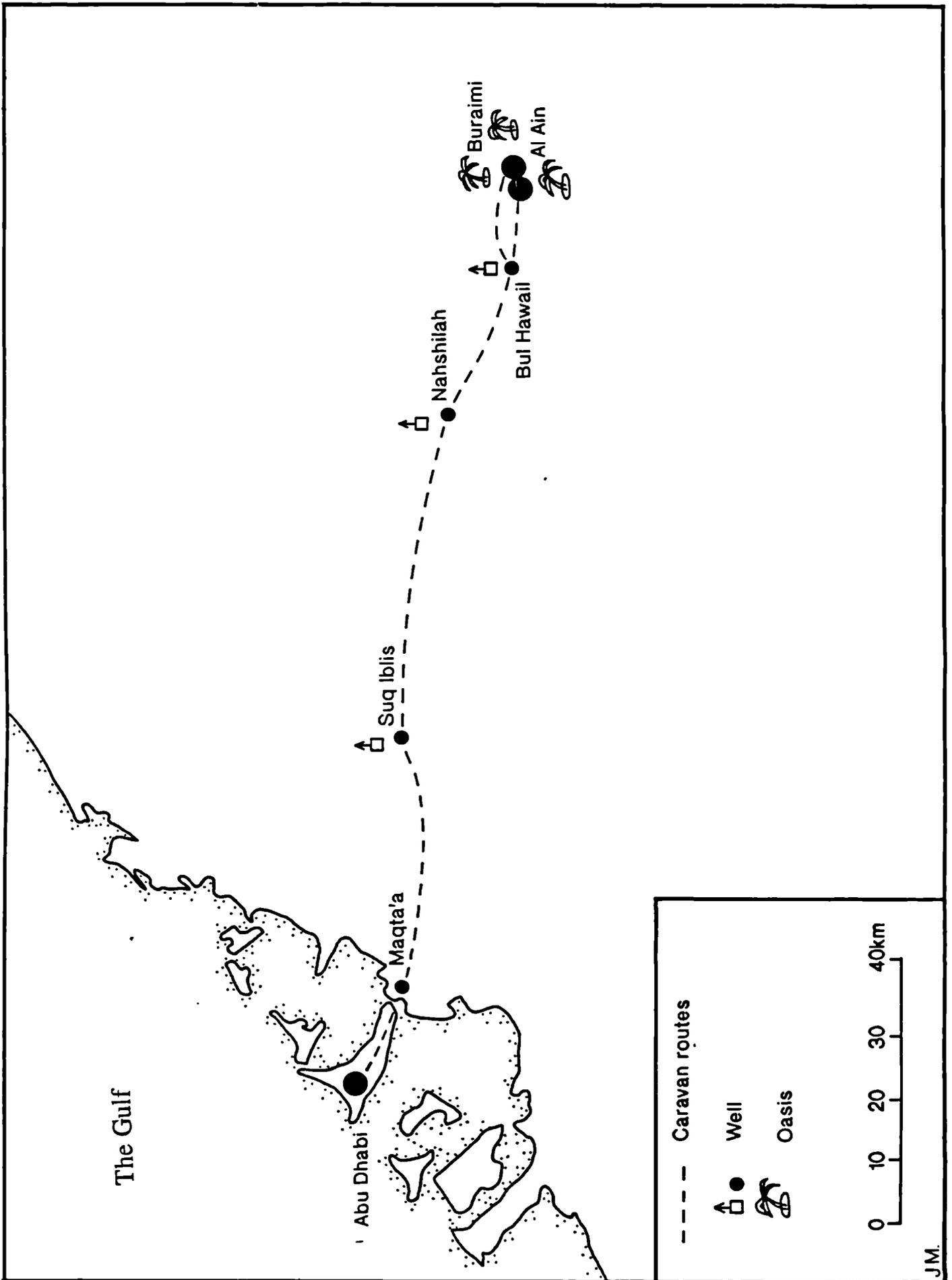
- 1) The mountains: located in the north east of the Emirates; a narrow zone running from north to south behind the east coast of more than 155 km in length and 37 km in width.

- 2) The low plains: areas to the west of the mountain zone which occupies 92 per cent of the land of the Emirates <sup>(15)</sup>.
- 3) The coastal strip, which occupies 780 km along the west and east coasts.

In this section, the relief of the Emirates will be used to illustrate how the routes have been geographically located throughout the Emirates, by being attracted towards the rare 'positive' features and driven away from the 'negative' or empty characteristics of much of the area.

The nature of the land is arid, with high temperatures and scarce rainfall (about 50-200 mm per annum)<sup>(16)</sup> which give rise to rock exposures, and promotes the creation of unrelieved sand dunes, except for a few oases surrounded by palms trees and Ghaff trees (*Prosopis spicigera*) along the way. These oases have fresh water springs which encourage the caravans to stop at them. The camel, as the major transport mode of that time, depended on water and plants for survival; also, as a consequence of the long hours spent travelling between the places, passengers needed to take a rest along the routes, and therefore typically spent a day at every stopping point. As shown in Figure 2.3 the evolution and the movement of the caravan routes were thus a result of the attraction of the wells and oases. For instance, the route from the original point on the coast at Abu Dhabi town, proceeded towards the location of wells, travelling from Al Maqta for 16 km, then to Suq Iblis and Nahshilah wells for 44 km, then to Bul Huwail wells (24 km) and Juhar wells (40 km) and finally to Buraimi oasis for 20 km. Lorimer mentioned that this route lies over sand dunes.<sup>(17)</sup>

Figure 2.3 THE EVOLUTION OF CARAVAN ROUTES AND THE EFFECTS OF PHYSICAL FEATURES



The other physical features which governed the formation of the routes were the wadis which predominated in the mountainous and other arid areas. Hindley (1971) mentioned the importance and safety of the wadis as the most crucial factor of all land features.<sup>(18)</sup> There are 56 recognised wadis in the Emirates ranging in length from 1-40 km.<sup>(19)</sup> These wadis have caused the established of a number of settlements along their banks, e.g. Dibba wadi gave rise to Ajmiah, Tiban and Dibba villages, and Al Dhaid wadi provided Al Dhaid village with the main location for its agriculture production. The wadis consequently gained a human population, strengthening the need for caravan routes to follow the wadis, and giving them some promise of the availability of water.

The perilous nature of the salt marsh which dominates western Abu Dhabi for over 100 km, discourages frequent use of this direction as a route; except on a few dry days, it is unsuitable for camel or car.

It is impossible to explain the sand formation of any area of the Emirates without the existence of reliable data. Over the past 100 years a little information about the sand dunes' formation has been collected by the travellers to East Arabia; for example, the wadis which were called *seh* in the Emirates were mentioned by Wilkinson:

"The sand cover increases away from the mountains, but corridors of *seh* and *sabkha* provide good routes through the sand from the coast to the mountains."<sup>(20)</sup>

Physical features, therefore, can be seen as significant to the evolution of the roads. The main features are wadis, wells and sand formations (see Chapter 3).

The above explanation of the historical geography of the development of routes in the Emirates was necessarily derived from travellers' papers, but it has made clear that the wadis were an important factor affecting the formation of routes, whereas

there is clear evidence, especially in the eastern region of the Emirates, that the wells along the coastal and inland areas were the more important influencing factor in the development of caravan routes. In addition, sand formations have affected route development.

## **2.4 Beginnings of the modern road network**

The purpose of this section is to evaluate the morphology of road network development throughout the Emirates, and the main factors which have assisted in road expansion from 1965 to recent times. The intentions behind road construction are also examined, for the road network in any country develops as a result of a response to human activities and policies. Finally, there is a need to consider the extent of international linkage of the road network of the Emirates, and the basis of this development in political and economic terms.

Before the establishment of the United Arab Emirates in 1971, there were no really comprehensive plans for the development of the road network throughout the Emirates, although in 1967 the Trucial States Development Office (TSDO), for political and economic reasons, completed some road projects in some areas, such as the Dubai to Sharjah road, as an inter-state road, in order to improve accessibility between coastal and interior population centres. This was constructed and designed by Sir William Halcrow, at a cost of 428,000 Bahrain Dinar (BD). This was in part related to the rapid population growth caused in itself by the vast expansion in the oil-based economy of the Emirates at that time (see Chapter 8).

The oil-dominated economic structure has been the major factor in the development of the UAE since 1971, when oil became the primary source of income in the Emirates, thus opening up the capacity to improve all parts of the infrastructure within a very short time.

Consequently, oil revenue has assisted the spread of economic and social activity throughout the state. However, oil field development in some places has been an indirect factor bringing about links with remote villages, particularly in Abu Dhabi state, for instance around Liwa Oasis, where various degrees of access to major settlements already existed.

Formerly, individual plans were implemented to develop the infrastructure of each Emirate, especially the rich ones (see Chapter 8). Dubai, for example, as an entrepot and commercial centre, owed its development specifically to the seizing of the opportunity afforded by the decline of the port of Lingah on the south coast of Iran.

*"It was during Maktum's rule from 1894 to 1906, that Dubai began to grow as a commercial centre. Maktum himself was liberal and enlightened, and was quick to seize the opportunity that the decline of port of Lingah in Persia offered for Dubai to develop...Dubai became the main port for the entire Trucial coast, and the chief distribution centre for foreign goods destined for the interior, especially the Buraimi Oasis."*<sup>(21)</sup> Zahlan, R.S. (1978).

The main influences on development have been the emergence of the coastal cities which were distinguished as the first populated centres on this coast. This was as a result of the nature of the environment at that time, such as the formation of creeks along the western coast which provided these cities with the opportunity to expand laterally, and the needs of other settlers to communicate with the main ports such as Dubai city (see Chapter 4).

The apparent dominance of some emirates, such as Abu Dhabi and Dubai, over other emirates has been due to the fact that the former were the first to produce oil, thus giving them an early strategic advantage over the others.

In 1969, in Abu Dhabi and Dubai, this led to the use of oil revenues in the service sector. Projects such as the development of the road network received major expenditure. Thus:

*"..Revenues from oil allowed major development in the socio-economic infrastructure, and a further stimulus in changing the pattern of oasis agriculture [was] the development of a modern transport network in association with the growing urbanisation of the population."*<sup>(22)</sup>

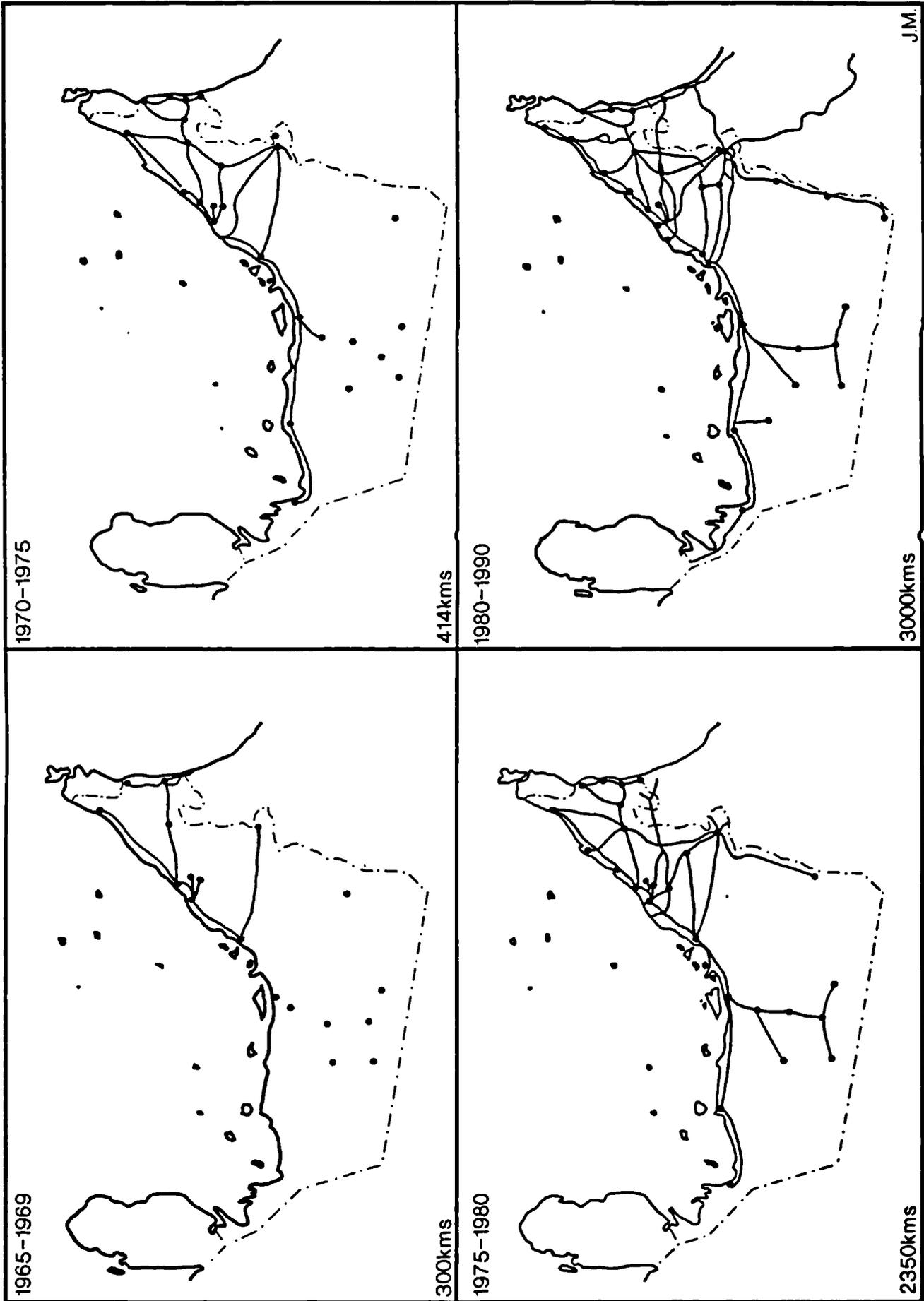
The earliest road developments in this area relate to the Trucial States Development Office, which worked with Sir William Halcrow & Partners in 1965 to construct the main trunk road, called *The Transpeninsular Road*. This was from Sharjah city, to Fujairah, enabling the achievement of specific economic and social targets for the people of this area. These processes were encouraged in the development of the Trucial states by the TSDO, which at that time was working in close association with the 'Protecting Power', Britain, the government of which was at that time strongly committed to the notion of regional development, using road transport as an incentive.

As indicated in Figure 2.4, the expansion of the modern road network from 1965 to 1990 can be divided into three types of road development. Derived from the particular circumstances which produced the recent road network, these types relate to the historical circumstances of economic, political and social demands for this region.

The three types are:

- 1) Road networks formed as a result of resource exploitation (oil fields) inland e.g. Abu Dhabi - Liwa region;
- 2) Road networks patterned as a result of the internal ambition of the UAE and the demand for the linking of local markets within it, for example all parts of the northern network including Abu Dhabi city as an administrative centre of the state.

Figure 2.4 THE EVOLUTION OF THE MODERN ROAD NETWORK IN U.A.E., 1965-1990



J.M.

- 3) Road networks formed as a result of the importance of links with other countries.

Many transport network theories rely on the understanding of the reasons for economic growth through road expansion, the most famous model being that produced by Taaffe, Morrill and Gould (1963). This explained the development of transport in less developed countries, and was named the Ideal-Typical Sequences Model.

From the start of British protection of the Trucial states, no major roads projects for colonisation purposes were constructed until the areas where the oil fields were to be found were developed e.g. in the Abu Dhabi region. Metalled roads to oil fields were built to facilitate the oil companies' movement between the coastal centre of Abu Dhabi and the interior oil centres at Al Dhafra and Liwa, which is where the major oil fields in this emirate predominate<sup>(23)</sup>. This sort of development might be implemented as the Ideal-Typical Sequences Model for this part, but there were three types of road development which actually developed. One is the internal federal road network caused by the federation of the states, the second is local intra-emirate links, and the third is the international road network proposed for political reasons in order to form links with other countries.

#### **2.4.1 Road networks influenced by natural resources**

The natural resources in any country are one of the most important factors in the expansion of the road network, as in some West African countries, where natural resources were the prime reason for road development; these have been represented as a colonising roads model. Taaffe (1963) has examined this model in countries which have demonstrated four main stages in road network development.<sup>(24)</sup> It is useful to attempt to examine this model in the light of the development of the road network in the United Arab Emirates.

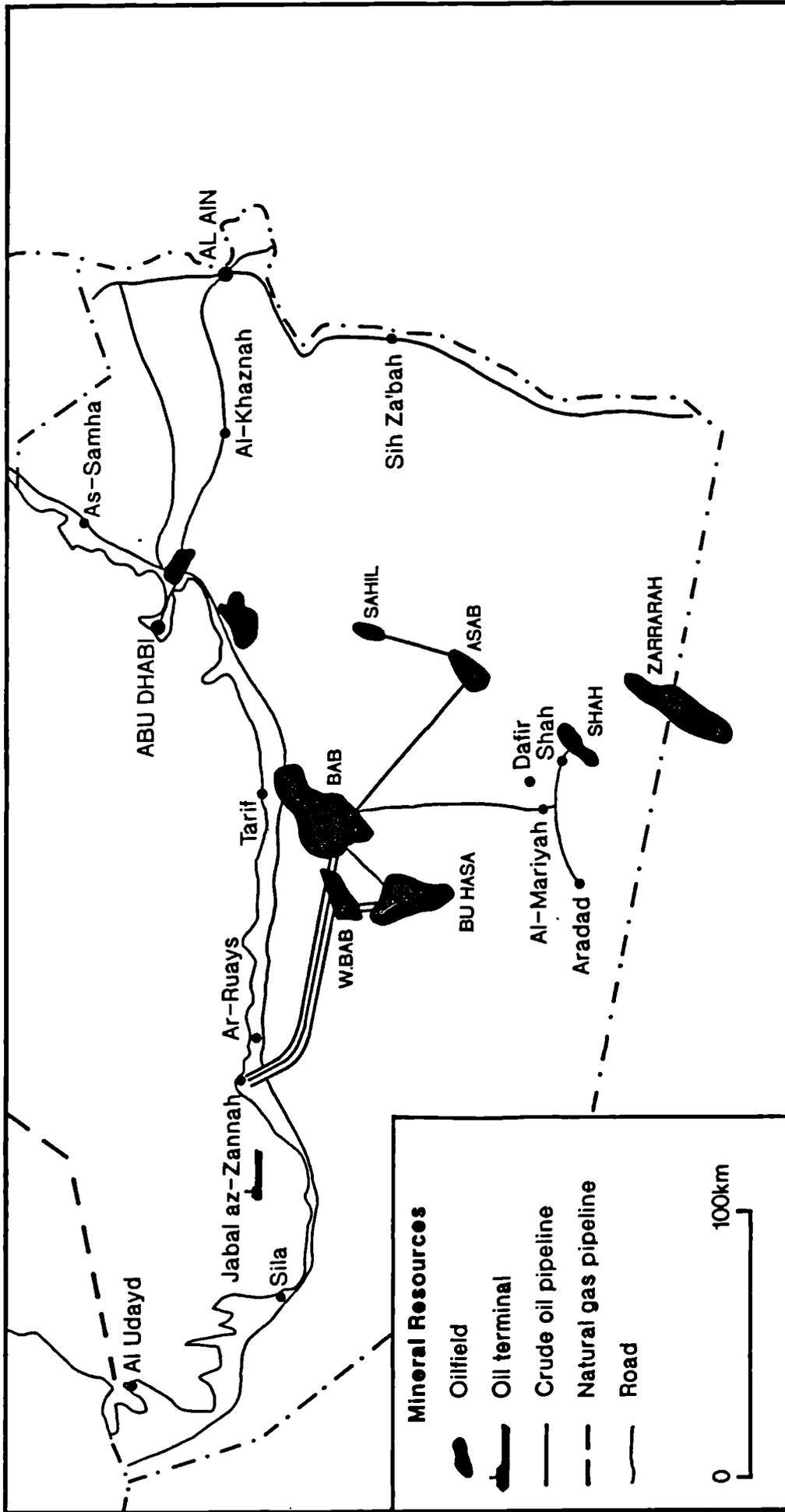
The area selected for this case study is the Abu Dhabi Emirate, excluding Al Ain city (Figure 2.5), for the following reasons :

- 1) Foreign oil companies focused on this emirate, because it was the first accessible for oil at the outset of this development (see Chapter 1).
- 2) The improvement in services in some of the interior villages up to the standards of the coastal cities was due to the impact of oil development.
- 3) The influences of oil development have led to links, either by accident or by design, being developed with Liwa oasis and the few other isolated population clusters.

Political problems had developed in the sheikhdoms along the coast line of the Trucial states and in particular in Abu Dhabi. Because of its large territory, it was decided that there should be a Representative placed in Liwa, in order to keep the Sheikh of Abu Dhabi in touch with any 'political developments' among the tribes in these regions. However, the situation was aggravated by the remoteness of the area, making communication between the Wali (the Representative) and the Sheikh of Abu Dhabi difficult.

The arrival of the oil companies provided the means to an apparently perfect solution to this problem<sup>(25)</sup>. Having surveyed for oil, the companies needed to metal many of the roads to facilitate the movement of equipment used for laying oil pipes, and also for reaching the remoter places where wells were to be dug. The indirect result of this process was the enabling of Abu Dhabi to gain access into the more remote territories in the Liwa oasis. The significance of this in political terms will be analysed in later chapters (see Chapter 7).

Figure 2.5 ROAD NETWORK AND LOCATION OF OIL WELLS IN THE EMIRATE OF ABU DHABI



- 4) Oil development influenced employment and income directly through the process of concessions to oil companies, causing an increase in the population of these areas.

Before the oil search began this area was characterised by a scattering of small ports, located along the coastline, such as Abu Dhabi, Ras Ghanadhah, Traif and Rwais villages, dependent on the pearling industry, fishing and boat building for a living.

There was no strong connection between these ports, other than that between Abu Dhabi village and Ras Ghanadhah. This was as a result of its close proximity to Dubai city, which was subsequently developed in the 1950s by the Petroleum Development Trucial Coast (P.D.T.C). This British company, the first to obtain a concession to search for oil<sup>(26)</sup>, concentrated on oil exploration in the Emirates, starting with Ras Sadr oil field in Abu Dhabi in 1949.

Throughout transport history the major factor in the development of a region's transport network has usually been the first penetration line into the hinterland, and its consequences for lateral links. As a result of the arrival of the oil drilling equipment, and the nature of the land of these areas, it was essential for the oil company to metal roads towards their targets, in order to move this equipment to the site of the fields. The first metalled roads were built along the coast to Abu Dhabi, roads which were built to serve the oil development of that area. Next, there occurred the first penetration line inland from the port of Abu Dhabi, linking the oil field centres.

This spatial process created a modification of the hinterland, as well as changing the function of Abu Dhabi from a village to a city, with its consequent enlargement, thereby creating the feeder routes towards the lateral villages. The hinterland of Abu Dhabi was always demanding new construction material from the port, as an import gate, in order to improve its urban growth. Thus, the port of Abu Dhabi was able to

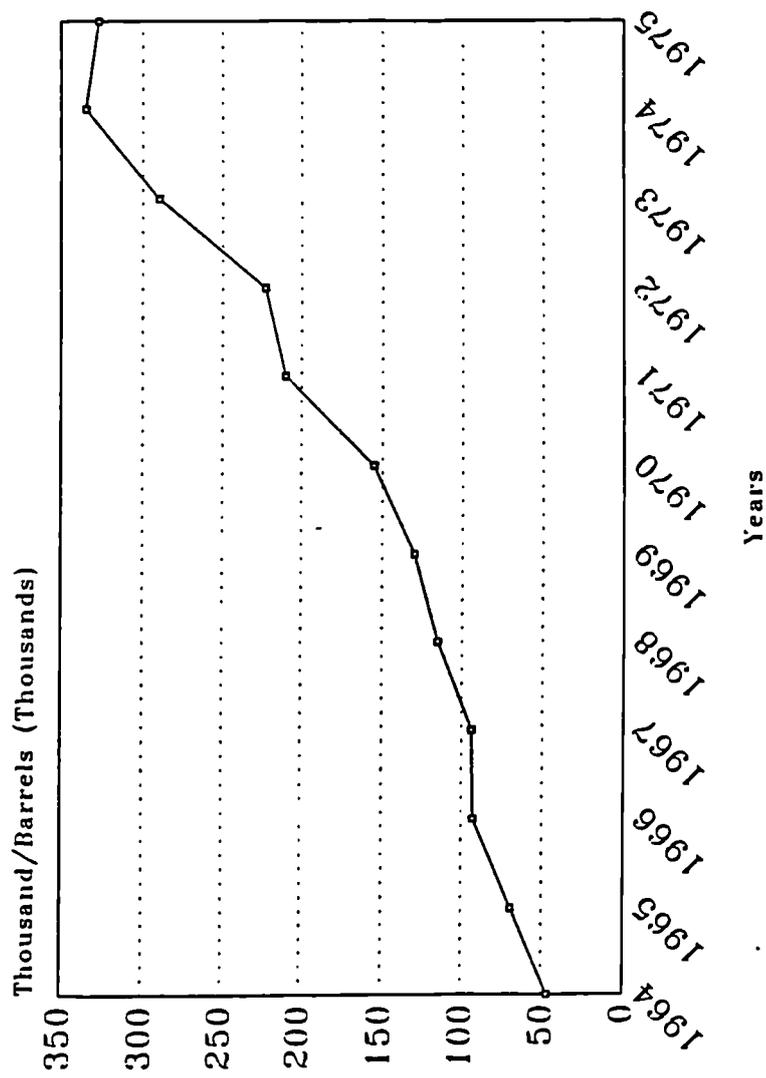
poach the traditional hinterlands from other laterally neighbouring ports, and thus became a major port in its own right.

The distribution of oil fields in Abu Dhabi is divided into two regions; 1) the onshore oil fields region located in the southwest of the Emirate. 2) the offshore oil fields, situated in the territorial water of the state. The main onshore oil fields are located in southwestern Abu Dhabi, and consist of the Bu Hasa and Asab fields. These oil fields necessitated the rapid construction of the road network leading towards the interior of the state, which has facilitated the development of feeder roads to link with interior villages. This process has strongly influenced the social and economic structure of the state, transforming the economics of the Emirates from that of limited local economic activities to those of an international economic scale. It has also resulted in a marked change in the structure of the villages surrounding the oil wells.

Figure 2.6 shows the crude oil production in Abu Dhabi Emirate from 1964 to 1975. This oil development initially encouraged some of the interior people of the remote areas to settle and to obtain jobs. It also created the need for better access to other cities. Consequently, the number of roads increased rapidly, leading to a change in the lifestyle in lateral areas, which developed through the building of modern houses, modern markets, clubs and gardens in order to serve these places, thus, in effect, urbanising the form and structure of the village.

The spatial process represented by oil development over these areas has caused a vast change in the function of the coastline e.g. the activities of the ports and the focus of their development, especially in the port of the Abu Dhabi, more so than other lateral small ports. The modifying of the hinterland of this state has swiftly resulted in the development of Al Ain city on the Oman border, with a related population expansion in that city due to the rising job opportunities in all sectors.

Figure 2.6 Development of Oil production in Abu Dhabi from 1964 to 1975.



Source: Al-Otoba, 1977.

Initially, the development of the road network from the main port of Abu Dhabi was towards the oil field centre. Roads led to development of the villages, but in particular of Abu Dhabi city itself; more road connections occurred between 1971 and 1981 as a result of the oil revenue on the one hand and the decision of the state to encourage the settlement of the Bedouin in specific interior places on the other.

The building of planned interconnections took place after 1977 when the enlarging of the major port was in progress, thereby influencing growth in the various interior centres such as Al Ain, Madinat Zaid and Habshan and the nodes along the penetration line. During the 1980s the road network was fully connected with all the remaining interior centres, as well as with the other emirates. As can be seen there were focal points (main centres) linking with the main port (Abu Dhabi) like Al Ain city, Madinat Zaid, Liwa oasis and other small centres in the oil fields, but this process created a main artery between Abu Dhabi and Al Ain city as its second city. This was because the growth of Al Ain city was not a product of the colonising road development, but as a major centre in its own right, being the agriculture producer for the people of Abu Dhabi. Other main roads extended to Dubai as the trade centre for the Emirates (see Chapter 7).

The Taaffe model could be applicable in the first stages of road development, and before the independence of the Trucial States in 1971. Later, however, road development was supported by oil revenue, a major factor in the development of the UAE. It can be argued, therefore, that there is strong evidence linking the rapid development in oil production and the concomitant population growth, with the increase in the road network, especially when compared with earlier periods of road development.

However, this theory can not be completely implemented in Abu Dhabi, because development of the first road expansion was related to the colonial routes model,

when the oil companies desired to get their oil production to Europe, as opposed to the further road development into the interior, which was definitely related to oil revenue being used to make a federal road network and to implement the federal plans of unity. This will be discussed in the next section.

#### **2.4.2 Federal goals and the road network**

The creation of the federation of the United Arab Emirates, on 2 December 1971, provided the major incentive for the integrative road network development throughout the Emirates.

Roads which predate 1971 are typically those which were constructed to serve specific purposes related to the localities which they directly served. The oil situation is the most obvious example of this, and this type of development is discussed in the following sections.

The short period following Federation, which had largely come to its conclusion by 1990, was therefore characterised by high rates of investment in programmes designed to complete the networking of the federated states' road schemes.

Thus, in terms of the evidence of the road network, 1971 was a 'good' moment for federation to occur. Federation provided the justification and the means for a huge investment in road construction, much of it aimed at bringing further together the various settled areas of the UAE. Equally, the road building of the 1960s provided both a framework for this network to develop around and the right social climate for the Federation ideals to flourish.

Other factors followed the UAE's establishment, such as internal security between the Emirates, trade and food movement between the internal markets, plus the factor represented by the development of social relationships between the people of these

Emirates and the provision of social services of a high order to virtually all of this population. The effects of the new state and the role of roads during this phase on the people and land of these areas has been observed.

*"..Probably the most effective federal achievement, which in itself helped the nationwide provision of various services and a more uniform economic development, was the construction of the road network." (27)*

Because of the dependence on federal policies for the improvement of all the infrastructure, the ministries of the states have played a very large part in the development of the life of the Emirates people, and ensured that the United Arab Emirates has a significant place in the Gulf. This is due, in the first place, to oil revenues, but is also a consequence of the achievement by the Federal state of key objectives relevant to its integrated development.

The road network, as the first important development of the Emirates period, was dependent upon the desire to integrate one place with another. This implied movement of people or goods and was for an abundance of purposes, the most important being the fulfilment of unity among the people of the Emirates. Previously, the inertia of distance was a substantial factor restricting the integration of people between Emirate sheikhdoms.

Before the federation, road projects relied upon the Trucial State Development Office. The beginning of the road network development was from the west coast, and as a consequence of the lack of roads in the Emirates before 1965, apart from internal roads in Dubai city. The first development in the modern road network between cities was from Dubai to Sharjah, where 13.5 km was established and financed by the Development Office in 1966<sup>(28)</sup>.

The British were thus significantly involved in this early phase of the creation of the initial road network of what was to become the UAE. Continuing the theme of outside involvement, the Saudi Arabian government agreed to finance the important Northern Extension of the road to Ras al Khaimah, as part of its policy of co-operation in the opening up of these areas. It is interesting to note that, as late as 1967, it was still regarded as inappropriate to expect local funds to be sufficient to pay for such a major project.

This scheme was part of the first major metalled road project not linked directly to oil extraction, being built in order to link the west coast cities. The Dubai - Sharjah first stage, was built as a result of the strategic and commercial location of Dubai and the importance of Sharjah city as the British military headquarters, the first airport also having been built there in 1932. This road was then followed by the Sharjah - Ras al Khaimah road, financed by the Saudi Arabian government.<sup>(29)</sup> This 116 km road consequently served the movement between these two cities and facilitated the goods trade which was generated from Dubai city.

It also allowed the major agricultural area around Digdagah village to be linked to encourage the movement of its agriculture production to other places, as this road joined the cities located on the west coast of this road e.g Ajman and Umm al Qaiwain and other small villages which were improved due to the function of Ajman as a traditional ship building base and Umm al Qaiwain as a fish farms base. The completion of this road will be shown to have assisted in the development and integration of these areas.

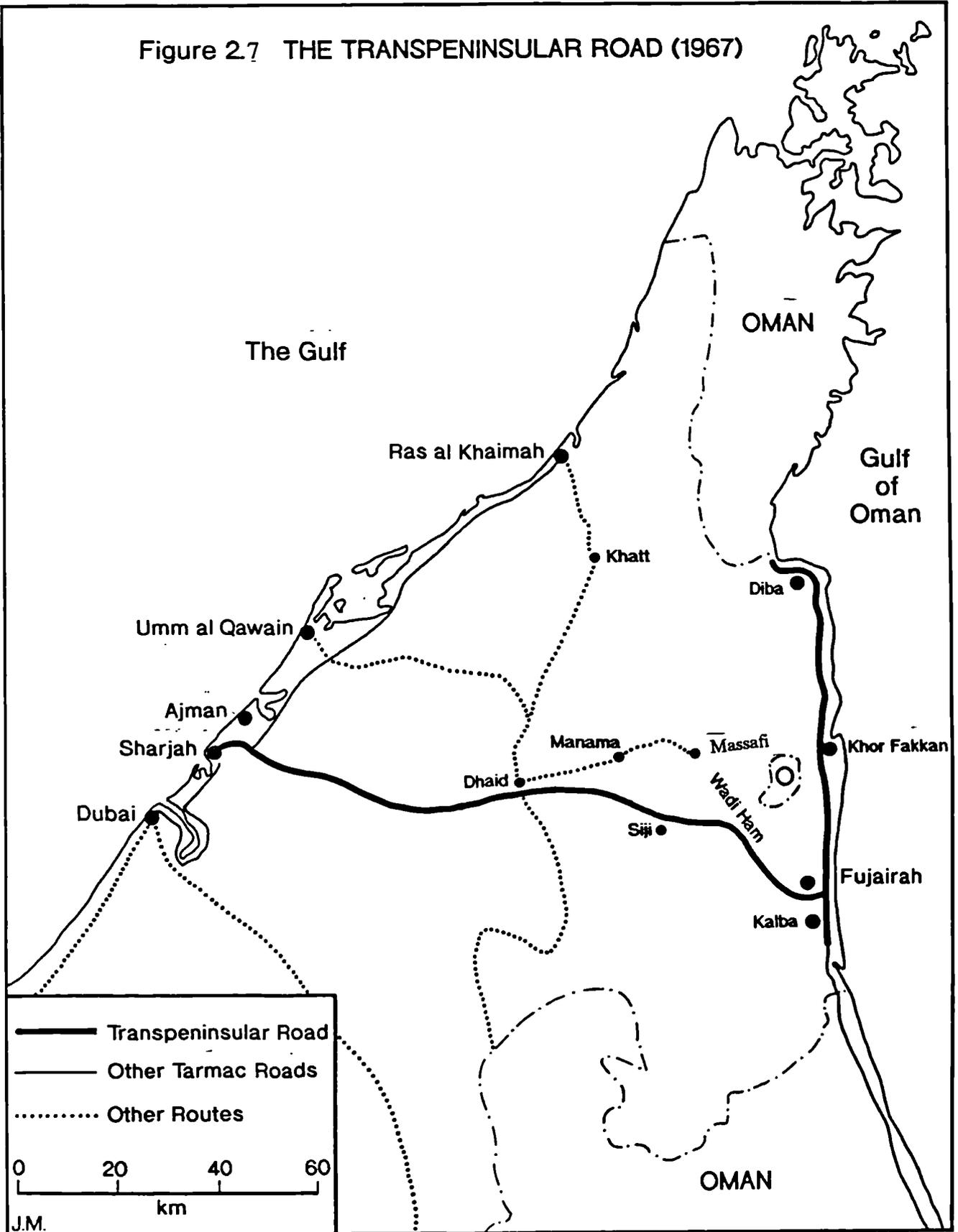
Road building has also been an internal, planned part of the urban expansion of cities, such as the first 12 km of the Dubai - Al Ain road which was built from Dubai to the Al Hasah site by the Costain Construction Company, in order to bring stone from there for Port Rashid's construction in 1968.

The Transpeninsular Road shown in Figure 2.7 was started from Sharjah city to Al Dhaid village, a distance of 75 km, as part of a project financed by the Abu Dhabi government, as a result of Abu Dhabi policy to help the poorer emirates to establish a basic infrastructure. That project demonstrated the idea of unity among all the emirates. (The total route recommended was from Sharjah over the sand to Al Dhaid, over the gravel plain to Siji, up the Wadi Ashwani on the western side of the mountains to the Wadi Ham on the east, on to Fujairah, with an east coastal road stretching from Dibba in the north to Kalba in the South)<sup>(30)</sup>. It was constructed by the Trucial States Development Office and was the most prolonged of the road projects. In 1967 this road was continued to Fujairah across the Al Hajjar mountain for 50 km, from Al Dhaid to Fujairah. There were other significant roads running from Ras al Khaimah to Al Ain, and passing through Manamah, Al Dhaid and Buraimi oasis then onto Al Ain for another 175 km, the latter being a very important road project for economic reasons as it linked the major agricultural zones, which were in the same location as the three recent cultivation zones.

In addition, this road linked the tribal areas, facilitating their communication and relations with both the Abu Dhabi and the new federal government: this was a key concern of both levels of government.

The Abu Dhabi region was developed at the same time as the roads in the northern Emirates, because there was a five year plan to develop the Abu Dhabi infrastructure between 1968- 1972. This also included some other Emirates, as indicated in Table 2.2 which compares the costs of some roads with their Authorities' Funds.

Figure 2.7 THE TRANSPENINSULAR ROAD (1967)



**Table 2.2:  
Road Construction in the UAE**

Road	Length/km	Width/metres	Total cost BD,'000s (Bahrain Dinar)	Authority Funds for road	Approx. cost per km BD,'000s
Dubai-Sharjah	14	11	427	TSDO	31.7
Sharjah-Ras Al Khaimah	116	8	3,500	Saudi Arabia	30.1
Sharjah-Al Dhaid	48	8	1,300	Abu Dhabi	27
Abu Dhabi-Al Ain	145	16	14,000	Abu Dhabi	96.5
Transpeninsular road	125	10	4,700	TSDO	37.6
Town roads of Sharjah	-	-	53	TSDO	-
Ajman town roads	-	-	90	Abu Dhabi	-

Source: Trucial States Development Office, *Roads in the Trucial States*, D- 1371, Appendix to Newsletter of the Trucial States Council, Chapter 3, Inter-state Projects, 1970.

In 1968 they focused their plans on the development of a road towards Al Ain, due to the political importance of the location of Al Ain as a previous boundary problem, and as an agricultural area. This dual carriageway road of 145 km between these two towns has continued to gain more significance in traffic yearly, because Al Ain town is the second city in Abu Dhabi state. However, this was contradicted by the report issued in 1970 from the official mission on traffic on this road, which stated that the traffic was very light and not expected to increase in the future.<sup>(31)</sup>

In contrast, the 130 km Abu Dhabi-Dubai road was seen as an essential road for both Emirates, due to the complex issues of tribal, political and economic relationships between Abu Dhabi and Dubai. In addition, Abu Dhabi having become the administrative capital of the Emirates, needed to have complete communication by road with all other cities. Other roads were built such as that between Abu Dhabi - Tarif,

part of the project to link Abu Dhabi with Qatar, but the extension westwards beyond Tarif over the international border was not constructed until 1973 for political reasons, despite the fact that the firm link was recognised at this early stage as being crucial to the UAE's commercial needs.

The main impetus for transport network development in the Emirates between 1971 and 1990 was the political power of the federal state. As a result of the establishment of the federal state the number of the roads between all the cities increased with a similar increase in settlement in all parts of the state. Secondly, the general desire of the new population has been to have a good road network linking every state, such as Abu Dhabi's plans to develop roads in the north Emirates.

As a result of the federal plans to cover all aspects of regional development, including all aspects of public services e.g. health centres, schools and settlement, these roads can be seen to have provided a significant contribution to the process of economic and social change in various sectors, such as the bringing of agricultural production from rural zones to the urban centres. Indeed, the road network is the vital factor in the services distribution throughout most places in the Emirates. However, some places are still (1993) without modern road access to other cities, creating transport problems which remain to be solved. This matter will be discussed at a later point in this thesis.

### **2.4.3 Road network development in response to international demands**

International border crossings are an important and sensitive factor in the relationships between the UAE and neighbouring countries. This consideration determines the strategic importance of the location of the UAE, for its transport network is a significant feature in the measurement of the power of a state, particularly in terms of the assistance it gives to communication within the Gulf Co-operation Council. At

this point it is necessary to consider the historical development of international routes and their importance to the UAE.

The international road network developed partly in response to the need to encourage economic relationships with other countries in the Gulf area, depending on the former relations between these countries, the formation of the old caravan routes, and a desire to improve external connections. Finally the establishment of the Gulf Co-operation Council necessitated the strengthening of links, both for security and for economic and social reasons.

The United Arab Emirates has five main exterior roads linking the Emirates with neighbouring countries:

- 1) Abu Dhabi city - Saudi Arabia, the principal 'exit route'.
- 2) Fujairah city - Muscat (Oman);
- 3) Al Ain city - Sohar (Oman);
- 4) Al Ain city - Iberi (Oman);
- 5) Dubai city - Shinas (Oman), as a local regional movement.

These roads were constructed in different periods. These crossings were created as a result of the development of the Emirates, depending on the economic activities between the Emirates and other countries. Closely integrated links already existed between the Emirates and Oman, not least because of the complexities of local ownership around Buraimi; with Saudi Arabia and Qatar links were always more tenuous. Most Emirates have external connections with the Sultanate of Oman. For instance, there was a lot of traffic between Dubai and Muscat and the rest of Oman in terms of the movement of commodities.

This is now served by a dual carriageway road of 110 km, linking the northern emirates with Oman through Al Wujajah in Hatta village. Statistics have indicated that there were 4,000 vehicles daily travelling through this point to Oman in (1986),<sup>(32)</sup> denoting that a lot of material is moved from Dubai to the Oman markets. These vehicles, which come from Oman, are carrying fish, dates, and other Omani commodities to sell in Dubai. This is because of the availability of all types of goods in Dubai markets as a result of Dubai city's unique function as an entrepot centre among all Gulf, and World, countries. For this reason the ruler of Dubai has funded the building of the road from Hatta to Shinas, indicating the long and strong relationships between these countries, and the importance of the economic movement from Dubai to Oman and *vice versa*, factors of significant importance for both countries (see Chapter 5).

A second link with Oman is the Fujairah - Shinas road, 78 km of which is in the Emirates. This road has a traffic census point at Khat Melaha, which has estimated its use between Fujairah and Khat Melaha to be 600 vehicles daily (1985),<sup>(33)</sup> indicating that it is an essential road for both countries. The third road is between Al Ain and Ibri to Salalah city in the south of Oman. This road is a vital link, indicated by the high daily traffic using it, recorded in 1985 between Al Ain to Ibri as being 2,300 vehicles<sup>(34)</sup>. This use has been determined by the flow of construction materials, food, furniture, etc., bound for all parts of Oman. Before the federation, this road was a primitive route, and had proved very difficult for the movement of transport. The fourth link with Oman is between Al Ain and Sohar. This road developed from the old route which was used a lot due to the old relationships which developed between the two nations.

The fifth road is a very important road for the Emirates in many ways; the most significant point is the recognition of its situation as the local gateway to the outside world. This road was developed, after the federating of the Emirates, in 1975, because

there were plans to build a coastal road linking Abu Dhabi with Qatar. Financial consultants at that time regarded it as being a low priority in terms of economic investment, and as a result completed this project only as far as Tarif oil port. However, this analysis was short-sighted because, since the beginning of the Federation it has been necessary to promote international relationships, in which this gate was an essential feature, because of the developments throughout the Arabian Peninsula at that time particularly in transportation. This important road was later completed, linking it to all parts of the Arabian Peninsula.

The 1980s however, demonstrated a very important movement, first of all in food supplies, which came from Lebanon and Turkey and other Gulf countries, and then in other materials which were exchanged from Emirates markets to abroad. At this point road transport was substituted for sea transport in food importation. This is because it was considered to be a safe and quicker method than by sea, owing to political instability and port congestion. The Gulf War between Iran and Iraq, which created numerous problems in air and sea transport methods, thus encouraged people to utilise roads, particularly international roads, throughout the GCC.

## **2.5 Public transport**

This brief section discusses the importance of public transport, its development as an investment sector, its role in transportation operation and as a main factor of the construction era leading into the economic boom from 1974 to 1977, and at work particularly until 1983 (see Chapter 8).

There are, surprisingly to the outsider, no public transport systems connecting the Emirates' cities with each other. Abu Dhabi Emirate has its own urban public transport network, and intra-emirate services which facilitate passenger movement in its remoter places. Dubai has a long established bus service operating throughout

the emirate. Other emirates, however, have no such services, not least for financial reasons.

Since the establishment of the road network, the growth in public transport has rapidly increased, due to oil revenue and its consequences for society, and to the start of the construction phase for all of the infrastructure of the state.

Historically, the transformation from the use of the camel as the main transport mode, to the use of cars, has created a big change in the landscape of the Emirates, such as the reformation of the old routes. The first car arrived in the Trucial State in 1928 (for the Resident Agent of the British Government, Isa bin Abdul Latif, in Sharjah Emirate) and in Dubai in about 1930. These cars were used just for the Sheikhs or rich people of that time<sup>(35)</sup>. Later, the number of cars increased. Henderson (1988) noted that in 1948 there were 24 cars in the Diera side of Dubai, and seven cars in Bur Dubai: two for the Sheikh and the other five for the oil company. Cars were imported from many countries. For instance, Dubai traders travelled to East African countries, where they bought cars and electronics equipment, such as radios, and returned with them to sell them in the Dubai market.<sup>(36)</sup> Dubai roads were narrow and not asphalted. Later attention by the Dubai government improved various services, of which roads were one. With the British presence in this state, the Trucial States Council improved the motor sector as part of the new construction development in all fields of the community. At the beginning of the establishment of the federal state, planning programmes required an entire fleet of cars and trucks to assure the progress of the enormous construction movement throughout the Emirates between 1971 and 1980.

Public transport in the Emirates can be divided into that which is privately operated, and that which is state run.

### **2.5.1 Private public transport**

Private public transport is defined as non-government transportation, notably private companies operating trucks, vans and cars in commercial activities; these companies are assisted by general transport such as passenger or goods taxis, and the hire car companies. Developments in this sector were related to expansion in the infrastructure of the Emirates i.e. in education, health, housing and roads, from the establishment of Emirates in 1971.

Developments in general transport companies resulted from the construction activities of the Emirates. In the education sector an authority was established which primarily served the educational movement throughout the Emirates, and as hire companies for other organisations. Named the 'Emirates General Transport Establishment', and founded in 1981, it has 1,711 buses transporting pupils within cities, and 475 four wheel drive vehicles serving the remote areas. The Establishment transported 187,114 pupils in 1989 and 1990.<sup>(37)</sup>

### **2.5.2 Government public transport**

Through the government public transport system, much of the regional public network has been set up in order to link all the remote areas, in particular in Abu Dhabi Emirate (as the richest and largest state among the Emirates). Public transport serves passengers within the emirates, and was established in 1968. Since that time, this important sector has come to serve many places within the Emirate of Abu Dhabi. Links with Abu Dhabi city include Al Ain, Al Khaznah, Tarif, Dhafra, Liwa and other villages and main population centres in the Emirate. Abu Dhabi's main bus station opened in 1972, at a cost of 46,000,000 Dirhams. From 1972, starting with 28 buses carrying 150,000 passengers and operating on 9 lines, it increased rapidly to 350,000 passengers in 1973, with a non-corresponding growth in the number of buses to 42.

By 1975 the number of buses had more than doubled to 104, and by 1980 the number of passenger journeys throughout Abu Dhabi was estimated as 20 million.<sup>(38)</sup>

There has been a proposal to create a railway network serving all the states in the federation, but it has not yet been implemented. This project was considered as a good way of linking Abu Dhabi and other Emirates cities. The first proposal was introduced by Transmark - Transportation Systems and Market Research Ltd.- a subsidiary of British Rail in England - to connect Abu Dhabi Airport with the city centre. The rail network was proposed to facilitate regional communication and to expand links with other countries, but it has not been implemented due to the competition provided by the roads, as shown by the extensive road network already completed in all areas of the state. Competition, then has been largely eliminated due to the domination of the car as a mode of transport in all places. Another factor may be that the population is very low in comparison with other countries e.g. 1,600,000 in 1986, concentrated in the main cities. All this means that it is not considered financially viable to invest in the establishment of a railway project. For this reason, the federal council has approved the implementation of an inter- emirates bus network instead.

This attempt has led to and encouraged a federal public transport network to serve all parts of the UAE, and has stimulated links with all Gulf states. It is in line with the policy of the GCC, which seeks to stimulate linkages amongst regional markets, through roads, rail, air and water transportation networks.<sup>(39)</sup>

## **2.6 Maritime transport**

The location of the United Arab Emirates on an old trade route has long been very significant. The Portuguese were the earliest European power to have influence on this area, in the sixteenth century. Most recently came the British influence, which was officially withdrawn in 1971.

These historical influences have affected the number and development of the ports. The reason is to be found in the use of the Emirates as a transit point on the old trade route between India and the East Indies and both Basra in Iraq and the East African coast. These influences exhibit both passive and active effects on these routes. The passive role of these coastal ports is demonstrated by some powers, such as the Portuguese in the early seventeenth century, occupying minor ports on the Emirates coastline to ensure that Arab trading communities could neither compete nor seriously interfere with their commercial dominance. Such colonial designs also affected the port of Khor Fakkan on the east coast, when it was destroyed in the first expedition against Arab trade in 1506 by Alfonso de Albuquerque.<sup>(40)</sup>

The active role has been by the local people in utilising their ports for trade, such as Dubai and Sharjah, to other areas in the Gulf. There was historically local, regional and international maritime transport throughout the Emirates, represented by the ports of the state. All are related to the geographical location of the Emirates and have been determined by the varieties of economic activity undertaken by the people of this area, which forced them to look towards sea transport from earliest times as they travelled to India and East Africa for their trade, boat building and pearling industries. There was also the 'piracy' aspect based in the northern ports of the Emirates, and related to the Qawasimi state which developed dual function ports for defence and commerce.<sup>(41)</sup> The policies of the Qawasimi state so limited the function and use by outside powers of its port, that Ras al Khaimah eventually became inactive. Dubai, on the other hand, developed an international policy encouraging the free movement of goods and people, leading to its establishment as a major 'active' port in the area, a role it still maintains today.

The importance of the Emirates' ports has changed since the nineteenth century. At that time ports such as those of Sharjah and Ras al Khaimah dominated the region,

due to the Qawasimi state's political influences in the north. These ports were recognised as defence ports against European vessels and as trade ports. Their importance declined in the second half of the nineteenth century, while at the same time new ports rose up, such as Dubai, and Abu Dhabi.

Traditional sea transport routes can be classified into:

- 1) local routes which operated between the Emirates ports but which represented a tiny proportion of the total passengers and goods movement. For instance, vessels sailed from Dubai to Ras al Khaimah and Bukha in Omani territory, as a result of the existing agriculturally - based relationships of the south coastal people with the northern territories.
- 2) regional sea routes, linking the cities of the Emirates with other Gulf coastal cities such as Kuwait, Bahrain, Doha, Dammam and Basra and Iranian coast cities, and along the South Arabian, East African coasts as far as Zanzibar.

All types of goods were transported on these routes. Particularly in the nineteenth century, another vital traditional sea transport route was between Dubai and Sharjah, and Iran at Lingah and Bander Abbas. These routes have operated from earliest times up to the present day, and are still invaluable in the transport of food and livestock.

Latterly, the high degree of co-operation between the Emirates and the other Gulf countries has led to a sort of economic integration. This system involving the creek ports has improved the economic structure of some of the Emirates, as shown by the utilisation of such well-known vessels as *dhow*s and *sambuk* as the traditional mode of coastal sea transport for both passenger and cargo transport among the Gulf countries.

International sea transport was conducted with Indian and East African countries, from the main Trucial States ports, such as Dubai port, which was, in 1905, the major steam port in this area, used by a number of British steamer vessels. However, political changes in Iran caused the port of Lingah on its southern coast to decline, and thereafter Dubai assumed Lingah's prior importance.

*"In the early 1900s Sheikh Maktoum bin Hasher began to develop Dubai's commercial potential. One of Dubai's chief rivals was the small port of Lingeh, 160 km to the north.... Merchants there found their trading activities restricted by rather severe taxes which were imposed on them." (42)*

This development led to Trucial State ships generating further trade routes to India and East Africa as a substitute for the Lingah ones, subsequently forging the strong relationships between India and the Emirates which still exist today.

International trade development in the Emirates depended upon the ports. The key physical factor leading to the development of these coastal parts over a long period is the nature of the coastline. The various natural creeks have provided safe havens for the centres of commercial activities, the most important creeks being those of Dubai, Sharjah and Ras al Khaimah. Sharjah creek was an entrepot point in the nineteenth century, but declined, after 1950, for financial reasons.<sup>(43)</sup> However, Sharjah is now third in importance in the Emirates following the implementation of federal government schemes to revitalise it.

The Ras al Khaimah creek was also one of the most active ports during the early 1900s, due to its function as an entrepot defence port in Qawasimi state. It also suffered decline at a later date, but in 1965 the Trucial States Development Council improved the port. In 1968 an American oil company also enhanced this port under the terms of an oil concession<sup>(44)</sup>, since when the port of Ras al Khaimah has developed into an active

centre, with all modern port facilities. To what extent it is a rival to Dubai, and to what extent it relieves pressure at the larger ports will be discussed later (see Chapter 4).

One of the most significant of the new developments has been the UAE's exploitation of the economic potential of the sea-air transport system. By this is meant the development and improvement of sea transport has been very rapid over the past 18 years, indicated by the increase in all fields of the sea transport system, such as ports, ship movement, containerisation, oil tankers and oil terminals. Sea transport development is evidence of major economic activities, as illustrated in Table 2.3, which shows development in commercial ports from 1975 to 1985.

Sea-air transport involves moving goods by more than one mode of transport. The goods originate from production centres in the Far East, and are transported to the consumption areas in Europe, America and Africa. Transferring from ship to plane reduces the expense of using only air transport and the time cost of using only sea transport.

**Table 2.3:**  
**Development in Commercial Ports from 1975 to 1985**

Type	Measurement Unit	1975	1980	1985	Growth 1975-1985
Commercial Ports	Number	3	10	14	11
Berths number	Number	29	150	312	283
Berths length	km	6	36	46	40
Ports capacity	M/ton	5	74	95	90
Oil terminals	Number	3	10	12	9
National oil tanker fleet	Number	2	3	16	14
National ship fleet	1000/ton	530	664	1119	589

Source: Ministry of Planning, *Economic and social development in the UAE (1975- 1985)*, 1987, p.127.

In 1975 there were three seaports with 29 berths, with container facilities still to be established, but by 1985 this had increased to 14 ports, with the berths reaching 312 in number. This development of the ports' capacities, which totalled 5 million tonnes in 1975 and grew to 95 million tonnes in 1985, as well as the growth of exclusively oil export terminals, which rapidly expanded from 3 to 12 during the 10 years in question, relates positively to the international demand for Emirates oil during that period.<sup>(45)</sup>

Dubai creek has played a very important role as a trade zone from early times to date. The development of Dubai port goes back to the beginning of the twentieth century. For instance, in 1902 21 ocean ships were registered as having used the port.<sup>(46)</sup> This era of development was as a result of Dubai's free trade policy at that time. In 1958, the ruler of Dubai improved the creek by enlarging and increasing its depth, thus enabling trade movement to be doubled within five years. Import volume swelled from 191,000 tons in 1964, to 651,000 tons in 1970. This was mainly as a result of the arrival of merchants from Iran and India and Pakistan who planned numerous trade projects, using the favourable physical and financial facilities. In that period, the Port of Rashid was developed in order to undertake more economic activities, making a significant step towards sea transport investment. However, the creek still keeps its role in regional and local transport.

The Emirates has 14 ports, commercial ports and oil export ports. There are 312 berths distributed between all Emirates ports, related to sea transport activities development in this area and reflects an expansion in international sea routes linking the Emirates with both Europe and the Far East.

The Emirates' ports can be classified into west coast ports, and eastern coast ports. The historical development of the west coast ports is related to past economic activities such as the pearl trade, and food commodities movement such as rice, sugar

and coffee. These ports have developed additionally as a result of the hinterland factor which was improved by the expansion of economic and social activities, because Buraimi market in the interior supplied goods to Dubai and Sharjah ports.<sup>(47)</sup>

## **Dubai**

Involvement in the re-exporting system made Dubai an international entrepot city as early as 1909. Dubai port is still the major port amongst the west coast ports, growing from 15 berths in 1968 to 35 berths in 1979 as a response to the rapid growth of the economic activities of Dubai and other lateral places. This led during the most rapid growth period, to an increased import volume of 70 per cent more in 1972 than the previous year.<sup>(48)</sup> This enormous development took place during the main period of construction in the whole state. Dubai was the main gateway for the import of building materials to all parts of the UAE, which is the reason why the port developed so rapidly, offering the highest standard of all the ports in terms of technological equipment, especially in its containerisation system.

Small ports have also shared in the development of trade movement. For instance, Hamriyah port is 2 km from the centre, which traded with regional and East African countries. Consisting of eight berths, besides being involved with small ships and dhows for the transport of foodstuffs, livestock and timber, this port is established to encourage trade movement regionally.

The other main port in the Emirates and Gulf areas is Jabal Ali port; situated in Dubai but 35 km south of Dubai city, this port was established in 1980 with 74 berths, under the new policy to improve the Jabel Ali area as an industrial location. This policy was to establish the area as a free trade zone area for a lot of industrial projects, facilitated by these ports. An important factor in the expansion of the port's operation is a road network which makes fully accessible all part of the Emirates.

## **Abu Dhabi**

In 1966 Abu Dhabi was dependent on Dubai for its import commodities which were then transported to the city by road or by small boats. Abu Dhabi is the largest state in the Emirates, having five seaports serving its commercial sector and oil exports. Its only commercial port is Zayed, within Abu Dhabi city. This port was not created from creeks as the other north Emirates ports, but was established in 1972 to serve the Abu Dhabi region. The increased population and urban expansion of the city and its hinterland have caused this port to be expanded to its present size of 25 berths, totalling some 5,000 metres in length, fitted with all modern technological equipment.

This port showed a big increase in 1973 in the import trade sector associated with the beginning of the construction era of the UAE. For instance, in 1972 the trade import was 758 million Dhs. By 1974, this had reached 22,661 million Dhs. This rapid growth reflects the important circumstances of the time, such as the establishment of the federal government and the increase in oil income after 1973, plus the completion of the port in 1974.<sup>(49)</sup>

This port was the main port for the development of the Abu Dhabi and Al Ain regions. It has influenced urban development as well as the development of the interior of Abu Dhabi, and it was assisted in performing this function by good road networks connecting it with all parts of the state.

Other ports are located in western Abu Dhabi, such as Umm al Nar, Ruwais and Jabal Dhanah. All these are oil export ports, developing in parallel with oil production since 1962. They have enlarged to become industrial zones like Jebel Ali port in Dubai, with Ruwais mainly recognised for the export of petrochemical and liquid gas products, whereas the main function of Jabal Dhanah port is oil exporting only, linking as it does with all interior oil fields. All these ports have stimulated a lot of building projects and

growth in settlement, thus assisting oil company employees to find accommodation. They are served by a high standard of roads linking Abu Dhabi with its interior.

Some eastern coast ports have a long pedigree; Khor Fakkan, for instance is recorded as being a defence port for the Qawasimi state in about 1747.<sup>(50)</sup> From that time primary economic activities took place among the east coast people, and Khor Fakkan and Fujairah ports were the major ports which helped to develop markets and trade, rather more than dependency on the west coast of the state, via the overland routes already discussed.

Fujairah's location is seen as of increasing strategic significance, being outside the immediate political troubles of the Gulf; being marginally nearer to the international trade routes is also of some advantage. The port was established in 1982 and is therefore the latest port to be built in the Emirates. Initially it cost 175 million DB. Its prime official function is to serve the east coast, but as the leading non-Gulf port of the Emirates, its potential to serve a greater catchment area, should conditions in the Gulf make this necessary, has clearly been a key factor in its development. Altogether, it has 1,600 metres of berths. Economic activities on the east coast traditionally relied upon fishing, farming, and some handicraft trade.

The development of this port has potentially enabled it to become the most important port in the Emirates. Its function as a container port and, specifically, as a centre for sea-air transport to either Fujairah or other airports has also given it an important place in the transport system of the Emirates.

In addition to these coastal ports, there are many island ports which were established as a result of the offshore oil fields. These are Abu al Boukoush, Das, Mubarz in Abu Dhabi's Islands, and Fatah artificial port (for Dubai), which has been associated with the development of the sea transport system present in all the ports.

## **Conclusion**

To summarise, the geographical location of the Emirates has also been a very significant point in the development of the sea transport system, from early days to date. This development is mainly noticeable in the development of the ports. The development of the ports relied upon various factors e.g. political, economic and others. Such factors were principal influences in the growth of west and east coast ports. The historical development arising from the increasing importance of port activities, particularly of the east coast ports, emphasises the vital significance of the Emirates' transport system, and its affects upon economic activities.

## **2.7 Air transport**

Before 1990 there was no system of internal air services within the UAE. It was possible though unusual to use, as a domestic service, some of those few international services which called at, for instance, Ras al Khaimah and Abu Dhabi. In the 1980s a limited helicopter service evolved. Neither of these two are of real significance here. However, in April 1992 the first scheduled internal route opened between Dubai and Abu Dhabi, serving these two major emirates for commercial and business reasons. The service will be extended to other emirates if progress can be shown.

This section introduces a new aspect of transport policy: the UAE's role as an international transport provider, with particular reference to the exploitation of the UAE's international locational advantages.

The history of the development of air routes in the Trucial States is closely related to the British Empire of the 1930s, as part of the British policy to improve links with its colonies in India and South Asia, and to connect the route from London to Australia. The crucial factor here is the key location of the Trucial States relative to other Gulf

states, encouraging the development of the Royal Air Route, which began operation in 1931.

The national requirements of the Indian Air route, as perceived by the British government, caused an interaction of political influences among the Gulf Sheikhdoms of that time. The main reason for the operation of this route was mentioned by Burchall (1933):

*"In 1929 the difficulty was overcome, and the Persian Government granted an authorisation to Imperial Airways to fly for three years, once weekly in each direction, along the Persian Coast, subject to certain restrictions...By that time our arrangements were complete for a change over to a route on the Arabian Coast...The Arabian Coast route (as it is normally called) follows the line Basra-Kuwait- Bahrain-Sharjah (in Trucial Oman) and from there directly along the Persian Coast, but outside territorial waters, to Baluchistan and India." (51)*

After long negotiations between the British government and the rulers of the various Sheikhdoms, air strip refuelling stations were built on the Trucial Coast. Following the results of the Trans-Oman Expedition in 1927, which investigated the area between Sohar and Sharjah in order to get an appropriate landing ground for airplanes, approval was granted, in March 1932, for the establishment of the Arabian Coast Air route. Efforts were then concentrated upon finding suitable locations for landing- strips within these Sheikhdoms. The place nominated as suitable for use as a landing or emergency landing strip was Ras al Khaimah, as having a good geographical location for connections to Gwader in Pakistan.

Initially this attempt was rejected by the Ras al Khaimah ruler, because he was worried about giving the British a foothold in his town for taking action against him<sup>(52)</sup>, so the first airport and a military station for the British Royal Air Force was not built until 1932 in Sharjah. Thus, a first step towards the air transport era in the Emirates was

taken. It was to be utilised by the Royal British Airways route to India, encouraged by the low landing fees, although cost was not the significant factor for this use. In 1968 it was transformed from a military station into a civil passenger and cargo airport, and in 1975 a new airport 12 km from the city was built. This is now the second most important airport for sea air transport, after Dubai airport.

In Dubai, civil aviation history began in 1937 when the first Empire flying boat landed on Dubai creek. For the first year, there were weekly flights linking Dubai, Karachi and Southampton in the U.K.. In 1938, air traffic increased to four flying boats a week, thus creating the 'Horseshoe Route' which linked Durban in South Africa with Sydney in Australia via Dubai. By 1940 there were 8 flights a weeks by BOAC airliner (British Overseas Airways Company). In 1959 Dubai International Airport consisted of one runway 1,800 meters in length, open from 07:00 to 18:00. Later, working hours were increased to 18, in response to the demands of the development of Dubai city.

The airport is 2.5 miles from the city centre. Increases in aircraft movement in the early years of the Federation were rapid. For instance, the 22,458 recorded aircraft landing and taking off in 1972, represented an increase of 53.4 per cent over the previous year, and an increase of over 90 per cent over the total for the previous three years.<sup>(53)</sup> At the same time the airport installed all the modern air traffic equipment necessary to facilitate traffic movement. Since 1972, Dubai airport has demonstrated its willingness and ability to respond to the development of Dubai as a trade centre, leading in the early 1980s to its modifications to make it suitable to accept Jumbo jets.

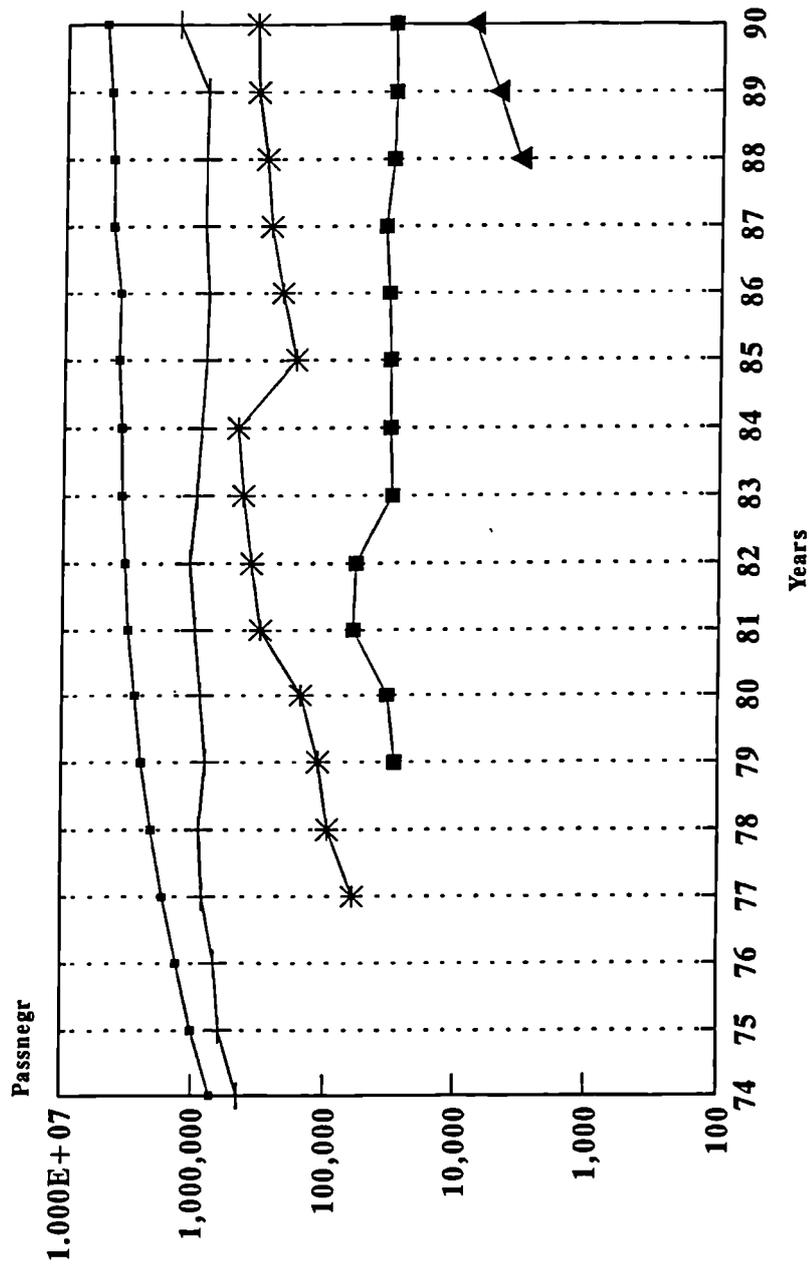
By 1984 the second runway was completed and equipped with the latest meteorological and airfield lighting instruments. By 1989, Dubai airport had 51 airlines using the airport regularly and around 134 civil and commercial flights daily, serving 87 international destinations, using it for a variety of reasons such as those brought about by

the 'open skies' policy. The latest progress in air transport in Dubai was the establishment of the International Airline of the United Arab Emirates (Emirates Airline) in 1985. This has been as a result of the significance of Dubai and the UAE as an international trade centre.

The development of passenger traffic passing through Dubai airport has been equally impressive. For instance, in 1977, 1,675,236 passengers used the airport. This increased to 5,000,000 passengers by 1990 as shown in Figure 2.8 comparing the emirates' airports. At the same time cargo traffic increased from 35,000 tonnes in 1974 to 1.4 million tonnes in 1990,<sup>(54)</sup> corresponding to the importance of Dubai internationally (see Chapter 4).

Due to the country's geographical location, Dubai has, since 1986, become a leader in the sea air transport system, a system which still continues to expand today. It is the international trade movement which links the global East as an origin (manufacturers) to the West as a destination (markets), that has led to the choice of Dubai as a sea air transport point. Development has increased from 8,432,459 kg in 1986, to 14,610,981 kg in 1990. The major countries of origin (by weight) are: Hong Kong 37.9%, Taiwan 24.4%, India 18%, Singapore 4.5% China 4% (see Chapter 4).

**Figure 2.8 Passenger movement within Emirates Airports from 1974 to 1990.**



+ Dubai  
 \* Abu Dhabi  
 \* Sharjah  
 ■ Ras al Khaimah  
 ▲ Fujairah

Source: Civil Aviation Authorities, 1990

Air transport in Abu Dhabi has also been related to the operation of the oil company (PDTS), which needed such facilities as roads, and air strips to assist in the exploitation of oil resources in this Emirate. In the 1960s the Gulf Aviation Company made five round-trip flights weekly, using the Sabkhah airstrips.<sup>(55)</sup> By 1960 the first international airport was established, at a distance of 5 km from the city, in response to the demands of the increasing air traffic. The economic growth of the city has also encouraged air transport. Since then, the establishment of the Gulf Aviation Company in the 1950s was assisted through the growth of oil companies from 1966. This year is distinguished as an active period of oil exploration in the Emirates.

The increase in passenger traffic using Abu Dhabi Airport corresponds to the phases of development throughout the state, the key factors were:

- 1) The construction period (1972-1980)
- 2) Federal government policies (1971 onwards) encouraging foreign capital investments in Emirates projects particularly, in Abu Dhabi, through the oil companies.
- 3) The revitalisation of development projects (1985 to 1987) after recovery from the 1976 economic crisis in the Emirates. Passenger movement through Abu Dhabi airport is high, reflecting not only the high mobility of its own population, but also its function as a transit point between East and West.

There are also three other airports, at Ras al Khaimah, Fujairah and Al Ain. These airports are less active than Dubai, Abu Dhabi and Sharjah. Ras al Khaimah international airport was built in 1979, 25 km from the city centre. This airport has not provided much development to its surrounding areas, but it might improve regional and international services, and may well offer a service to tourists for the northern Emirates.

Fujairah international airport is the fifth in the Emirates; just 3 km from the town centre, it serves the whole east coast region. Its importance is related to its unique strategic location in recent times, as during the Iraq-Iran war when the Strait of Hormuz was closed several times for political reasons.

The east coast location of Fujairah has led to significant economic activities in this area of the Emirates, all of which have been of assistance to the airport, especially since the establishment of the sea - air transport system in this state, as well as because of its importance as a seaport. The sixth international airport in the Emirates, Al Ain airport, is located about 15 km northwest of Al Ain, and will be opened at the end of 1993. This airport was established as part of the Abu Dhabi state policy to encourage Al Ain in its regional expansion. The reason suggested was that due to the 'great distance' between Al Ain and either Dubai (135 km), or Abu Dhabi (180 km), the Al Ain population needed to have a local airport to facilitate travel; it had become apparent that Al Ain city had increased in both population growth and as an agriculture and important tourist area, so the government decided to support this project. However, it is more likely that political rivalry or the desire to increase its status lie behind this decision.

Air transport development in the Emirates was as a response to the demand for development as a whole, paralleled by other Gulf countries, as well as a response to the needs of oil companies and their development. For it is clear to see that the rise of some Emirates' airports to the status of major airports in both passenger and cargo movement, such as Dubai, Abu Dhabi and Sharjah, is related not only to the spatial function of each city, but also to some Emirates' desire to establish a local airport of their own within the Federation's structure.

## **2.8 The development of transport policies**

The Trucial Coast states were distinguished by unintegrated settlements scattered along the west and east coasts. This scattering of communities reflected the sheikhdom system, recognized as a Bedouin community system and dependent on the economic and social activities which regulated people's movements.

The development of general modernisation policies commenced in this area after oil exploration, when the oil companies decided to undertake private projects and develop oil field zones for their movement, indirectly utilising the small scattered population in the desert.

The usual way to evaluate an accurate record concerning the development of road, air and sea transport networks, their effects upon political integration and the extent to which these projects achieved their targets, would be to refer to historical and contemporary documents. Unfortunately, however, there is not much data available in this field. Nevertheless it will be attempted here to portray an accurate profile assisted by those historical books and some of the TSDO documents that offer relevant information.

The recommendations for the development of the Trucial States were carried out by the Middle East Division of the British Overseas Development Administration and were to determine the growth of economic and social policies of the Trucial states, such as:

- 1) Satisfying the minimum needs of nationals for housing, water, electricity, health and education services;
- 2) Employing nationals in productive jobs and raising their productivity;

- 3) Providing the infrastructure of a modern society: transport, communication, administration;
- 4) Improving the physical environment of the urban centres;
- 5) Exploiting existing resources economically and searching for new resources, thus leading to a diversification of the economy; and
- 6) Integrating the permanently employed immigrant labour into the local social system, a policy that has not been achieved, due to the nature of the local community in the Emirates, which refuses to accept this integration for religious and national reasons.

These aims arose from the local development needs of the Trucial States people and were later applied to individual investment opportunities within the state, such as in Abu Dhabi and Dubai. There were two regions which had individual policies. Abu Dhabi region and the North Emirates region developed separate infrastructure plans; Abu Dhabi, as a result of its rapid economic growth oil revenue from 1962, was the first Emirate to make policies which co-ordinated all activities throughout its region.

In 1967 comprehensive plans in Abu Dhabi allocated BD 296 million for developing the social and economic sectors, which included the roads projects. From 1968 to 1972, a five year plan system was developed, which also incorporated expenditure on roads and the communications sector generally, to an even greater percentage over and above other projects.<sup>(56)</sup> It indicates the enormous attention the government gave to the building of the essential road network in the region. These policies were transferred to the new federal state policy of 1971.

The Trucial State Development Office was the main executive authority in the development of the infrastructure of the northern Emirates from 1965 to 1971. That

period produced the completion of the main road plus construction plans and projects which had been discussed by the various local authorities of the Sheikhdoms. It encouraged the development of a closer relationship between the States concerning population centres, economic and social activities such as agriculture, livestock, marketing, fisheries, transport, housing and urban development and health throughout the states.

The TSDO's emphasis was mostly on the roads projects sector because of their important effects on spatial differentiation, and its belief that these projects, once achieved, would make large strides towards the federation of the states. They also broached some essential projects such as the Transpeninsular road for economic, social and political reasons, decisions which have been effective in the development of the Emirates.

Federal plans were formulated in 1971 for all federal states as part of a series of five year planning programmes, but, twenty years later, had not been completed as a five year plan programme for all Emirates, for various reasons based around on individual state's failure to agree with their federal targets. These plans proposed the development of the social and economic sector specifically in order to lead towards integration of economic relationships between the states, and the establishment of a regional infrastructure. However, this policy has been attempted for some emirates especially in the north, and has been achieved successfully.

In terms of the development of the main infrastructure of the Emirates there have been two separate scales of development policy determining the development of each Emirate, known as the Local and Federal scales. As has already been mentioned, federal plans, drawn up at the establishment of the UAE, were on a federal scale approved by the Federal budget.<sup>(57)</sup> This has mainly been responsible for improving

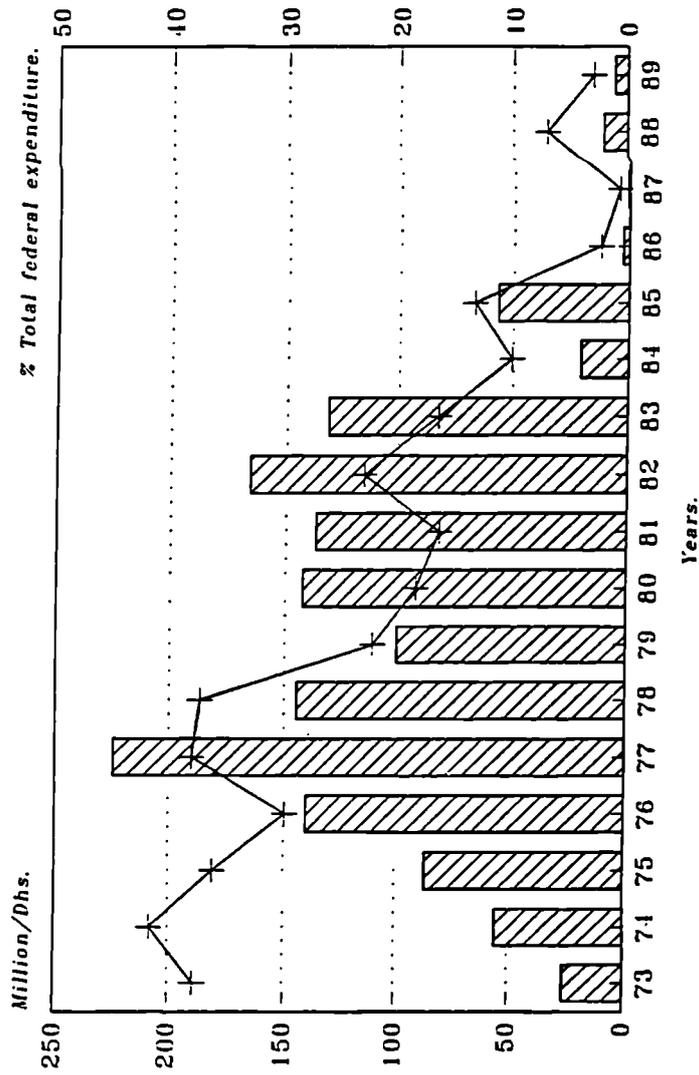
the transport sector as one of the major projects in the whole infrastructure, in order to facilitate communication between the federal state cities, and to have appropriate transportation for passengers and goods between the market centres and the ports.

The transport plan was prepared with the technical assistance of the United Nations in 1979, in order to establish a study for the National Transportation Plan for the United Arab Emirates,<sup>(58)</sup> but has not been implemented because of disagreement over the costs involved. However, other plans such as agriculture, housing, water, health, etc. were successful. Federal policies investigated roads investment among the states, and studied inter-regional road transport between demand and supply places, both before and after the federation. They also looked into the efficiency of these roads. This point is addressed in Figure 2.9.

Local policies emerged after the period of construction from 1971 to 1980, as a result of the financial circumstances of the federal budget. These plans concentrated on Abu Dhabi, Dubai and Sharjah and, since the subsequent oil exploration, have emphasised the urban development of these cities.<sup>(59)</sup> (see Chapter 8).

Consequently, these policies concentrated upon essential transport themes such as inter- and intra- emirate public transport, plus traffic congestion and pollution. These points gave attention to the avoidance of abundant problems for urban and regional transport systems in the States. For instance, in local government policies in particular, traffic congestion at the entrances of the cities during peak hour periods, such as on the Dubai-Sharjah road, has been solved by the enlargement and modernisation of the motorways between these cities.

**Figure 2.9 Total Expenditure on Roads Projects.**  
 In UAE between 1973-1989.



▨ Roads projects + % total expenditure

Source: Ministry of Public Works, 1989;  
 Annual Statistical Yearbook, 1990.

Air transport policies relate to the existence of earlier British agreements which established air strips throughout the lands of the Trucial States, starting with the building of the Sharjah airport in 1932, and followed by further airports in Dubai, Abu Dhabi and the other states. This system, and its associated objectives, have been a response to the nation's wish to exploit the strategic location of the state by improving air transport facilities. The growth of air transport has also led to an enlargement of economic activities in the cities and in the remote areas as well.

This sector has had to face some co-ordination problems between Emirates, as clearly demonstrated in the airport distribution among the states, the result of the disadvantages of individual transport planning in every emirate, as mentioned by Drysdale (1985):

*"The weakness of central planning agencies or other co-ordinating bodies has allowed much needless duplication. For example, Abu Dhabi, Sharjah, and Ras al-Khaymah have all developed 'international' airports within 125 miles of one another. Sharjah's is 20 minutes by car from Dubai's and only 25 miles from Ras al-Khaymah's. These also compete with nearby airports in Bahrain and Qatar, which once considered joining the UAE." (60)*

The need for the integration of sea and air transport between states has been recognized, as the importance of the strategic location of the UAE has become increasingly significant. This has resulted in a transportation policy which has initiated low transport charges for the movement of goods through the seaports.

Thus, the transformation of all policies in the Emirates, but transport in particular, covers three stages:

- 1) Before the 1960s oil production era, as portrayed by the Bedouin system of camel transportation.

- 2) the Oil Era and the Trucial State Development Office from 1962 to 1971. This can be seen to have established the foundation for the building of roads and others structures throughout the Emirates.
- 3) The era of the establishment of the United Arab Emirates, from 1971 up to the present day.

These stages embody the most important influences on the development of the Emirates transport policies.

## **2.9 Conclusion**

Historically, the development of transport systems in the UAE has been patterned by environmental influences represented by the example of the Bedouin lifestyle affecting the movement both of people and of goods, and followed by the pattern resulting from linking the population centres among the regions. This development has been given impetus by the development of the centres along the west coast to their interiors, with connections to the east coast.

The human and physical factors affecting the formation of routes in the Emirates has been the basis for the fundamental structure of modern road networks. The use of old routes has improved the main nodes through which the old routes passed, thus emphasising the physical factors of the wadis and wells and their roles in directing roads between origins and destinations throughout the country.

As has been illustrated in this chapter, there are strong links between the old routes and the modern road networks. These links are demonstrated in some major roads, such as Dubai-Al Ain, Abu Dhabi-Al Ain, and Ras al Khaimah-Al Ain (as the southern region) road. The movement which followed these routes has recently grown as more people move between the UAE's cities.

The development of the transport system has assisted integration in the formation of spatial process, such as in the organisation of settlement in the interior, particularly in the oil fields regions, but also along the coasts. Air transport has also been effective in the modernisation of the community, and its transformation from a primitive place dependent upon pearling and fishing, to a trade centre or entrepot, in its utilisation by passengers and goods.

All this points to the strong relationship which has grown up between the development of Federal policies and other local policies of emirates and the development of the transport system and trade (see Chapter 8). The integration between these transport systems, in particular between sea and air transport, has assisted in the economic and social development in the Emirates. As has already been stated these policies are divided into three stages of development: i) the pre-oil stage, ii) the oil production era and establishment of the Trucial State Development Office, and iii) the era of the creation of the federation of states. The improvements in the transport system have paralleled throughout the infrastructure of the state, but have been one of the key factors in all major developments.

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## Chapter Three

# Physical factors and problems associated with the location of roads in UAE

### 3.1 Introduction

The topography of the United Arab Emirates is dominated by a large plain, which covers 90 per cent of its total area. It is divided by two other physical features: a coastal strip on the western side, 640 km in length, with a width of between 9 and 50 km, and another on the eastern side, 90 km in length, with a width of 1 to 10 km. A mountain zone accounts for 8 per cent of the total area. The salt flat (*sabkha*) runs alongside the coast from Abu Dhabi to Al Sila on the Emirates-Saudi border.

This physical layout causes no major problems for the location of the roads or for the road transport system. The difference in the landscape from coast to coast is described here in order to show the relationships that exist between these physical features and the roads, which in turn is reflected in the human activity of the Emirates. However, there is a close relationship between the physical features and the detailed alignment of the road transportation network in the emirates because of the complexities of topography in the mountainous areas, in areas covered by sand dunes and in the coastal strips.

Earlier the old caravan routes in the United Arab Emirates were determined by such physical features as wadis and the location of wells, rather than by the coastline. As indicated earlier, these routes were determined by the availability of ground water resources in the desert and by the location of wadis in the mountain areas. Consequently, the modern road network follows the old network of routes which was an outcome of the topography of UAE.

The physical features of the Emirates have produced two distinct types of road network. The network of the mountain area, which has apparently received special attention from the government both in respect of construction and maintenance, due to the nature of the terrain, and the desert and coastal road network which has overcome some of the physical problems, which will be evaluated in this section.

Although economic and social factors played the major role in the development of the road network in the UAE, this chapter attempts to examine the influence of physical features like relief and climate in determining its structure and layout.

### **3.2 Climatic factors**

In the past, the influence of climate on human habitation meant that, albeit indirectly, there was a close correlation between adverse climatic areas and the lack of transport routes. However, although temperature variations affect man, and in turn affect road construction as well as the routes they traverse,<sup>(1)</sup> climate is now merely a hazardous factor to be overcome, not a determining factor. Nevertheless,

*"The significance of climate thus concerns not only the hazards met en route, but also the construction and maintenance of the route itself. It follows that engineers responsible for the selection and construction of a route must be highly conversant with the climate and climatic extremes of areas through which the route passes."*<sup>(2)</sup>

The 'desert' climate of the UAE is not entirely uniform. Humidity is generally higher along the coasts than in the interior, but the main factor influencing the climate rhythm is the lack of rainfall and the very high temperatures. For instance, the July daily temperature reaches 45°C, damaging tarmac.

Climatic influences are apparent in the development of the air transport system, reflected in the location and in the design of airports even more than in the road layout.<sup>(3)</sup> However, the effects of climate are particularly evident in road construc-

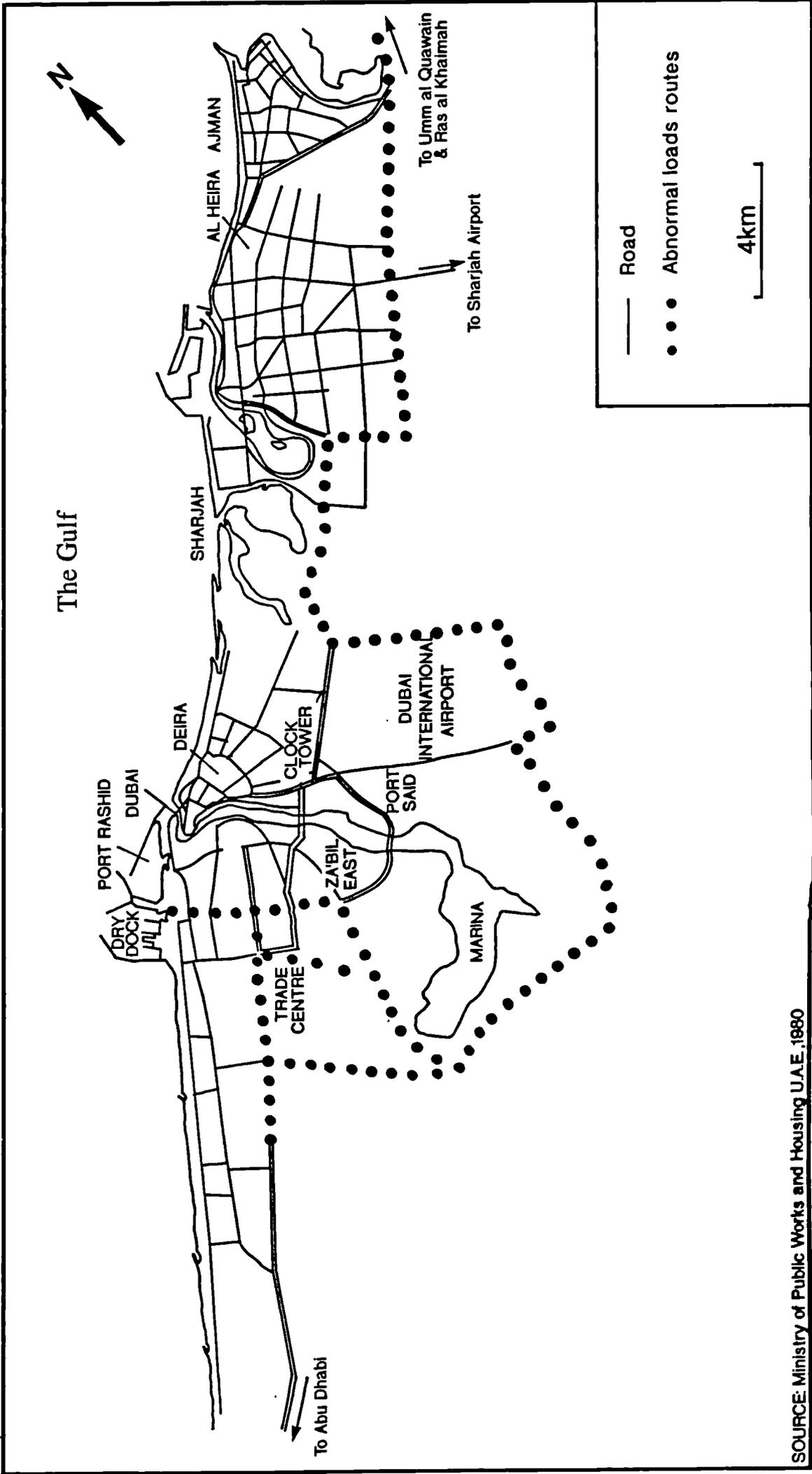
tion. This is indicated directly by two major factors: the variation in temperature throughout the year, and rainfall causing erosion. High temperatures lead to pronounced expansion in the road surface causing cracking and wearing down. Other climatic factors, such as sand storms and fog, create adverse conditions for travel by road.

### **3.2.1 Temperature**

High temperatures need to be regarded as the most critical factor affecting roads, nevertheless the temperature drops to very low levels especially in winter. Such contrasts in temperature are experienced in the interior desert areas rather than at the coast.

The annual variation in temperature acting on the asphalt surface of the roads tends to result in damage when the road is used by heavy vehicles. The effect of the variation in temperature is apparent in the urban road network, as revealed in some of the commercial centres, e.g. Dubai city, where the problem is clearly seen on the internal road network, such as on the road starting from the Port of Rashid to the industrial and commercial zones in its hinterland of Al Quta'eyat Road. Many of these vehicles carry very heavy loads, over and above the legal limit. Figure 3.1 shows the road network that links the three emirates of Dubai, Sharjah and Ajman. The asphalt surfaces of these roads have been much affected by the contrasting temperature regime aggravated by its use by vehicles heavily laden with goods, usually travelling at speeds which add to their capacity to damage.

Figure 3.1 NETWORK FOR ABNORMAL LOADS IN DUBAI, SHARJAH AND AJMAN



SOURCE: Ministry of Public Works and Housing U.A.E., 1980

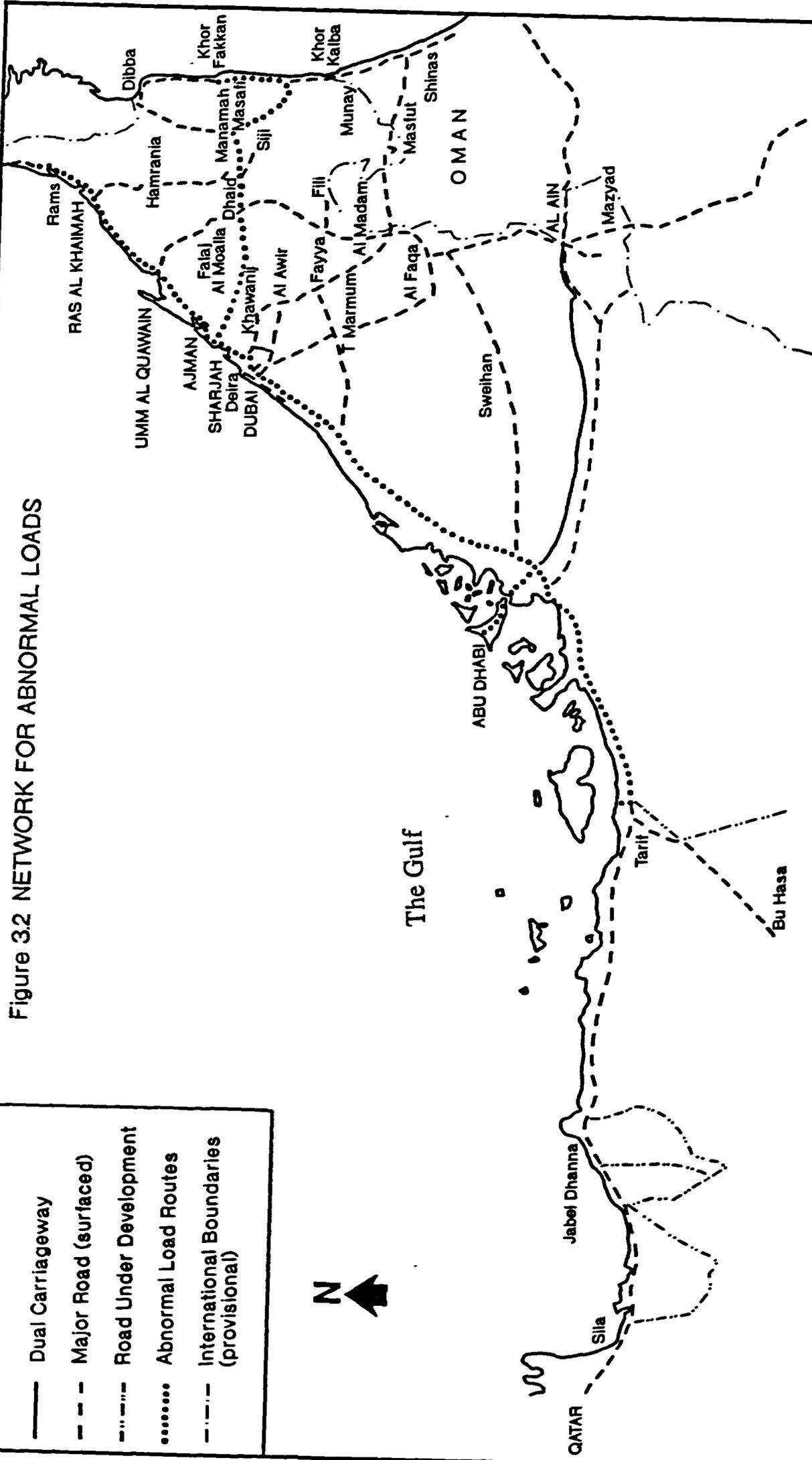
This problem has also been studied by the federal road network system. A report by the Ministry of Public Works and Housing (1980) has designated it as the axle load problem necessitating capital investment and specific federal government policies. The report also delves into aspects related to the wearing down of the roads by the elements. In 1986 a federal law was issued legislating for maximum axle loads on the roads. However, this law has been implemented only in some emirates such as Abu Dhabi and Dubai. Weighbridges have been built to check truck loads. This is recognised as an example of the lack of co-ordination in the UAE (see Chapter 8).

There is a close relationship between the variation of temperature, the movement of goods, road cracking, and the economic activities generated between the main ports, industrial zones and the markets within the Emirates. Figure 3.2 illustrates the heavy load carried on roads in the Emirates caused by industrialised activities which calls for movement of goods and fuel from ports, power stations, cement works and from the oil refineries.<sup>(4)</sup> Commercial movement from the ports is the main origin of this movement. Figure 3.3 shows the potential effects of the variation in temperature on the road network in Abu Dhabi and Sharjah which have been recorded over the past two decades. This evidence of mean summer temperature of almost 40°C clearly indicates that temperatures experienced in the sun on the open road surface regularly exceed 50°C. These temperatures have been responsible for road cracking problems of some major roads, where the road shoulders have been much affected.

During the 1970s the Abu Dhabi-Al Ain road suffered from this problem. This was due to the quality of the bitumen used for its construction. The bitumen had undergone changes due to the action of both weathering and traffic<sup>(5)</sup> causing much damage to the road, which meant additional expenditure to the government for its maintenance. It resulted in building a 145 km long new dual carriageway from Abu Dhabi city to Al Ain in 1974 at a cost of Dhs.140 million.

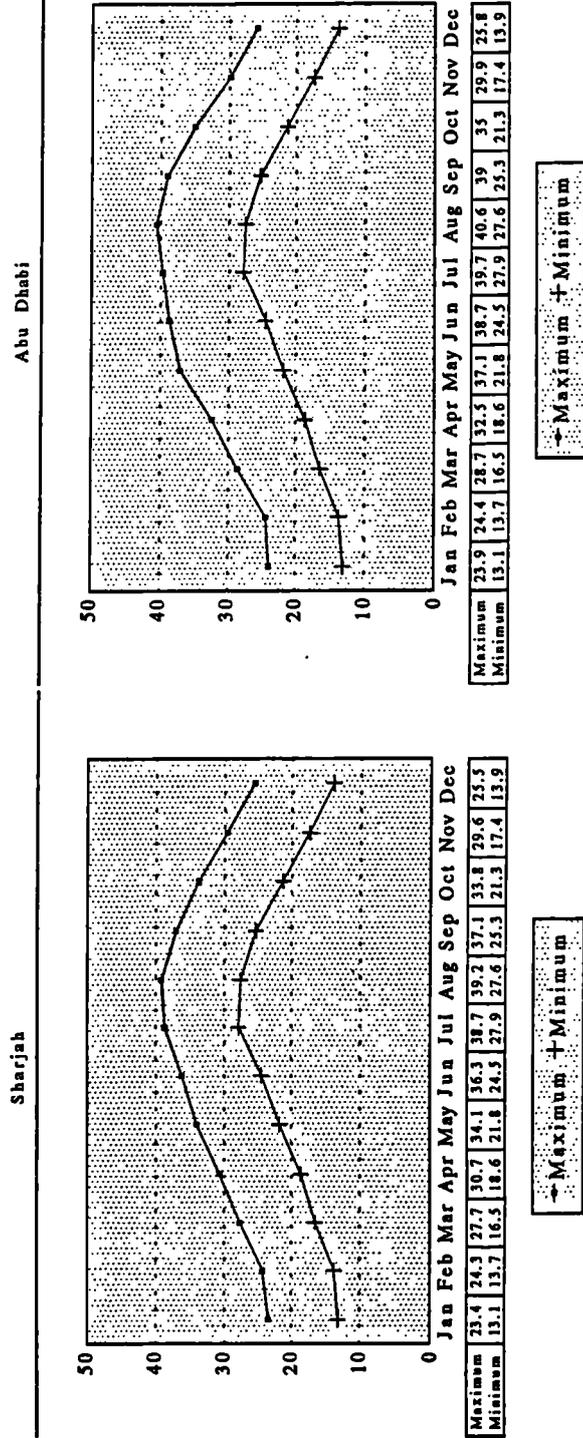
Figure 3.2 NETWORK FOR ABNORMAL LOADS

- Dual Carriageway
- - Major Road (surfaced)
- · - · Road Under Development
- · · · · Abnormal Load Routes
- · - · International Boundaries (provisional)



United Arab Emirates

*Figure 3.3 Temperature Variation in the Emirates of Abu Dhabi and Sharjah.*



*[ All max. and min. figures are monthly mean values, not absolute values.]*

Source: Al Kalieb, 1991.

### 3.2.2 Rainfall

Rainfall is identified as one of the most important factors to be reckoned with when designing and constructing roads. The hazards of rain are felt more in the central desert region of the emirates. The pattern of rainfall here is akin to that found in the hot deserts where there are annual variations in rainfall with sudden, short, intense downpours. Table 3.1 shows the rainfall figures for Dubai for the period 1979 to 1990.

**Table 3.1:**  
**The rainfall on Dubai emirate from 1979 to 1990**

Year	Heaviest fall in one day/mm	Month of occurrence	Total rainfall annual/mm
1979	35.4	March	83.9
1980	30.0	Feb	42.4
1981	33.1	Apr	62.3
1982	51.2	Feb	212.5
1983	39.3	Feb	106.7
1984	11.0	Dec	22.8
1985	73.0	Dec	123.7
1987	48.5	Mar	102.1
1988	150.2	Feb	220.6
1989	33.0	Dec	143.4
1990	42.3	Jan	122.6

Source: Dubai Municipality, *Annual Statistical Book, 1988*; *Dubai Statistical File, 1991*.

Rain has a great effect on the roads in Emirates. Rain is however, very scanty, the average annual rainfall being about 65 mm in 1986,<sup>(6)</sup> except in the mountainous regions where it increases to levels higher than the desert and coastal areas. Nevertheless, this area is periodically hit by thunderstorms and short spells of heavy rainfall,

leading to the destruction of roads caused by landslides and shoulder deterioration, especially between the months of November and April (see Table 3.1).

There are signs of erosive action on the slopes of embankments on some of the UAE rural roads and motorways as seen in Figure 3.4. This is due to the absence of vegetation, aridity and the occurrence of rainstorms, which are all evident in the problems associated with the erosion of the road embankments.

The road network of Dubai has been evaluated in order to provide a cost effective solution to the prevention of rain erosion on the slopes of embankments which causes much disruption to traffic and maintenance costs during winter.

This problem is mainly found on the motorways of the UAE. Dubai Emirate's rural roads are subjected to severe erosion during some rainy seasons. Many studies have been carried out by municipal officials of the Emirates to remedy this road problem. In the Dubai Municipality solutions were applied to two major roads; the Dubai - Al Ain motorway and the Nad Al Hamar motorway which were both constructed in 1988.

Based on the outcome of the study some major technological solutions have been introduced to prevent the erosion of roads by rainfall. Amongst the recommendations are the use of suitable materials (stabilising the existing embankment material with cement) as well as alternative solutions to prevent slope embankment erosion, such as turf cultivation, curbs and gutters and the construction of intercepting ditches on sandy areas.<sup>(7)</sup>

Despite adopting these remedial measures the problem has not been successfully resolved. This problem is affecting some vital roads which link the major populated centres in the UAE, such as the Shuaib Road which links the eastern and northern Emirates with Al Ain region by a 33 km road passing through some Bedouin villages.



*Fig. 3.4 Rain erosion on the slopes of embankments on the road of Manama - Ras al Khaimah.*

Figure 3.5 shows the course of the road and its locational importance in the federal road network. Currently, the road suffers from many problems such as the erosion of slope embankment in some places when it is hit by heavy seasonal rainfall causing considerable damage. This is seen especially in the southern part of the road which starts from the interchange of the Dubai-Hatta road to the South, as well as to the northern part where it suffers from the effects of the same problem. This road is kept busy during the weekend when university students use it frequently. As the students come from all the emirates, and over 70 percent from the northern parts, they all use this road to return home!

### **3.2.3 Fog**

Fog is a normal feature of the weather in the Gulf and occurs mainly along the coast. The period of intense fog occurs between the months of October and March as seen in Figure 3.6. This weather phenomenon affects air transport to a much greater extent than road transport. Nevertheless, the occurrence of fog slows down the movement of traffic and contributes to road accidents caused by poor visibility. Foggy weather conditions often prevent planes landing at the Dubai and Abu Dhabi airports resulting in them being diverted to land at the neighbouring countries of Oman and Bahrain. The completion of the new airport at Al Ain should overcome the problem and be of great benefit to travellers to and from the UAE (i.e. not those in transit).

Figure 3.5 DHAID - SHUAIB ROAD, LINKING THE NORTHERN REGION WITH THE SOUTHERN REGION

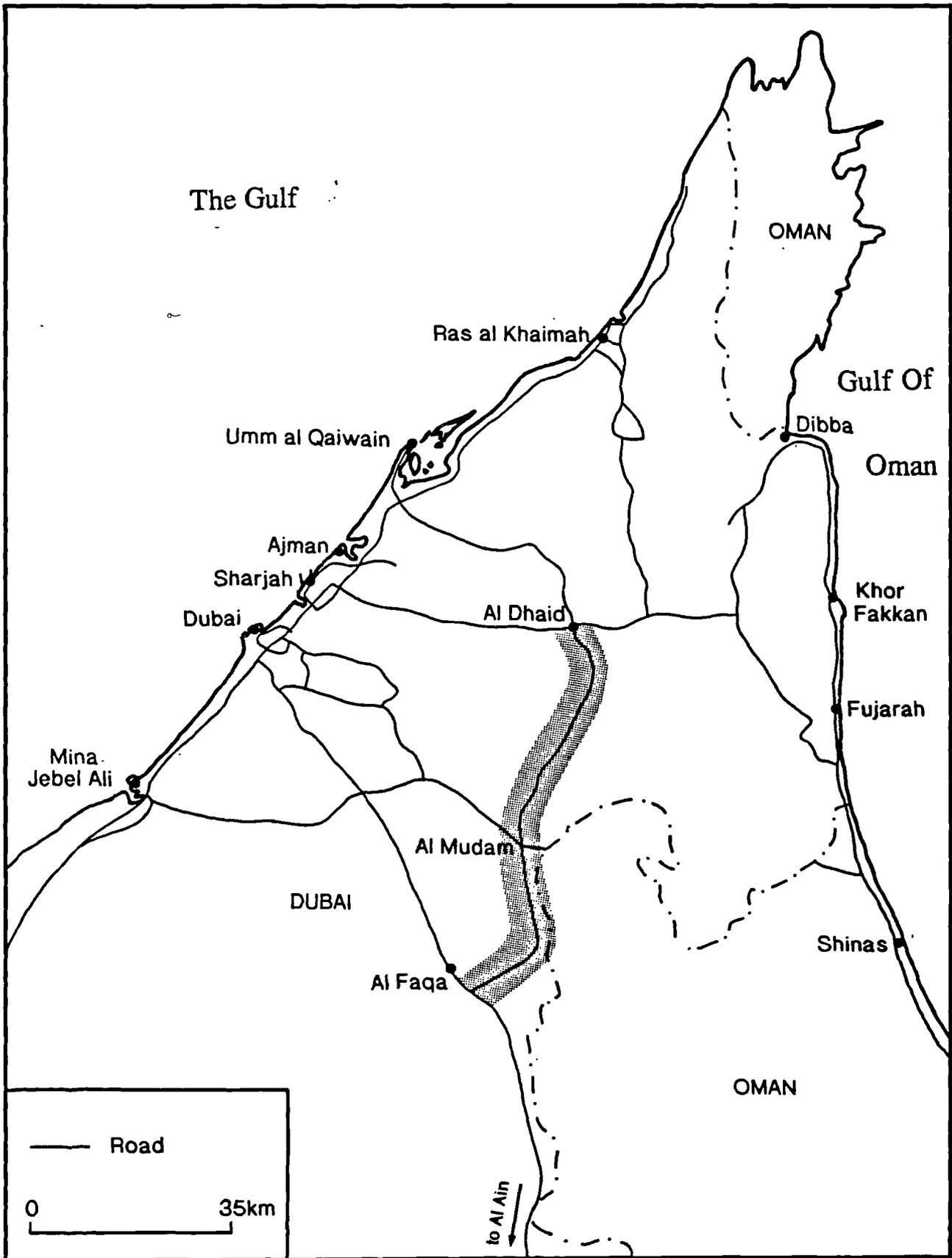
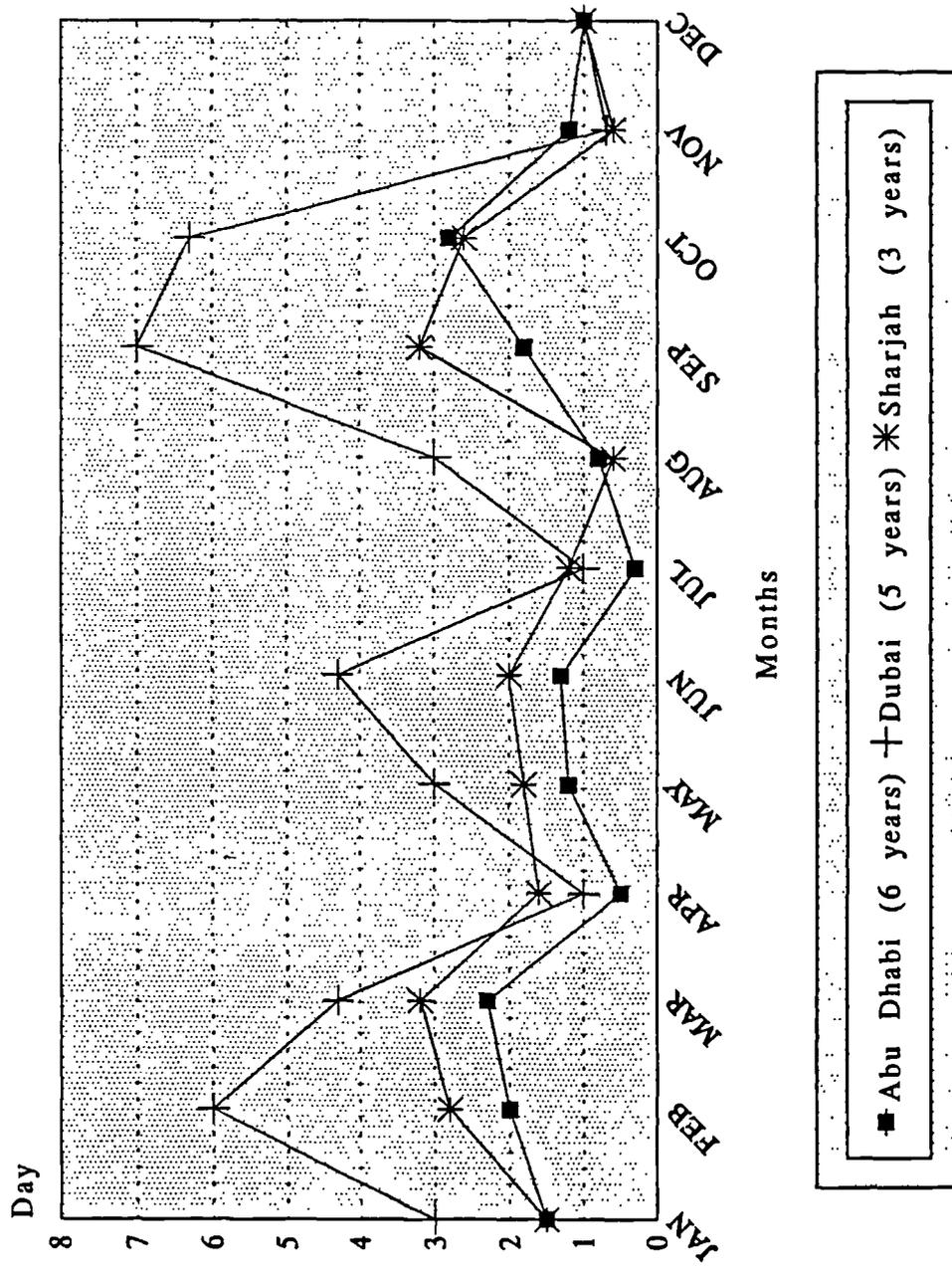


Figure 3.6 The Average of foggy days in the Emirates.



Source: Al Kulaib, 1990; Dubai Municipality, Annual Statistical Yearbook 1988.

### **3.2.4 Weather conditions in relation to road accidents**

Generally, deaths due to road accidents in the UAE are proportionately higher than in some western countries. For example, in 1980 such deaths were twice as high (per head of population) as in the United Kingdom and four times higher than in the United States. Such a high accident rate needs to be attributed to many factors, such as: 1) unskilled drivers, 2) unroadworthy condition of vehicles; 3) cattle crossing the roads, 4) hazardous weather conditions.<sup>(8)</sup> In Dubai Emirate, most road accidents are caused by careless driving, though it has been suggested that the weather is responsible for a small share of the accidents. In 1987, 98 per cent of road accidents in Dubai Emirate were said to have been caused by human error and only a mere 2 per cent by poor condition of the vehicle or by the weather.<sup>(9)</sup>

The very infrequency of hazardous climatic conditions renders such conditions all the more hazardous when they occur and, therefore, it is reasonable to suggest a relationship between the adverse weather conditions such as heavy rain, fog and road accidents all along the roads that link the emirates. Despite attempted enforcement of speed limits on motorways during bad weather road accidents have not decreased.

### **3.3 Physiographic controls**

The physical problems encountered in respect of the roads in the Emirates can be categorised under three heads:

- 1) Cost of road construction.
- 2) Safety standards and speed design limits.<sup>(10)</sup>
- 3) Factors associated with the maintenance of roads resulting from the damage caused by earth slips and rock slides in the mountainous areas.

These factors have a bearing on the standard of technology utilised in road construction in the Emirates. Fundamental to the unification of the Emirates in 1971 has been the study of the Hajjar mountain zone in order to achieve one of the main objectives of the union, which is to encourage the population in the different parts of the Emirates to interact with each other by using the roads, and also to establish links between the major cities of the western Emirates with the east coast.

The aim of this section is to evaluate the importance of two key physiographic features for the development of the road network, using two contrasting methods of analysis. First, to measure the roads by Detour Index in order to indicate the strength of the physical problems facing their construction, and then to see the effect of physical features on the economic cost involved in their construction and maintenance.

### **3.3.1 The Hajjar Mountain problem**

The Hajjar mountains are located in the eastern Emirates. They extend 155 km north to south and 37 km east to west. Geologically, they are made up of a "*Palaeozoic core of metamorphic and basic igneous rocks flanked by later limestone successions.*" <sup>(11)</sup> Their topography and geology have strongly influenced the development of the road network. The mountain range extends from Dibba in the north to south of Kalba. The highest peaks rise to a height of 2,400 metres. <sup>(12)</sup>

The old routes followed some well-used wadis through these mountains e.g. Siji, Ham, and Dibba, thus allowing the movement of people and goods between the western and eastern parts of the emirates (see Figure 3.7). Thereafter, new strategies both in road construction and network development concentrating on the mountainous area were mapped out. The nature of the terrain was assessed so as to determine the more suitable routes for road construction. In constructing roads in this area security reasons gained precedence over economic and technological problems as it was a



*Fig. 3.7 The old caravan routes used wadi Ham in the Eastern region of the Emirates.*

stretch subject to tribesmen's attacks, in itself, a reason for 'opening up'. This problem ended in the early 1980s.

The terrain is characterised by wadis many of which were always seen as the best course along which to forge links between the populated centres of the east and west. However, some of these wadis present one of the main topographic obstacles for movement. Although their alignment still provides a focus for some of the key routes, the physical nature of wadis, including their unstable sides and the risk of flash flooding mean that modern roads traversing the wadis, have certain specific and expensive constructional problems. Before the federation, many problems faced the movement of people and goods as Peck (1985) mentioned:

*" Until the advent of modern roads, these difficult mountains presented a considerable barrier to land travel between the Batinah coast and the emirates to the west. Local tribesmen frequently attacked outsiders who ventured there. By 1960 the security provided by the British-officered Trucial Oman Scouts (TOS) helped make feasible the construction of a road for motor vehicles to Fujairah through the Wadi Ham." (13)*

Losch (1954) mentions in his principle of 'Law of Refraction' the estimated cost of routes between two points separated by a mountain range.<sup>(14)</sup> He hypothesises three factors related to road construction through the mountains. Considering the economic cost of traversing the mountain area - the direct route is not necessarily the cheapest; diverting around the edges of the mountains provides the cheapest alternative, and therefore a final compromise is often chosen *"to run over the two mediums of plain and mountain"*<sup>(15)</sup>. Naturally, the *"selection of a transportation route through a mountain is a matter of compromise"*<sup>(16)</sup> between human mobility, the places where they like to live or like to explore, economic considerations and the practical, physical, financial and technological constraints.

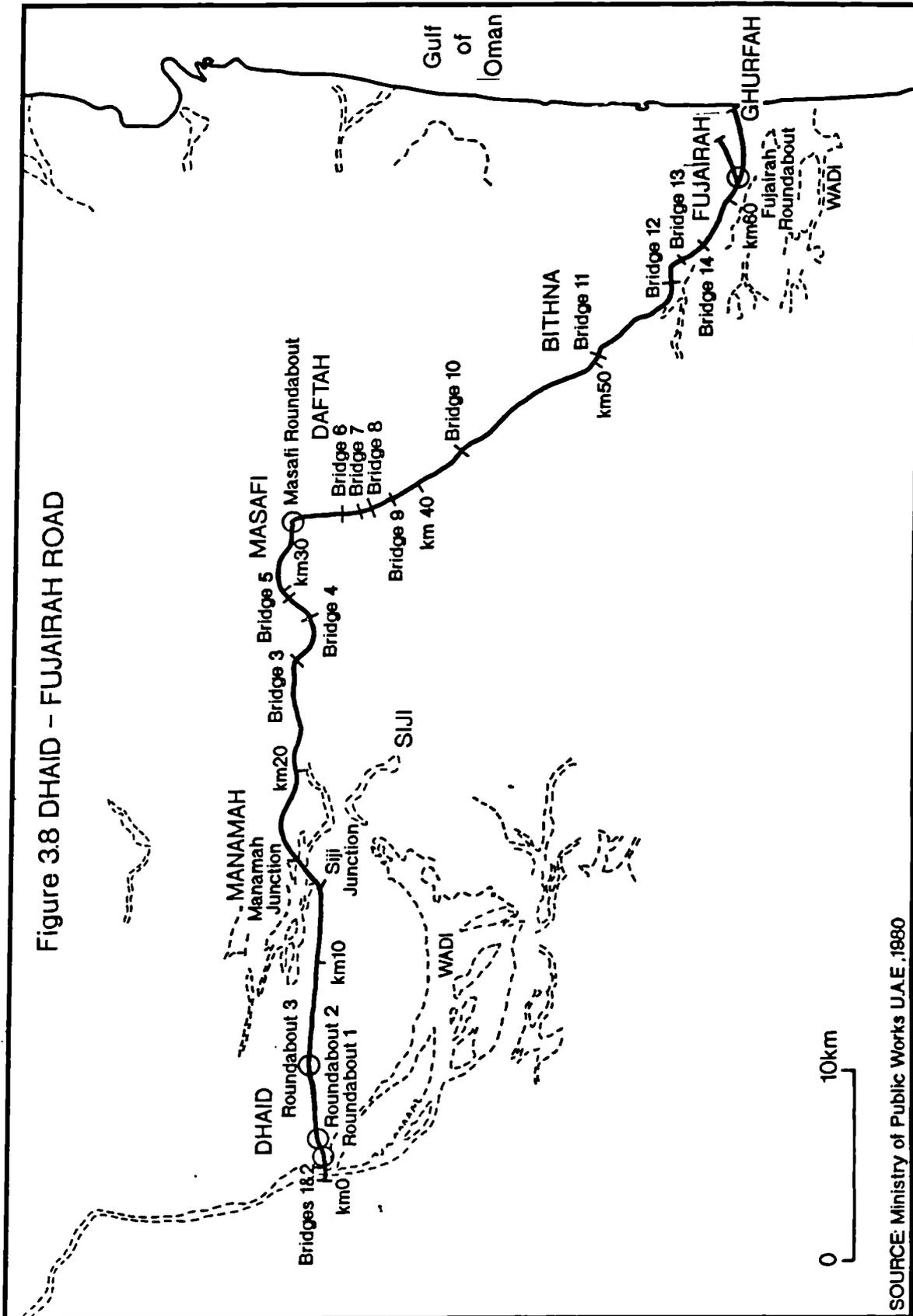
Road construction across this region has its origins in 1972, when it was decided by the Ministry of Public Works to build a road from Dhaid to Fujairah, serving the

anticipated traffic flows between Sharjah and Fujairah (Figure 2.4). It was opened in 1976, and was widened in 1977 to become a dual rather than single carriageway. The widening programme is an outcome of the physical barriers which the first road faced. These factors made it necessary to resort to the construction of fly overs, not only to traverse the width of some minor wadis, but also to cover much of the length of the major ones which are used as a route alignment. For instance, where cutting had been made to beset the initial alignment, bank gradients were often made too steep, given the nature of the bed rock (which includes a high sulphur content). This produced many rock falls, leading to frequent road closures. The building of the second carriageway adopted new techniques to overcome this prevalent problem.

The dual carriageway from Dhaid to Fujairah is divided into five sections as illustrated in Figure 3.8, which shows the road construction from Dhaid to Siji as running over a flat area; then Siji to Massafi for 4 km through part of Wadi Siji, thus avoiding some mountains; and then it runs from Massafi to Daftah for 2.5 km. However, in this place Wadi Ham has some major physical factors which caused problems for construction and made it necessary to build four flyovers (see Figure 3.9). The road from Daftah to Bithna, 3 km in length, also proved to be a very difficult stage in road construction, due to the narrowing of the wadi and the cracking of rocks along the mountain slopes. The depth of the wadi is 20 metres, the risk of floods at any time is high.

The solution to this problem by the construction of flyovers has proved successful. Finally, it shows the road from Bithna to Fujairah, which is free from major obstacles, except for some rockfall from mountains sides. The flyover of Wadi Ham (the previous old route), particularly faced many problems: flooding, ruggedness and instability of the terrain. This is a good example of roads following the morphology of the wadis and mountain edges, in turn influencing the economic activities and human behaviour.

Figure 3.8 DHAID - FUJAIRAH ROAD





*Fig. 3.9 The bridges over main wadis in the mountain region in the Eastern Emirates.*

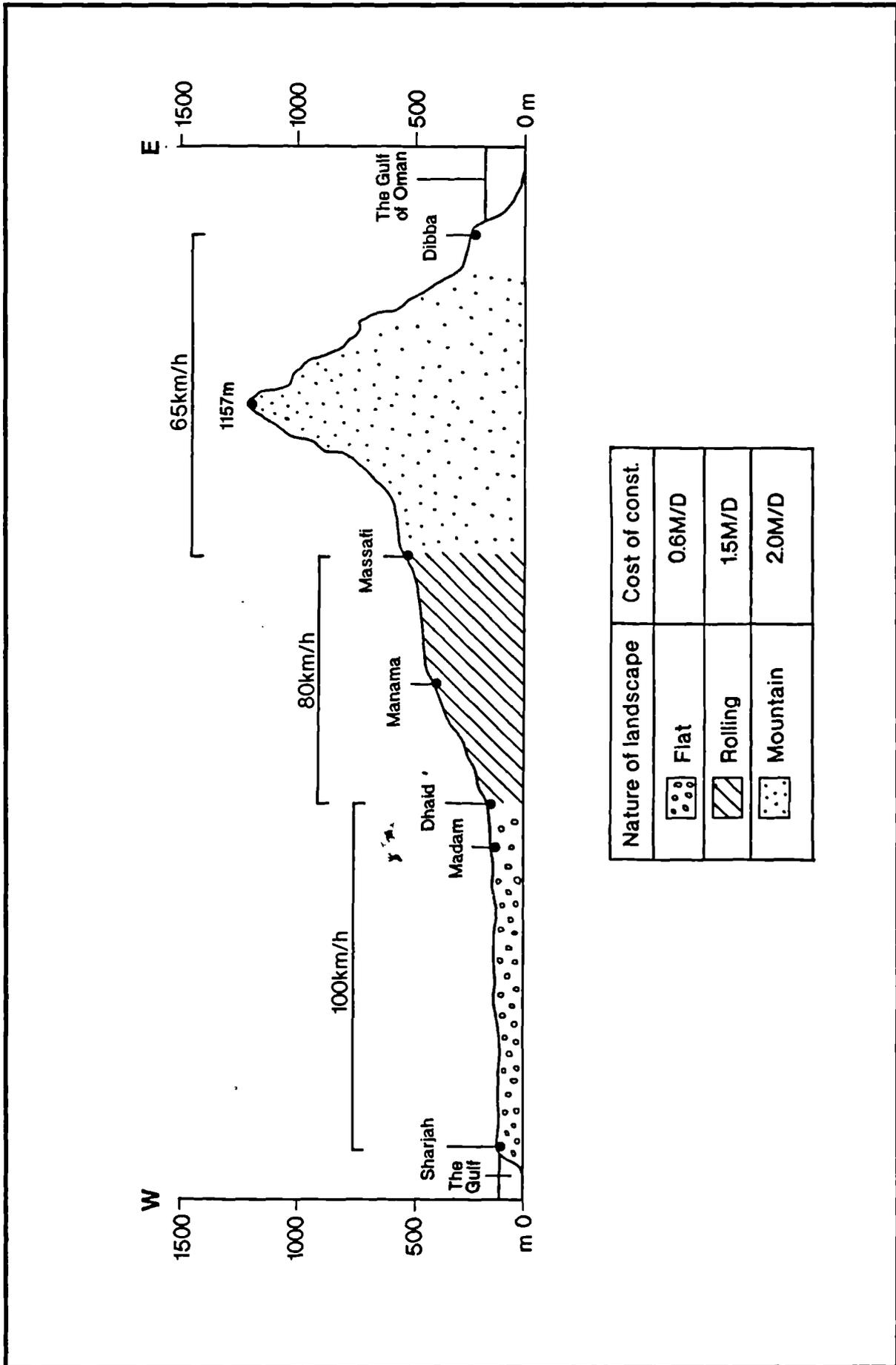
The new design of this road was researched by the Ministry of Public Works and Housing in order to encounter fewer obstacles in its construction, but there was a challenge for human effort caused by the physical features such as the penetration of the hard rock areas of the mountains; explosives were used to blast and overcome these obstacles, especially in Daftah and in Bithna.

Another example where problems had to be faced due to the hard rock structure of the mountains was in the construction of the mountain road between Massafi and Dibba. It was very different in respect of construction costs and speed design. This is clearly represented in the Dhaid to Massafi road section of 37.6 km, which passes through three types of terrain flat, rolling and mountainous. Consequently this spatial differentiation affected the 'design speed' of this road, and the cost of construction. The speed limits has been laid down as 100 km/h in the flat area, 80 km/h in the rolling terrain, and 65 km in the mountainous section nearer Khulaybiah.

This is a good example that could be cited for differentials involved in the cost of road construction determined by the varying physical layout of the terrain. The Massafi-Dibba road was estimated to cost of Dhs. 94,749,435 in 1975, of which Dhs. 2,046,000 per km, was spent on the mountain area, whereas the flat area (Madam - Dhaid road) cost only Dhs. 574,087 per km.<sup>(17)</sup> Figure 3.10 shows this.

The variation in physiography throughout this area has therefore caused much disparity in the costs involved in the construction of the road network. Clearly, mountain areas generated the most costly road construction projects in the federal road network, in terms of physiographic constraints. But, as Table 3.2 indicates, other factors played their part. The width of the roads (duel carriageway/single carriageway) is obviously a decisive factor, as is the payment of compensation. Compensation payments are clearly higher in inhabited coastal areas than in the interior and this helps to even out the apparent cost differences.

Figure 3.10 SCHEMATIC CROSS-SECTION, LEADING FROM THE WEST COAST TO EAST COAST OF THE U.A.E., SHOWING THE SPATIAL DIFFERENTIAL OF THE LANDSCAPE AFFECTING ON SPEED DESIGN AND THE COST OF ROAD CONSTRUCTION



**Table 3.2:**  
**Characteristics of road construction in the mountainous areas in the UAE.**

No.	Road	Total cost	Cost per 1 km	Year	Length of road	Notes
1	Al Dhaid-Fujairah	96 M/DHS	1.5M/DHS	Nov. 1978	67 km	Mountainous road - dual carriageway
2	Dibba-Massafi	95 M/DHS	2.05 M/DHS	Mar 1975	46.3 km	Mountainous road - single carriageway - difficult terrain
3	Sharjah-Al Dhaid	69 M.DHS	1.5 M/DHS	Mar 1976	46.2 km	Rolling - dual carriageway
4	Al Dhaid-Madam	34 M/DHS	0.6 M/DHS	Feb 1976	60.4 km	Rolling - single carriageway
5	Fujairah-Khor Fakkan	73 M/DHS	2.7 M/DHS	Mar 1979	26.7 km	Coastal road - dual carriageway
6	Dibba-Khor Fakkan	54 M/DHS	1.5 M/DHS	Apr 1974	36.6 km	Coastal road - single carriageway - difficult terrain

M/DHS = Million Dirhans

Source: Ministry of Public Works and Housing, Interview Report, July 1991.

Due to the location of the wadis along this road and its physical layout, nine flyovers were built along its 33 km length from Massafi to Fujairah. Consequently, it could be considered as one of the best examples for demonstrating the relationship between the physical environment and road construction, which reflects the adjustments that needed to be made to fit the transport line to the nature of the terrain.<sup>(18)</sup>

Another good example of the relationship between the mountain and road alignment is seen in the road from Dhaid to Fujairah city and to Dibba. It is possible in this case to utilise quantitative measurement to find out the close relationship between physical characteristics. The 'negative deviation' of this route can be seen between point 'a' (Massafi village which represents a gathering point for the movement generated from western major cities to the eastern coast) and point 'b' (Fujairah city) in the south, and also between "a" and "c" (Dibba village) in the north.

This case of deviation is illustrated as the best example of the negative deviation which Haggett (1965) used to explain the shortest line deviating from a straight line.<sup>(19)</sup> Negative deviation can be measured by the Detour Index<sup>(20)</sup> to get the efficiency of the route in cases of existing physical obstacles any increase over the original theoretical distance can thus be measured. When applying this index to the Emirates road network, as in Table 3.3, it can be seen that, of all main UAE roads, in particular the Al Ain - Fujairah road stands out with 177 per cent, the only road to achieve a number which represents a road distance in excess of 50% longer than the direct distance.

**Table 3.3:**  
The 'Detour Index' of the Emirates road network.\*

Road	Actual Road km.	Straight line km.	Detour index %
Abu Dhabi-Dubai	170	128	133
Dubai-Sharjah	16	11	145
Sharjah-Ajman	10	8	125
Sharjah-Fujairah	110	101	109
Ajman-Umm al Qaiwen	30	23	130
Umm al Qaiwen-Ras al Khaimah	60	45	133
Fujairah-Khor Kakkan	20	20	100
Al Ain-Dubai	130	124	105
Al Ain-Fujairah	200	113	177
Al Ain-Abu Dhabi	160	143	112
Ras al Khaimah-Fujairah	110	83	133
Umm al Qaiwen-Fujairah	120	94	128
Average/overall Index	1140	892	128

\* The detour index is: actual road distance  

$$\text{Detour Index} = \frac{\text{actual road distance}}{\text{straight line distance}} \times 100$$

Source: Geoprojects (UK) Map of the United Arab Emirates; 4th ed. 1990.

This is because of the necessity of avoiding the geographical barriers (mountains, sand dune, hills and political boundaries) from Al Ain to Fujairah (Hajjar mountain) passing through some major villages e.g. Madam, Dhaid, Massafi and then on to Batinah.

Also there are four major roads which have shown detour indexes ranging between 125 to 145 per cent. This is due to the nature of coastline diversion and the location of economic activities. Political disputes between Ras al Khaimah and Fujairah resulted in routes taking a circuitous course resulting in such high percentages (see Chapter 7). There are two other reasons why the detour index can be affected: economic features, and human hazard. Road problems in mountainous areas need to be assessed very carefully, not only for planning and design during construction, but also for future maintenance purposes.

### **3.3.2 Sand dune formation in the UAE**

The desert belt in the United Arab Emirates occupies more than three quarters of the total area, and extends from the southern coastal plains to the edges of the Hajjar mountains in the east. The desert zone in the Emirates merges into the Arabian 'Empty Quarter' in the southern part of the Emirates. Sand dunes occupy approximately 70 per cent of the total area of the desert.

The main problem in this area is associated with the movement of sand which is caused by the effect of strong north westerly winds which blow particularly in the summer, carrying with them large quantities of loose sand. Consequently, the development of industrial areas and the interior settlements in the deserts, along with infrastructural provision such as the major roads which link these centres with the ports and the main cities, have had to face many problems.

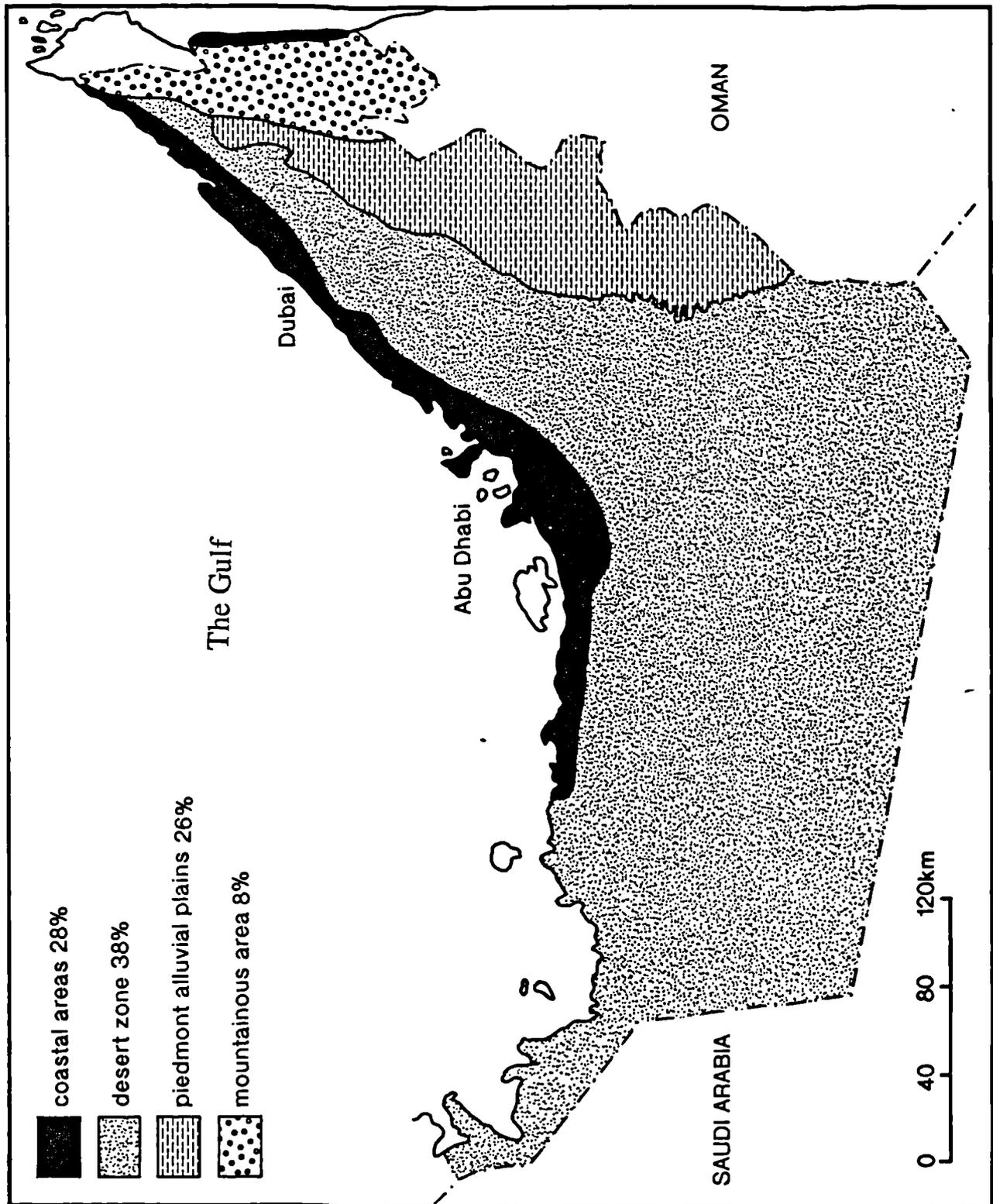
The desert area of the UAE is covered by two types of sand dune landscape and they are predominantly found in the middle of the northern Emirates, and in a large area located in the south of Abu Dhabi. Satchell (1978) mentioned that :

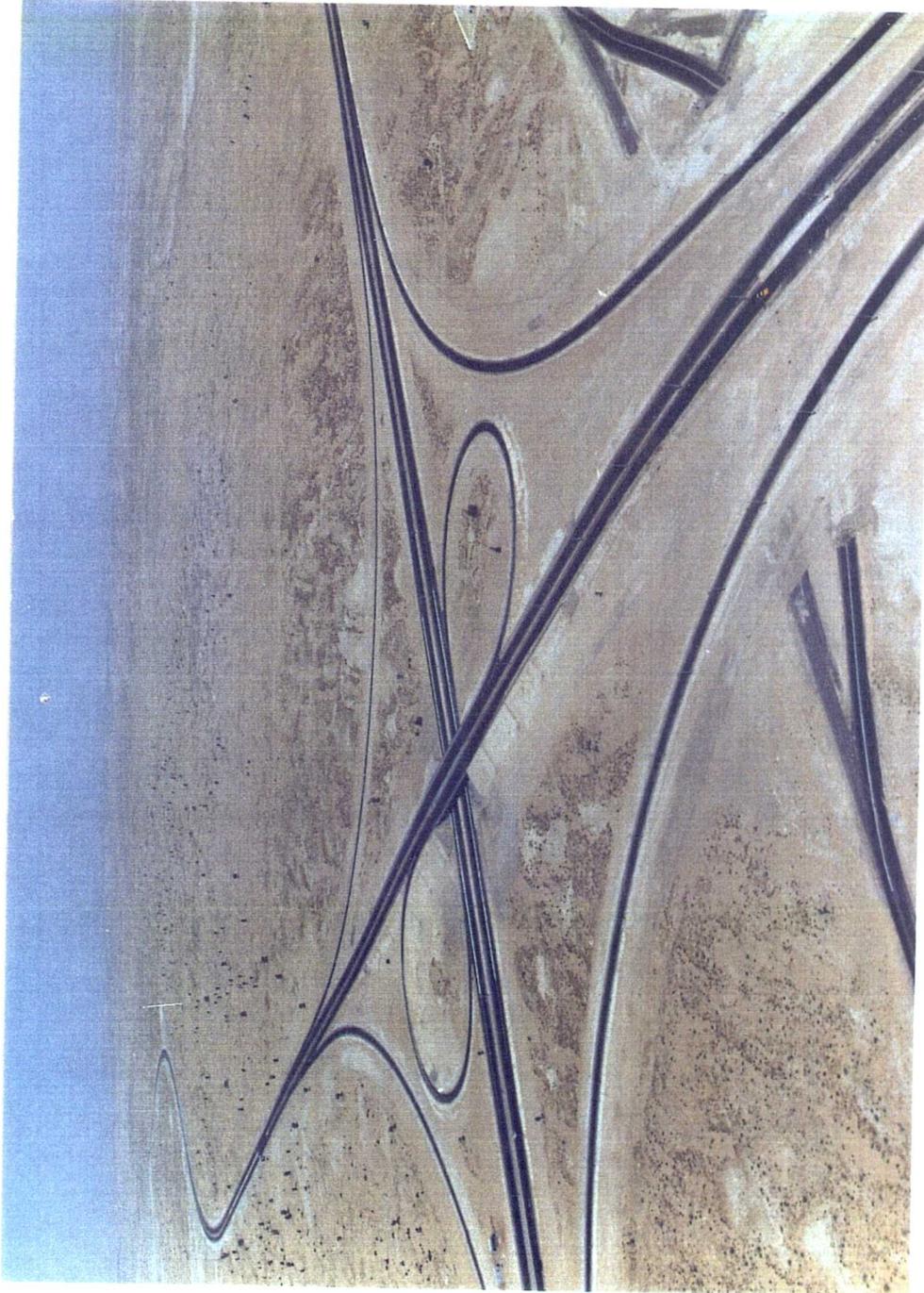
*" The dunes are of two sorts: (a) those found along the coast are composed of white carbonate sands formed from fragments of marine shells; (b) those found inland are red and formed of weathered quartz rocks. The northern dunes are relatively small and to some extent fixed by vegetation." (21)*

There is a considerable degree of variation in the density of the road network in each of the four main topographic divisions of the UAE: the coastal zone, mountain zone, piedmont plains and the desert roads as demonstrated in Figure 3.11. This classification shows the significance of the roads in desert areas, where a great deal of modern human activities goes on. This is related to the major economic and social strategies adopted within the Emirates.

Figure 3.11 shows, for 1985 data, the percentage distribution of the 2500m of metalled roads across the topographic divisions of the UAE. In addition, it is estimated that about 1,000 km of unmetalled roads are used by vehicular traffic of lesser importance. The percentage distribution of these metalled roads is an index of the general physical nature and its extent in the Emirates. These percentages reveal that although the major share of the roads are located in the desert zone, where there are some Bedouin settlements such as Bid'a Zayed, Liwa, Badi'a and Hazi'a al Boush on the Al Ain road, as well as in the industrial centres such as the oil fields in the Dhafrah region (see Figure 3.12), not surprisingly the highest road concentrations are in the well settled coastal areas.

Figure 3.11 PERCENTAGE DISTRIBUTION OF ROAD NETWORK WITHIN THE FOUR TOPOLOGICAL DIVISIONS OF THE UAE





*Fig. 3.12 Roads in the desert area in the UAE.*

The main desert roads link some places of importance: Tarif port is linked with its oil fields such as Habshan and Bu Hasa by a 105 km long road (see Figure 1.1). Roads also link the Liwa oasis area, this being the major desert settlement in Abu Dhabi; other roads of significance are the Abu Dhabi road which links the capital to Al Ain city on the Oman border (180 km), and the two main roads going north from Al Ain to Dubai (135 km) and Sharjah (173 km) and to the other northern Emirates. In the light of the vital functions played by these roads it is necessary to investigate the problems associated with drifting sand which affects the road links.

Drifting sand is regarded as one of the main physical barriers for both road construction and maintenance throughout the Emirates. As has already been stated, it results from sandstorm activity, and can be illustrated particularly by studying its effects along the Abu Dhabi-Al Ain Road, which has faced considerable problems due to drifting sand, leading to heavy expenditure on maintenance works which attempt to resolve this problem.

A trunk road crosses a large area of sand dunes located between Abu Dhabi and Al Ain, where the barkhan (crescent-shaped dunes) are a frequent phenomenon, their behaviour and movement being directly responsive to the direction of the prevailing winds.<sup>(22)</sup> A government department has been formed in Abu Dhabi to design techniques to overcome this problem by "defence works", with the view to stopping the sand drifting over roads. This is an example of human ingenuity attempting to resolve problems of the physical environment, and is successful to a limited extent.

Stabilisation of sand dunes has been the particular concern of the Public Works Department in the Emirate of Abu Dhabi where most of the desert routes are located. However, this is a matter of concern for all other Emirates. Attempts at solving this problem have been made by a process of stabilising the dunes using bituminous

emulsions, and by planting a 'green belt of trees' along the roads to prevent the drifting sands reaching the roads. The bituminous spraying stops the sand movement only temporarily as it soon loses its efficacy.

### **3.3.3 Road maintenance**

In view of the nature of the terrain in the UAE, road maintenance needs high priority if the vital arteries linking the different parts of the Emirates, thereby helping the process of integration amongst the different communities, are to be fully maintained.

Accordingly, road construction activity was very active at the beginning of the formation of the federation as this was one of the main methods by which the commitment to establish links between all the major and minor clusters of the population, thus assisting the task of integration was achieved. The era of road construction concluded in 1980, by which time the road network was effectively complete. Nevertheless, it is necessary for the federal administration to pay greater attention to it and to continue with the task of improving these roads. Attention will now be paid to an attempt to evaluate the maintenance of the road network in the Emirates and to find the extent to which the Ministry of Public Works has resolved the problems associated with it.

Before 1988, there was no administrative machinery set up to maintain federal roads. However, in 1988 the first department of maintenance under the Ministry of Public Works was established. This department was assigned the task of maintaining all social services such as schools, hospitals and roads, with the maintenance of roads forming its major function. In this study, field data failed to unravel the problems associated with road maintenance at the federal level due to its confidential nature.

Amongst the road network of the UAE, there are some major roads, linking important population centres, that suffer from the effects of physical features. These roads are

north-south links of the UAE. One of the best examples of this problem is related to the Shuaib Road as it is a major road that links the northern Emirates with the Al Ain region. This road passes through Sharjah and Abu Dhabi (see rainfall section in this chapter) and has become a vital road but has never been improved due to the absence of maintenance works established by the federal authority. In addition, its importance is seen in the fact that it is 1) the main road and the shortest link between the northern and eastern coasts, as well as the link with the southern region; 2) it traverses the existing extensive farmlands with agricultural projects and villages of the Bedouin.

Another important road is the one that links Al Manama village with Ras al Khaimah emirate. This road faces greater problems due to its embankment which always needs to be maintained. It is necessary to make it a dual carriageway for its importance. Other roads located especially in the north should be reconstructed so as to improve them and enable the process of integration of the UAE to be effective.

The main problem that is encountered in achieving it is the lack of co-ordination between the individual emirates and the Federal government, in respect of uniform policies to be adopted, and the problems mentioned earlier are basically an outcome of it. The limited financial strength of the emirates in the north cannot possibly cope with any major improvements to this road without associated inputs from the federal government. A comparison of the expenses of roads maintenance in the emirates both rich and poor produces a different picture.

For instance, Abu Dhabi Emirate has spent more than Dirhams 300 million over the past ten years on roads maintenance<sup>(23)</sup>; whereas in the other emirates' major roads have attracted little interest from federal policy.

### 3.4 Conclusions

This chapter deals with the geographical aspects, especially the physical characteristics, of road development in the Emirates. It has been demonstrated that from the time of the federation in 1971, as before, the presence of physical features like the mountains and deserts have influenced both road construction and the course they had to follow.

Problems related to physical factors have been evaluated in the light of the costs involved in road construction. However, the road network in the Hajjar mountain still needs to be maintained in order to avoid problems associated with rock-slides and soil erosion during the rainy season.

The problem of cracking caused by heavy loads is caused both by the elements and by the inferior quality of materials used in road construction. The latter needs to be attributed to poor consultancy services that were used at the time of constructing these roads.

As has been shown, one of the most important geographic problems facing the roads is that of drifting sand, a normal problem amongst countries of the Arabian Peninsula and other countries of the world with deserts. The local authorities have been much concerned about this problem, but the problem has yet to be resolved by mechanical, chemical, or by biological methods.

In all, it could be said that main problems associated with the construction of roads in the UAE have been caused basically by physical factors: economic considerations were not especially significant during the period of intensive network growth, whilst detailed political problems, though significant, have largely been overcome.

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## Chapter 4

# External transport links and economic development in Dubai

### 4.1 Introduction

The economy of Dubai has long been identified with trade, in particular because of its being a prominent entrepot in the region. This role long relied on the presence of traditional transport means, such as the dhow, in Dubai and in the neighbouring areas. There have recently been drastic changes in all aspects of life. These changes accelerated in 1970 as a result of the production of oil. Consequently, trade has essentially been associated with the development process, which eventually changed the commercial structure of the market in Dubai.

The impact of transportation on economic development is closely related to various geographical factors, resulting in a complex interrelationship between the transportation network and spatial factors. The completion of infrastructure provision in Dubai has led to improved services in all areas, and transport is now regarded as one of the most effective services in the country's economy.

Many studies have examined the significant role played by transportation in the economic development of countries. For instance, Hoyle (1973) studied the relationship between transport and economic development, laying emphasis on its importance in the development of certain East African nations:

*"The transport/development relationship is clearly dependent upon the specific type or range of transport media involved in a given area, upon the type of economy the transport facilities are required to serve, and upon the level of economic development at which transport media are introduced" (1).*

This chapter attempts to study seaport development as a contributing factor in the economic and urban development of Dubai. Attention is focused on the degree of impact the seaports have had on economic activity, with regard to the expansion of both the hinterland and foreland of Dubai. Development in this direction has been a specific policy and has meant the introduction of a new dimension in the transport system, namely the 'Sea-Air Transport' of the UAE, especially that of the Dubai Emirate. The latter, regarded as one of the major exponents of such services in the world, has tried, and with considerable success, to exploit its location at a global trading crossroads.

## **4.2 Characteristics of economic activity in Dubai**

Until 1791, Lingah, situated in southern Iran, shared with Dubai the position of the main entrepot of the Gulf region (see Chapter 2). Lingah's decline from 1791 enabled the improvement of economic activity in Dubai, as all the merchants along with their resources began to immigrate to Dubai from the 1790s to the present day. Development took place in both the economic and social sectors, contributing to much private sector entrepreneurship. Nevertheless, development remained 'traditional' until well into the twentieth century, and it was only with the coming of oil-related activities that major changes took place. Oil, in addition to providing income for the people, was able to support the heavy expenditure necessary for infrastructural build-up and for import and export trade. This chapter attempts to outline these developments and their relationships with the transport system in the country.

### **4.2.1 Traditional economic activities in Dubai**

The people of Dubai have for centuries been engaged in traditional economic activities associated with heritage trade. This includes trading in daggers and other items involving intricate metal work, and the building of fishing craft, and activities

related to it. Nevertheless, it was the pearling industry (pearl fishing) which formed the main occupation of the Dubaians. Since Dubai has a history of being the re-export centre for the Gulf, trading involved the movement of commodities through Dubai to other communities, with local consumption being a secondary (albeit important) consideration. This provided a social environment ripe for the take-off of the modern version of this entrepot activity.

Maritime transport is regarded as the most significant commercial activity in Dubai. This is attributable to the nature of the coastline, whose creeks helped the people to become essentially sea-faring, engaged in fishing or in trade. There was a total of 335 boats in the early twentieth century engaged in trade. In this field Dubai thus ranked second only to Abu Dhabi, while in boat-building Dubai was the main centre.<sup>(2)</sup>

Dubai's economy, meanwhile, was helped by the smuggling of gold, which was politely described as "trade". Paul, B. (1969) wrote:

*"...only Dubai, thanks to ingenious dealing in gold, had survived the collapse of the traditional pearling industry with any kind of wealth-producing economy."*<sup>(3)</sup>

This trading activity (gold smuggling) was encouraged by the former ruler of Dubai (1937-1990), when he wanted to develop Dubai to its maximum potential, so as to gain economic leadership in the Gulf.

Gold smuggling is associated with the earlier commercial links that Dubai had with Indian merchants. Smuggling was very active when dhows were used to carry gold to Bombay. To meet the demands of the trade they built ships that could travel fast.<sup>(4)</sup>

The local policies of Dubai were outlined to encourage free trade in gold between Dubai and India. This helped to develop economic activities whereby Dubai provided the leadership in trade amongst the countries of the Emirates. Before the 1960s the

main source of income for the UAE was from the pearling industry. Later the situation changed when 'cultured' pearls from Japan captured much of the market, having come upon the scene in the 1920s.<sup>(5)</sup>

Above all, the world-wide depression of the 1930s and the after-effects of World War II contributed to the decline of pearl fishing to its present insignificant position.<sup>(6)</sup>

Consequent on this fall in trade, given that the coastal belt was mostly infertile, the people who lived on the coasts and in the interior villages needed alternative means of livelihood. This resulted in them taking to industries traditional in other parts of the Gulf, such as carpet-weaving, wool-spinning, boat-building, the making of nets, daggers, swords, and the drying of fish.

In 1961 the two states which were economically strong in the lower Gulf were Bahrain and Qatar. This was due to their production of oil. The commercial growth of Dubai up to 1965 was backed by the port facilities, and the improvement in trade assisted the increase in imports.<sup>(7)</sup>

#### **4.2.2 Modern economic activities**

Table 4.1 shows the 1985 picture of economic activity in Dubai in respect of the Dubai-based labour force. It indicates that the public services (including social and personal services) employ as many as 36.8 per cent of the workforce. Those in commercial activities amount to 24.3 per cent, followed by labour engaged in construction activity, and those working in the industrial sector. Dubai's role as a trade centre in the Gulf is not only reflected in its commercial activities, but also in other economic activities which share in developing the economy. The policy of Dubai is to have close relationships with other countries in trade and in industry. This policy of the government has helped promote foreign investment by many commercial firms

to establish business in general, but especially commercial projects such as industrial factories established in the Jebel Ali area, commercial projects by institutions, and representative offices for international companies to develop their business through Dubai to facilitate the re-export trade in Dubai (see Chapter 5).

Moreover, incentives such as low taxes and tax-free concessions are offered for some activities. All this, coupled with the existence of an efficient transportation network that links all internal and external sections of the Emirate by land, air and sea, has helped to attract foreign investors to Dubai.

**Table 4.1:**  
**The economic activity sectors in the Dubai Emirate in 1985, according to the urban and rural work force**

Economic activity	Urban work force %	Rural work force %
Agriculture, fishing and forestry	0.4	6.2
Quarrying and oil	1.7	0.2
Manufacturing industry	10.5	0.7
Electric, Gas and water	1.6	0.2
Construction and Building	11.9	2.8
Wholesale, retail and hotels	24.3	7.4
Transport and storage	8.7	1.7
Estate, insurance and finance	4.1	0.2
Public social services	36.8	78.9
Total	100.0	100.0
* Rural work force: 2100; urban workforce: 137,080.		

Source: *Annual Statistical Yearbook, 1985.*

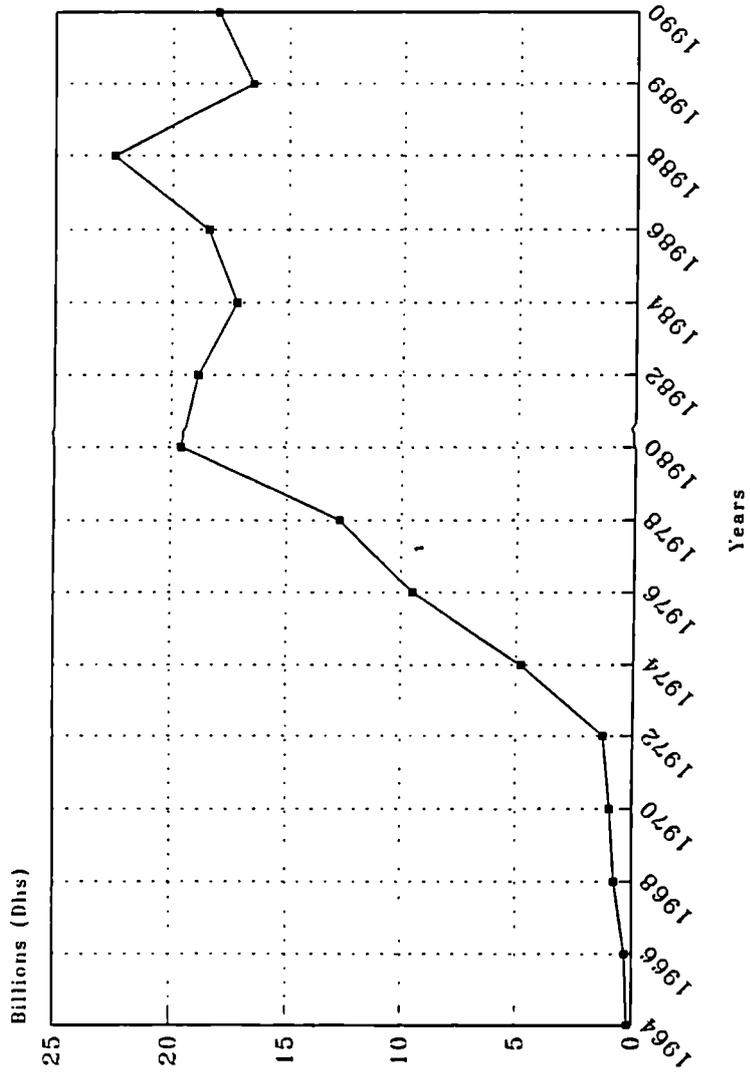
#### 4.2.2.1 Commerce

In the urban areas of Dubai some 24 per cent of the work force was engaged in commerce in 1985. This sector is far larger than the other economic sectors found concentrated in the CBD of Dubai.

The scale of improvement experienced in both internal and external trade is mainly due to the level and extent of the transportation facilities and related technologies in Dubai. The improvements effected both in the seaports and airports have been the key to the modern commercialisation of Dubai. This has had significant effects on the movement of goods to the world's capitals, thereby bringing about a global economic integration in trade<sup>(8)</sup>, which, to date, has been highly advantageous to Dubai (see Chapter 5).

An historical analysis of the trade policy of Dubai reveals that it was basically centred on improving its international trade links, a policy which had the backing of the ruler of Dubai in the 1950s (see Chapter 2). Moreover, Figure 4.1 shows how imports kept rapidly developing from 1964, being sensitive to the specific demands of the domestic market in Dubai and the markets in the rest of the Emirates. It also shows that there was a dramatic rise in imports from 1972 onward due to the establishment of the United Arab Emirates, which recognised the importance of Dubai as a major port in the UAE for trading activities, thus confirming the Dubai official view that the establishment of the UAE would be an entirely beneficial development for Dubai's commercial interests. Exports and re-exports also showed significant development from 1974 to the present day. In 1980 imports rose due to the commencement of the Iraq/Iran war. This led to an increase in the activity of the ports, as they handled large quantities of goods bound for Iran. There was a fear during the Gulf War that hostilities would prevent food from reaching the Gulf. Iran was one of the foremost countries importing goods from Dubai at that time.

Figure 4.1 Development of Dubai's import trade from 1964 to 1990.



Source: Dubai Annual Trade Review, 1965 - 1989; Dubai Statistical File 1991, Dubai Chamber of Commerce & Industry.

There are thus many factors that contributed to the development of Dubai's role in international trade. However, developments in economic geography are the most important; e.g., the change in employment activities from fishing and farming to commerce and trade, and employment in the government services.

Manufacturing industrial activity did not gain much importance either as a state-supported activity or as an employer of the local workforce, but trade was regarded as the most suitable activity when the state was established. The federal constitution also encourages trade in every emirate, in terms of its recommendation to establish economic policies encouraging the local investors to establish commercial projects in every emirate. However, the problem of co-ordination amongst them has prevented that goal (see Chapter 7). Abu Dhabi, for instance, refuses to allow nationals from the other emirates to establish such businesses, unless with the sponsorship of a citizen of Abu Dhabi.

In international trade, sea transport predominates, and this is of much help to the developing nations which have a larger proportion of imports coming into their countries.<sup>(9)</sup> International trade is a vital element in the economy of Dubai and it is supported by a most effective transport system, along with excellent port facilities. Countries such as Dubai which have deliberately fostered their role in maritime trade depend heavily on international trade to revitalise their economies<sup>(10)</sup> and, particularly in recessionary times, are aware that they must strive constantly to retain their position in the global struggle for a market share.

One of the most significant recent economic projects introduced in Dubai is the Jebel Ali Free Zone, with a view to promoting commercial activities. This is meant to attract foreign investment. The efficient transportation network already in place should help

the movement of goods in any direction, but, especially, the hope is to capitalise on, and lend support to, Dubai's role as an international transport node.

#### **4.2.2.2 Industry**

Before 1960, Dubai's infrastructure was underpinned by none of the characteristic features of the modern age, such as electricity, piped water and paved streets. However, the oil boom precipitated the modernisation of social and economic activities, and brought to fruition many new development plans. With oil production gaining momentum, a programme of industrial development began. This, with the establishment of the United Arab Emirates as a single political entity, was to receive special attention. Although there are no precise data relating to the early development of the industrial sectors, it is argued that political unification assisted in the development of industry.

Traditional industries were located in such towns and coastal cities as Dubai, Sharjah and Abu Dhabi. The location of these industries (such as boat-building and the manufacture of fishing nets, shelter materials (tents) and other local home items) was largely dictated by the local environment and inertia.

When oil production began, there was an increase of activity in all sectors. This attracted a large immigrant population, consisting of professional, skilled and unskilled labour, which in turn resulted in a very large increase in the population as a whole. Construction expanded in all fields. While oil was the largest industry, others included cement and building materials. Industries spread throughout the major centres of the Emirates. Most cities also have aluminium factories, maintenance workshops, and factories providing foodstuffs and drinks. However, industries did not develop independently of the transportation infrastructure.

Table 4.2 shows the range of industrial activities in Dubai in the mid 1980s, its figures including the total number of those employed (i.e. not just Dubai's residents): it indicates the extent to which the associated transport system needed to expand to cater for this growth.

**Table 4.2:**  
**Industrial activities in Dubai Emirate in 1985**

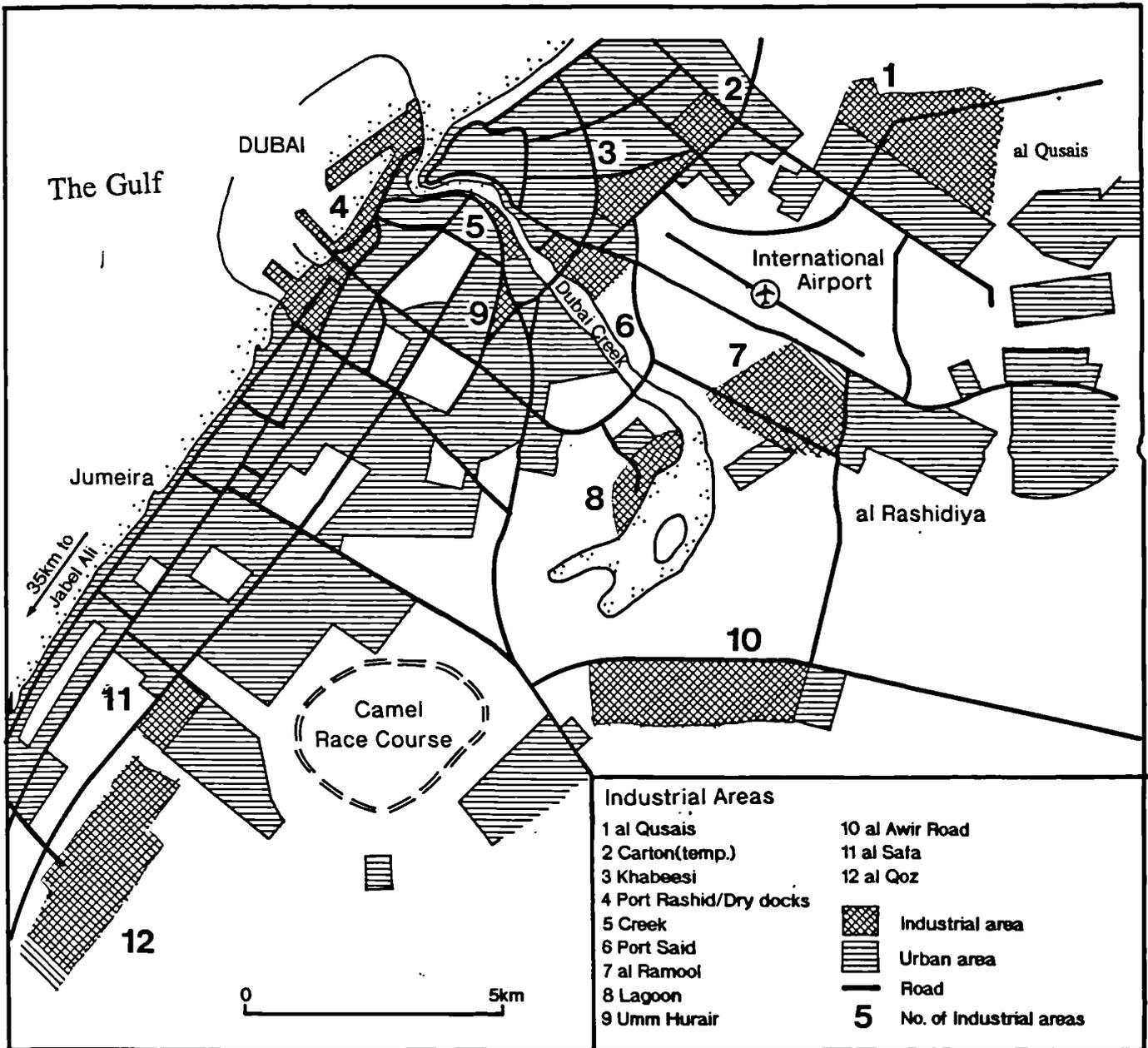
<b>Industrial activity</b>	<b>Number of factories</b>	<b>Number of employees</b>
Mining and quarrying	28	862
Food, drink and tobacco industry	107	1947
Furniture industry	190	1160
Paper industry	7	327
Chemical industry	13	382
Plastic production	24	753
Ready made textiles	1322	5057
Timber industry	44	336
Miscellaneous industrial activities	2208	22577

Source: Ministry of Planning, *General Census of Establishments in UAE for 1985*, Abu Dhabi.

For instance, the local spatial relationship between transport and industry is detailed in Figure 4.2, which shows the two main locations of modern industry in the Dubai Emirate. It indicates the intense clustering of industry which occurs around these key transport points, but, of course, it also shows the importance of planning policies for industrial location. The major factors in this respect are the road network, which allows easy access to all other commercial centres of the UAE, and seaports, which provide accessibility to the wider markets. The manufacturing-industry sector in Dubai employs only an estimated 10.5 per cent of the workforce in the urban areas of Dubai, ranking third after social services and commerce.

Figure 4.2

LOCATIONS OF INDUSTRY IN THE EMIRATE OF DUBAI



#### 4.2.5 The oil industry in Dubai

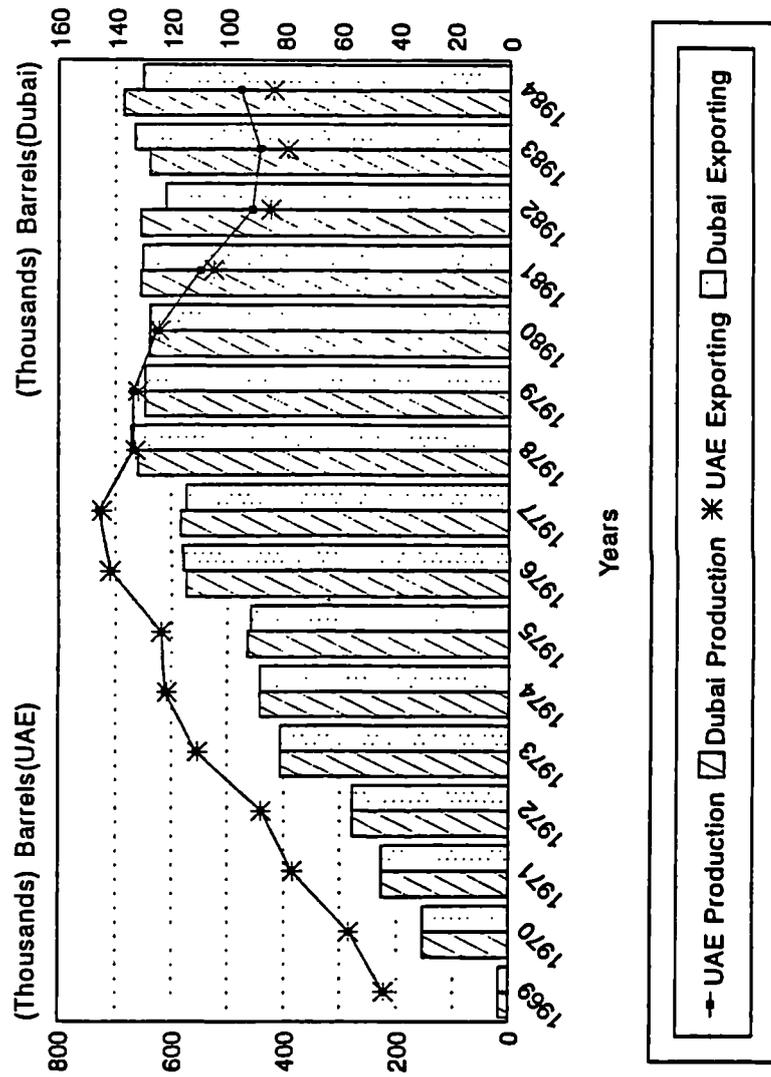
Oil is recognised as the major factor in the development of the economy of Dubai. Its history dates back to 1963, when the Dubai Petroleum Company (DPC) started its activity in oil exploration and associated industries. Later, interest in developing this sector increased when the international companies established their bases in Dubai. McDermott, for example, was established in Dubai in 1970. These developments led to more employees being employed, both from within the country and from outside.

The oil revenues have created a strong and sufficient infrastructure, represented by industrial projects and zones, the *telecommunication network*, *public utilities* and, more intensively, the infrastructure for transportation. Government oil revenues provide a very high performance for the economy. For instance, in 1989 oil and gas accounted for 38.4 per cent of the total gross domestic product for the UAE.<sup>(11)</sup>

Figure 4.3 shows the vital role played by the development of production and export of oil in the UAE as a whole, and in the Emirate of Dubai. Between 1969 and 1984 there were peaks and troughs in the production and exportation of oil, caused by global events such as war, economic recessions and even by climatic factors in some countries.

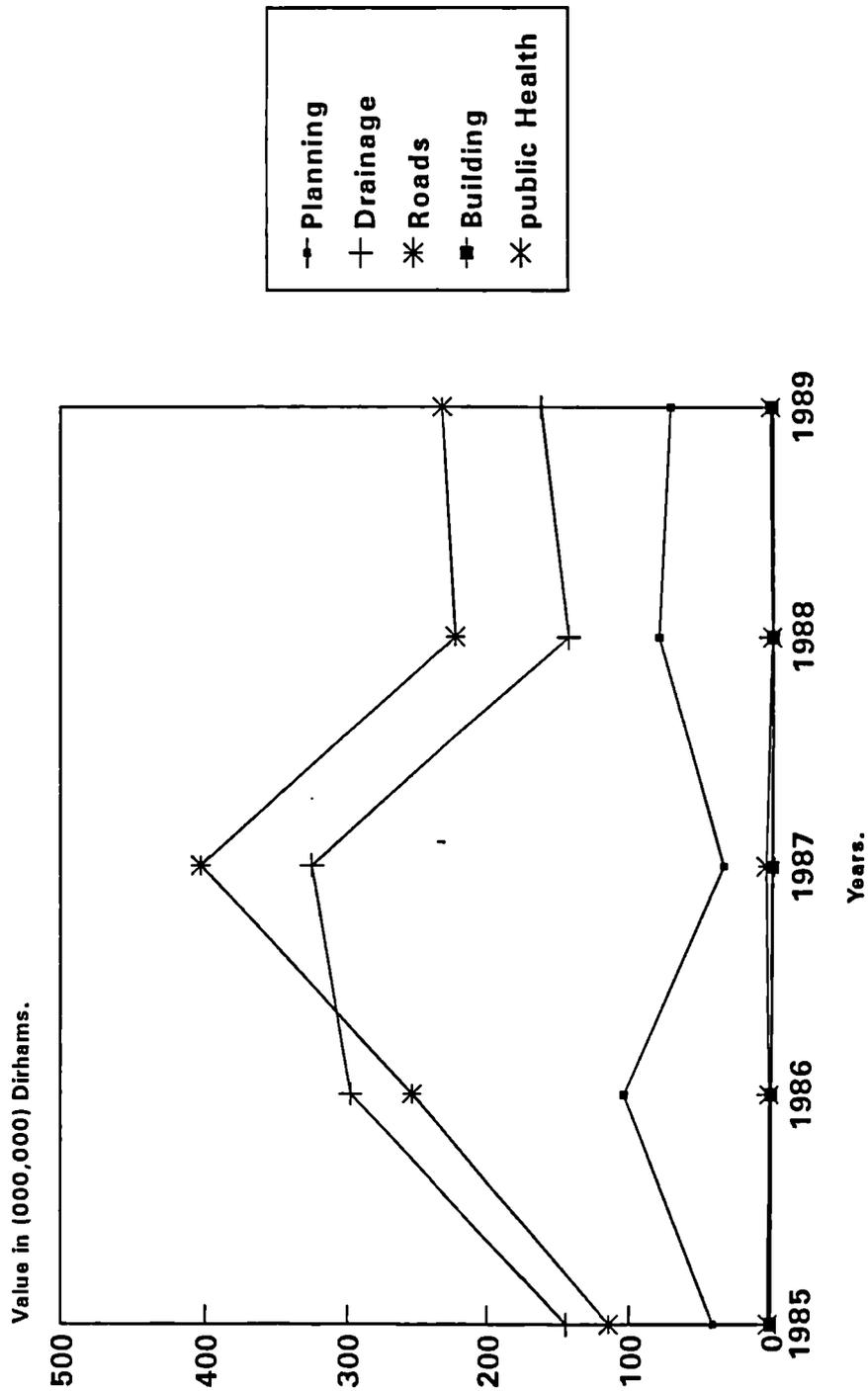
Figure 4.4 shows, for Dubai, how expenditure increased on major projects, and it demonstrates the great attention being paid especially to road projects, as these formed a significant sector in the urban and overall development programme of the Dubai Emirate. The apparently low figures for public health and building are in part a reflection of the fact that major developments in these sectors had largely been completed by this time; in part they reflected the exclusion of maintenance costs from these figures.

**Figure 4.3 Oil Production and exporting for UAE and Dubai Emirate  
From 1969 to 1984.**



Source: Dubai Municipality, Doxiadis, 1985.

Figure 4.4 Expenditure by Dubai on internal development projects from 1985 to 1989.



Source: Dubai Municipality, Annual Statistical Year book, 1989.

The impact of oil revenue on economic activity is being reflected in many indices, particularly in those related to personal income, which is generally due to an increase in the economic activity of the population, as well as in the area of social development.

The production of oil was started in Abu Dhabi in 1962, in Dubai in 1969 and in Sharjah in 1974. The oil represents approximately 90 percent of the countries' income. Ever since the establishment of UAE, oil revenue has tended to fluctuate, in response to production output and to world demand. For instance, production was up to 2,000,000 barrels per day in 1976-1977 but down to 1,200,000 barrels per day in 1983-1984 (see Chapter 1).

Whilst oil revenue has had its effect on industrial activity in general, its impact is seen especially in the oil industries which are related to the production of petrochemical products consumed locally, and those associated with the supply of oil to other countries, which involves tapping it from the oil fields and transportation through the pipelines to the terminals, ready for export by tanker.

#### **4.2.4 Other industries**

Because of the emphasis of the local market being focused on trade and its servicing, heavy industry in Dubai has not been especially encouraged. Light industries are represented in consumer products such as food processing. Industrial sites throughout the urban areas of Dubai have the greatest numbers of employees. These include industries such as garages, and those making stationery and home requirements, and secondly the heavy industries such as petrochemicals, steel and aluminium making, and other related industries. Industrial land use, which can also include the transport sectors such as seaports and airports, occupies 20 per cent of the total urban area of the Dubai Emirate. The government of Dubai has initiated many policies related to the development of industry. It has promoted this sector by starting industrial pro-

jects, and by attracting international investment, the latter being exemplified in the Jebel Ali free-trade zone.

The Jebel Ali area has been able to attract relatively high-technology industry. This includes major companies such as 'DUBAL' (Dubai Aluminium Company Limited), and 'DUGAS' (Dubai Natural Gas Company). These companies were established there for many reasons. For example, DUGAS was established to interface with Dubai's offshore oil fields, thereby putting to use the flared natural gas by compressing and dehydrating it before piping it onshore<sup>(12)</sup>.

The development in these sectors is related to the important roles played by the transport sector, which serves these areas of economic activity by an efficient network of roads and by well equipped ports. The international road links play a less significant role than other transport sectors. This relates to the location of UAE in the eastern part of Arabia: linking the UAE and the rest of the world with Oman. Dubai's location in this road network is essential because it links other parts of the UAE by a good road system. The portion of roads involved in the traffic of goods within the Dubai transport area is tiny, representing around 5%, as shown in Figure 4.6.

Movement of passengers leaving the UAE by road is 15 percent of the total movement of passengers leaving the country. This is a relatively small percentage of the whole, and is due to the relative isolation of the UAE from the global road network, and the fact that recent investment by Dubai in modern transport links has concentrated on sea and air transport. Dubai, which forms an important link with the rest of the UAE, recognises the importance of road links for international trade. This was why Dubai financially backed the road to Oman. However, most of the income for international transport is from sea and air, therefore the rest of this chapter concentrates on the sea and air sectors. The degree of expansion that the port services have undergone

within a short period, since the formation of the federal state, is indicative of the link that exists between transport and economic activity, a link which the UAE has successfully exploited.

### **4.3 Development of trade activity through seaports and the airport in Dubai**

The first sea transport system in Dubai was based on the Dubai Creek, the only port used for the movement of commercial boats. Small boats would ply between the creek anchorage and the steam ships which had to be anchored off the opposite side of Dubai Coast because of the shallowness of the creek at that time. The ships carried a variety of goods and the small boats (*teshiala*) would ferry between the ships and the creek carrying these goods. Some of the goods were meant for the domestic market of Dubai, and others were redistributed to the neighbouring emirates using either the caravan routes or the traditional sea transport routes (see Chapter 2).

Due partly to its geographical location and the reliability of its natural harbour, Dubai has had a long history of acting as an entrepot in the region.<sup>(13)</sup> In addition, trade relations between Dubai and other countries have always been based on political relationships, which in turn have depended on the regional equilibrium that prevailed between Dubai and the other countries.

The term 'Redistribution Centre' fits well with the location of Dubai in the Gulf Region. For example, Hamriyah Market, located on the Deira side of Dubai, is a wholesale vegetable market. It serves as a meeting-point for all the fruit and vegetable merchants of Oman, Kuwait, Saudi Arabia, Jordan, Syria, Lebanon and Turkey. Bringing their goods to the market in container trucks, the merchants unload and redistribute their goods either locally, or to other countries in the region, such as

Oman. This example typifies the trading generated by road transport, and indicates the importance of Dubai in this respect.

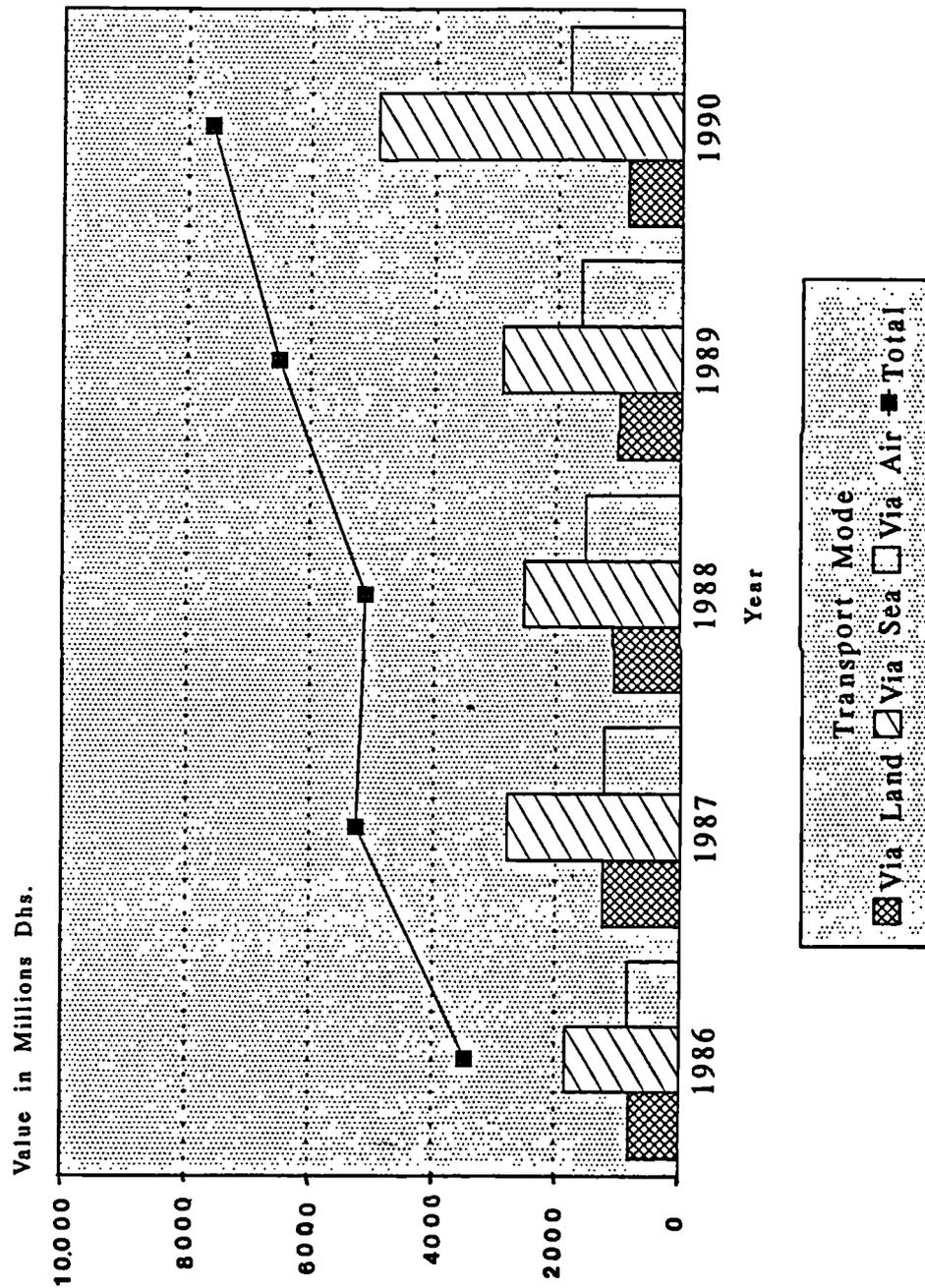
The sea-based re-export trade deals mainly with manufactured goods, machinery and transport equipment. In response to this, Dubai has developed its ports to cope with this activity. Airports have also helped these activities. As an example of this, an evaluation of the sea-air transport system in Dubai gives greater significance to the macro transport nodes in the Gulf and other Gulf countries. This significance comes from the great development in trade activity in Dubai, as will be seen later in this chapter.

The re-export trade which Dubai carries out with the Gulf countries is recognised as a significant activity in international trading. Figure 4.5 (a,b) shows the development of re-exports and non-oil export trade through the transport system of Dubai, and illustrates the importance of sea and road transport. In 1988, for instance, 18,000 truckloads of re-exports goods left the Emirates for the other Gulf countries.<sup>(14)</sup> However, in 1990 goods exported by road from Dubai totalled Dirhams 250 million.<sup>(15)</sup>

The export trade from domestic industries includes chemicals, refrigerator equipment, cement, manufactured goods and foodstuffs. During the 1980-1989 period, the export of domestically produced goods to the neighbouring countries increased. In this exercise the role of sea transport predominated, in respect of exports to Iran and some Gulf countries (see Chapter 5). Road transport accounted for 72,000 truckloads per year on average, carrying local products to Gulf countries such as Saudi Arabia, Bahrain and Kuwait.<sup>(16)</sup>

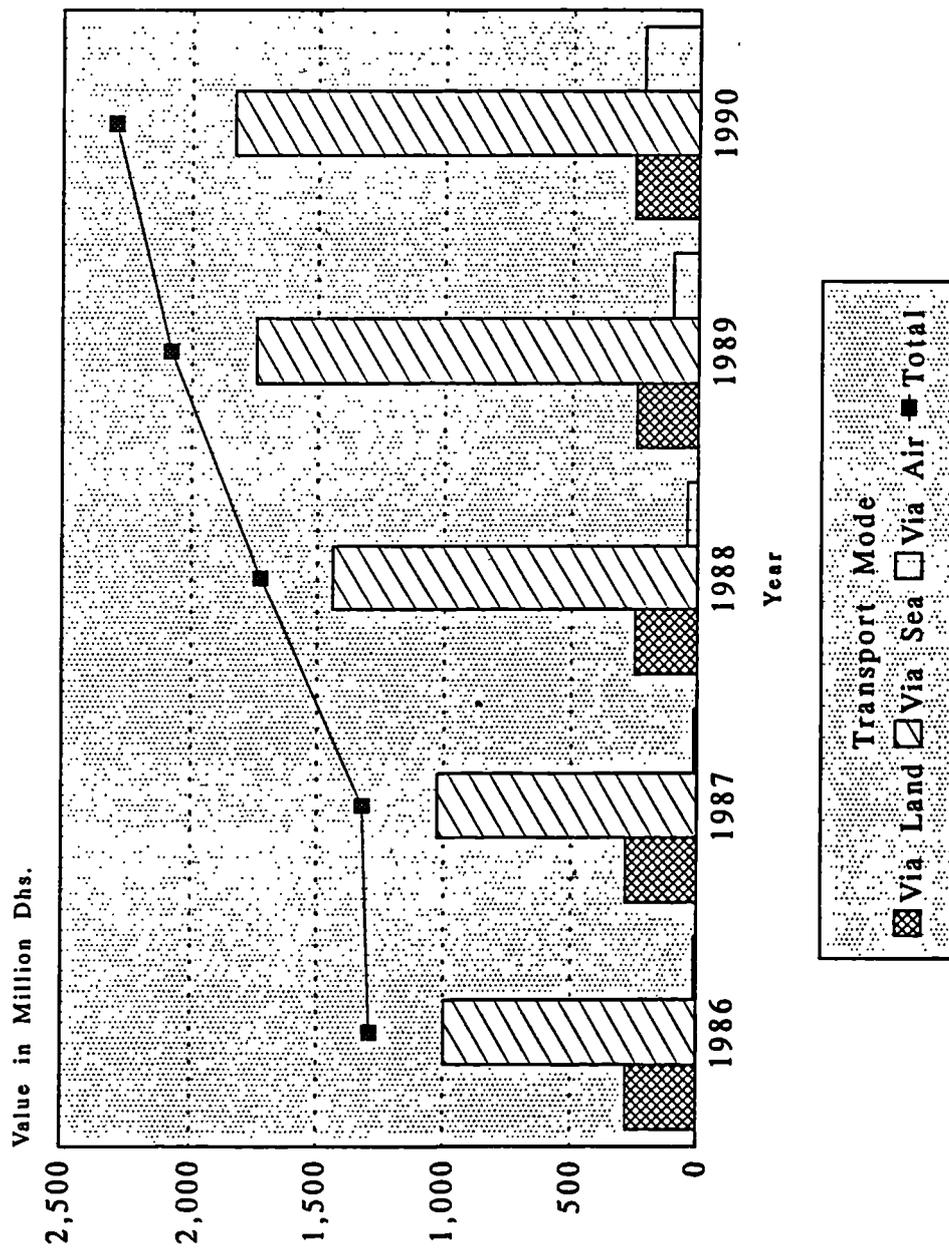
Of all the transport systems in Dubai, sea transport is recorded as being the most used by the commercial establishments. Sea transport was used for 84 per cent of the total export (by value) activity of the Dubai transport system in 1988. Figure 4.6 shows its considerable dominance over air and road transport in 1988 and 1989.

Figure 4.5 (a) Development of Re-export by means of Transport, Emirate of Dubai 1986-1990.



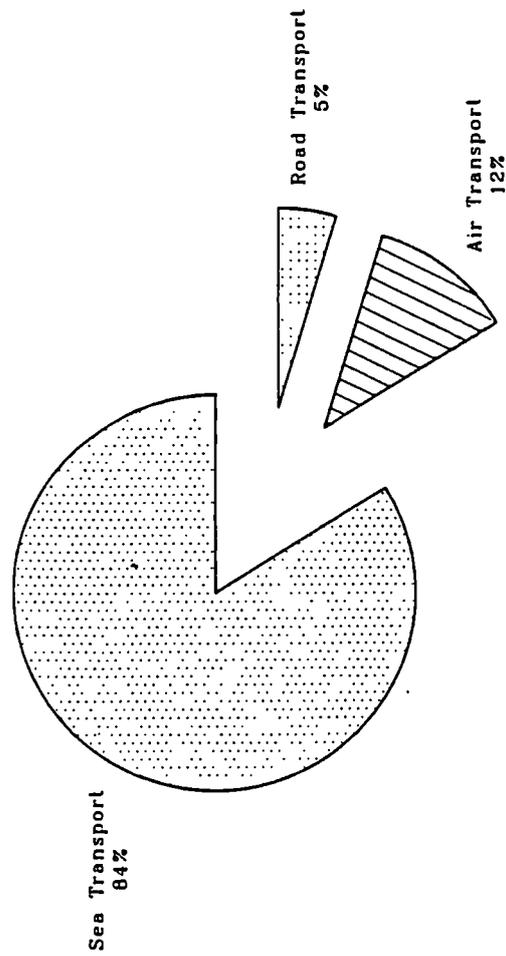
Source: Dubai Municipality, Annual Statistical Yearbook, 1990.

Figure 4.5 (b) Development of Non-oil exports by means of Transport, Emirate of Dubai 1986-1990.



Source: Dubai Municipality, Annual Statistical Yearbook, 1990.

Figure 4.6 Exports by mode of Transport system in Dubai in 1989. (By value:Dirham).



Source: Dubai Annual Trade Review, 1990.

### 4.3.1 Sea transport system

*"Dubai Creek was not a major trade port before 1902 (compared with other Emirates cities), but after the decline of Sharjah and Ras al Khaimah creeks as trade ports for re-export trade, Dubai creek rapidly increased in significance, and trade has been a major source of its economy." (17)!*

The major policy of the Dubai government has been to support the development of maritime transport systems through the new seaports and the Creek.

The sea transportation activity is concentrated in the four ports of Rashid, Jebel Ali, Hamriyah, and the Creek. Dubai relies in different degrees on these ports for its international trade. The physical characteristics of these ports are indicated in Table 4.3, which shows the importance of each port in terms of its physical characteristics. With the importance of the road network in its integration with economic activity, the location of the port is highly significant in respect of the degree of integration with its economic hinterland.

**Table 4.3:**  
**Characteristics of Dubai's ports in 1990**

Characteristics	Port Rashid	Port Jebel Ali	Hamriyah Port	Creek Port
Length of quay side in km	8.5	15	1.3	2.1
Number of deep water berths	36	67	-	-
Asphalt area in % of total port area	> 90%	< 10%	< 10%	> 90%
Value of customs declared goods and transit (Dhs)	18782 M.Dhs	3607 M.Dhs.	593 M.Dhs.	212 M.Dhs.
Value of customs declared goods per km quay side	2210 M.Dhs	240 M.Dhs.	456 M.Dhs.	43 M.Dhs.

Source: Adapted from Gabriel, Erhard, 1987; Dubai Statistics File, 1991.

The location of commercial seaports is determined partly by the existence of traffic for the interchange of goods between land and sea.<sup>(18)</sup> Seaports have links to their hinterland, which may form an urban area, and also develop into generating trade themselves. The Dubai Emirate is very much influenced by the port of Rashid in respect of urban and regional development.

There is an interrelationship between Dubai City and the port of Rashid. The concept of the 'Cityport' is appropriate to Dubai, because there is a strong relationship between the development of this port and the city's hinterland,<sup>(19)</sup> which is reflected in the movement of goods to and from the port. This relationship goes back to the first establishment of the port in 1968.

Trade activity has increased since the beginning of the federation in 1971, because at that time there was an urgent need to build the infrastructure of Dubai as well as the UAE. The effects of the port on the expansion of urban areas of Dubai may be judged by the increase in commercial activity. For instance, in 1970, the first year of the Port of Rashid, the urban area of Dubai was 1800 hectares, whereas by 1975 the urban area had risen to 4700 hectares. This increase is partly a result of improvements in trade activity and the port, because the people have developed their activities, and enlarged the areas of activity which caused them to move to other places in the urban areas. Of course there were other factors, too, which assisted in the expansion of the urban areas of Dubai; factors such as the road network (see Chapter 8).

In a technical sense, there are two types of goods movement through these ports; namely, general cargo and container cargo. Generally the UAE is recognised as having one of the most active container-traffic port sectors, being ranked fourth in the developing countries in 1987 (see Table 4.4).

**Table 4.4:**  
**Container port traffic of selected developing countries in 1986, 1987.**

Country	Container traffic 1986 (TEUs)	Container traffic 1987 (TEUs)*
Hong Kong	2,774,025	3,457,182
Singapore	2,203,100	2,634,600
Republic of Korea	1,532,911	1,949,143
United Arab Emirates	925,703	954,374
Saudi Arabia	823,906	830,122
India	486,379	517,869
Kuwait	200,599	200,034
Oman	112,791	140,496
Bahrain	80,393	79,499
Netherlands Antilles	42,572	58,689

\* TEU Twenty foot equivalent unit: A unit for calculating the carrying capacity of container vessels (Benson & Whitehead)  
1. Including all states with a figure of greater than 800,000 tonnes

Source: *Review of Maritime Transport*, New York, 1989.

The main port in Dubai is that of Rashid; this is the most active in handling both general cargo and containers. It is situated close to the CBD areas (see Figure 4.7). However, it is inappropriate to judge its importance purely on the basis of proximity and cargo-handling factors. As Fromm (1966), stresses:

*"The effective capacity of a port is not only determined by the physical equipment provided, but also by the coordination of a series of acts and movements of equipment, cargo and administrative paper." (20)*

Recently, the administration of Dubai's ports has been merged into a single authority; 'the Dubai Ports Authority' (DPA). This should lead to an improvement in the efficiency of the transport system in Dubai, creating greater interaction between the foreland and hinterland, which would in turn have effects on the commercial firms, industrial projects and on other economic activities. The main reason for that merger may relate to the importance of the Port of Rashid as the oldest seaport after the

Creek, which secured very rapid development of its facilities because of the great attraction of the hinterland of Dubai. A second factor is the importance of Jebel Ali Port. As one of largest seaports in the Gulf, it has the largest storage areas for both general cargo and containers. The development of the Free Trade Zone in Jebel Ali has also contributed to that merger.

#### 4.3.1.1 Port of Rashid

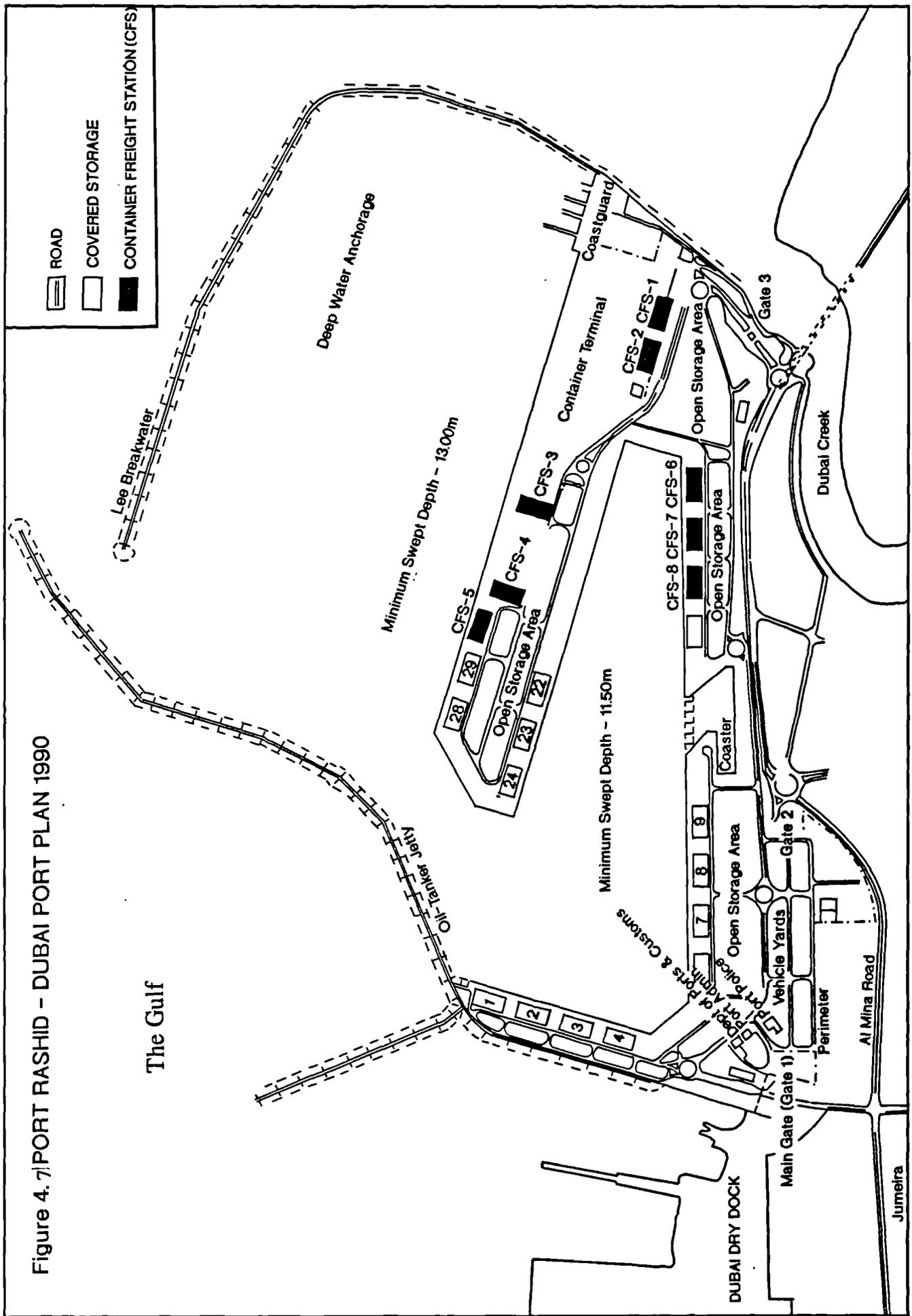
Table 4.5 shows that the Port of Rashid recorded a high level of cargo-handling activity from 1988 to 1990. That development is mainly due to the physical characteristics of the port; such as its having 36 quays used by ships belonging to 120 international lines.<sup>(21)</sup> Thus, the port provides greater connectivity with global nations in respect of economic and commercial activities associated with trade (see Figure 4.8).

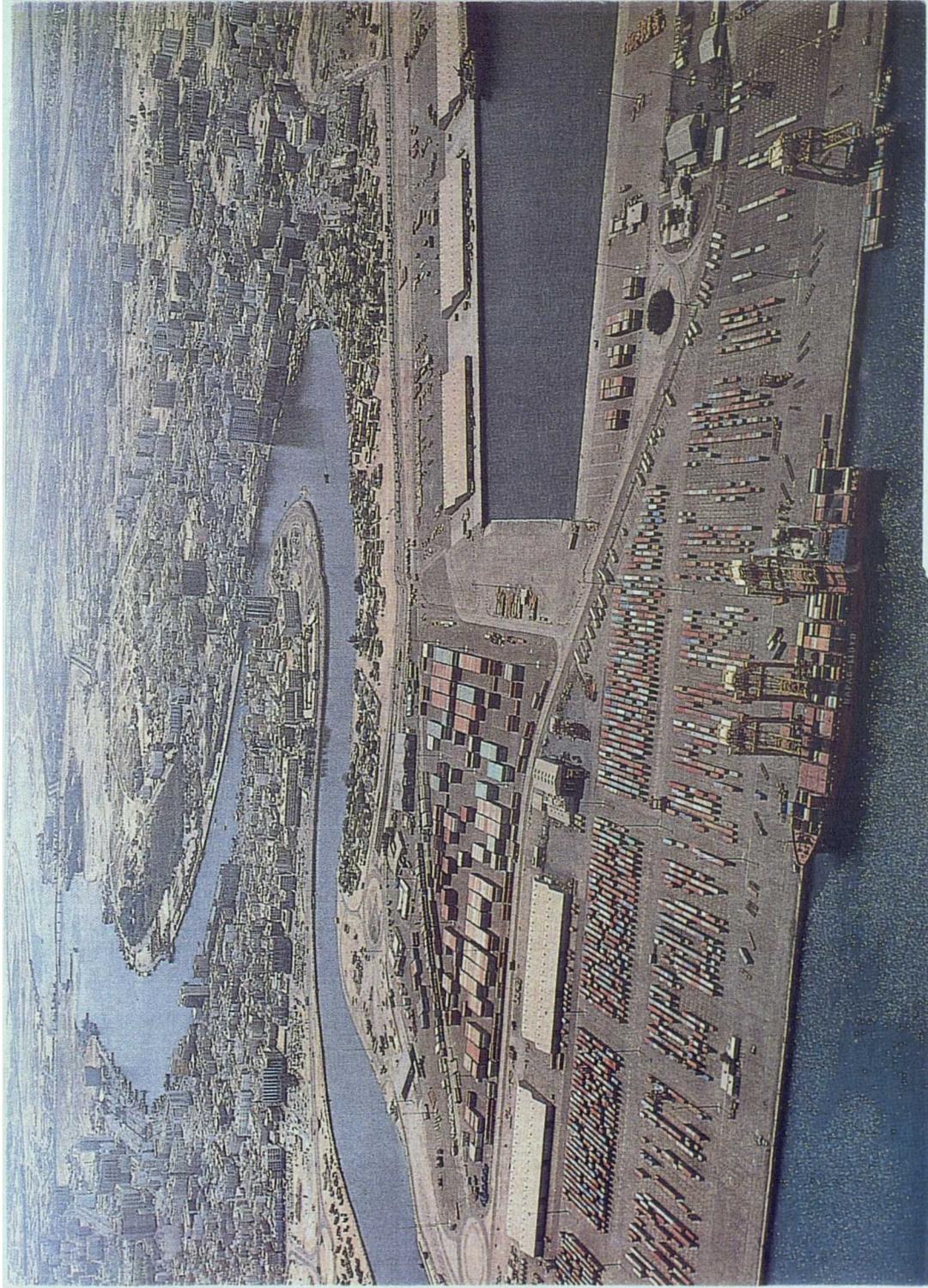
**Table 4.5:**  
**Economic activity of Port of Rashid in Dubai 1988-1990**

Activity	1988	1989	1990
Inward vessels	1,943	2,152	2,067
Outward vessels	1,930	2,122	2,044
Internal vessels	405	466	306
Tonnage landed	4,612,068	5,256,291	5,162,119
Tonnage uplifted	752,925	972,992	1,289,749
No. of containers	434,430	498,937	478,283

Source: Dubai Statistical File, 1991.

Figure 4.7 | PORT RASHID - DUBAI PORT PLAN 1990





*Fig. 4.8 The Containers terminal in the Port of Rashid; showing behind it the hinterland of the port (Diera and Bur Dubai).*

Goods imported through the Port of Rashid in 1987 include machinery and transport equipment (26.5 per cent); manufactured goods (24 per cent); miscellaneous manufactured articles (19 per cent) and food and livestock (14.4 per cent).<sup>(22)</sup> The Port of Rashid serves as a gateway to Dubai and to the other Emirates. In particular, goods landed at the port are needed for further construction activities and for commercial projects in Dubai. The Port of Rashid is primarily an international port, although it also serves the movement of goods at the regional level. In contrast, the Creek and Hamriyah focus only on regional trade with the other Gulf countries, particularly Iran (see Chapter 5).

#### 4.3.1.2 The Creek

The traditional mode of sea transport is the dhow, which is used for regional trade. Dhows carry both goods and passengers between The Gulf, Pakistan, India and East African ports. The principal dhow harbour is the Dubai Creek, which is the oldest port and acts as a natural harbour in Dubai for these boats.

*"Dubai Creek is particularly associated with this dhow trade and hundreds of dhows can be seen berthing and loading and unloading merchandise here (Dubai Creek), merchandise that is bound in the main for the Iranian ports."*<sup>(23)</sup>

The continued use of this traditional means of transport is determined by economic factors such as its relative cheapness in respect of capital investment and running costs. The government of Dubai has consistently tried to encourage this mode of transport by supplying fuel cheaply and by levying low port charges.

Another significant role played by the Creek Port is that it acts as a transit point for goods carried by small boats plying between the Port of Rashid and the Creek. As a result of the successful growth of the Port of Rashid, traffic congestion on the road network in the CBD and areas in proximity to it are worsening. Hence, the use of

small boats to ferry goods to the Creek is an attempt to reduce the congestion on the road network. The general increase in regional trade activity led to the crowding of ships at the Creek. In response to this problem the government of Dubai has expanded the capacity of the Creek by establishing new dhow berths on the Deira side of Dubai Creek.

#### **4.3.1.3 The Port of Jebel Ali**

The port of Jebel Ali, situated 35 kilometres south west of Dubai city, ranks second to the Port of Rashid in respect of volume of trade movement in Dubai Emirate (see Figure 4.9). The main purpose of establishing the Port of Jebel Ali was to reduce the congestion at the Port of Rashid as its hinterland came under pressure, not only due to increased traffic in transit trade in the nearby city centre of the CBD, but also as it needed more berths and greater storage facilities because of its transit trade. The rapid expansion of trade through the Port of Rashid led to increased emphasis being placed on alternative ports for the import and export trade.

Figure 4.10 shows trends in the movement of cargo through the Port of Jebel Ali. Activity in the port peaked during the mid-1980s, before declining in 1987 as a result of the climate of uncertainty regarding the Gulf's maritime market. The main reason for this decline is given by an official report by the *Economist Intelligence Unit*, about the general survey of the UAE in 1990, which said that 1987 was a bad year for Jebel Ali Port when the movement of container tonnage declined..; and it may also be due to an increase in attacks against ships in the Gulf before the end of the War in 1988.

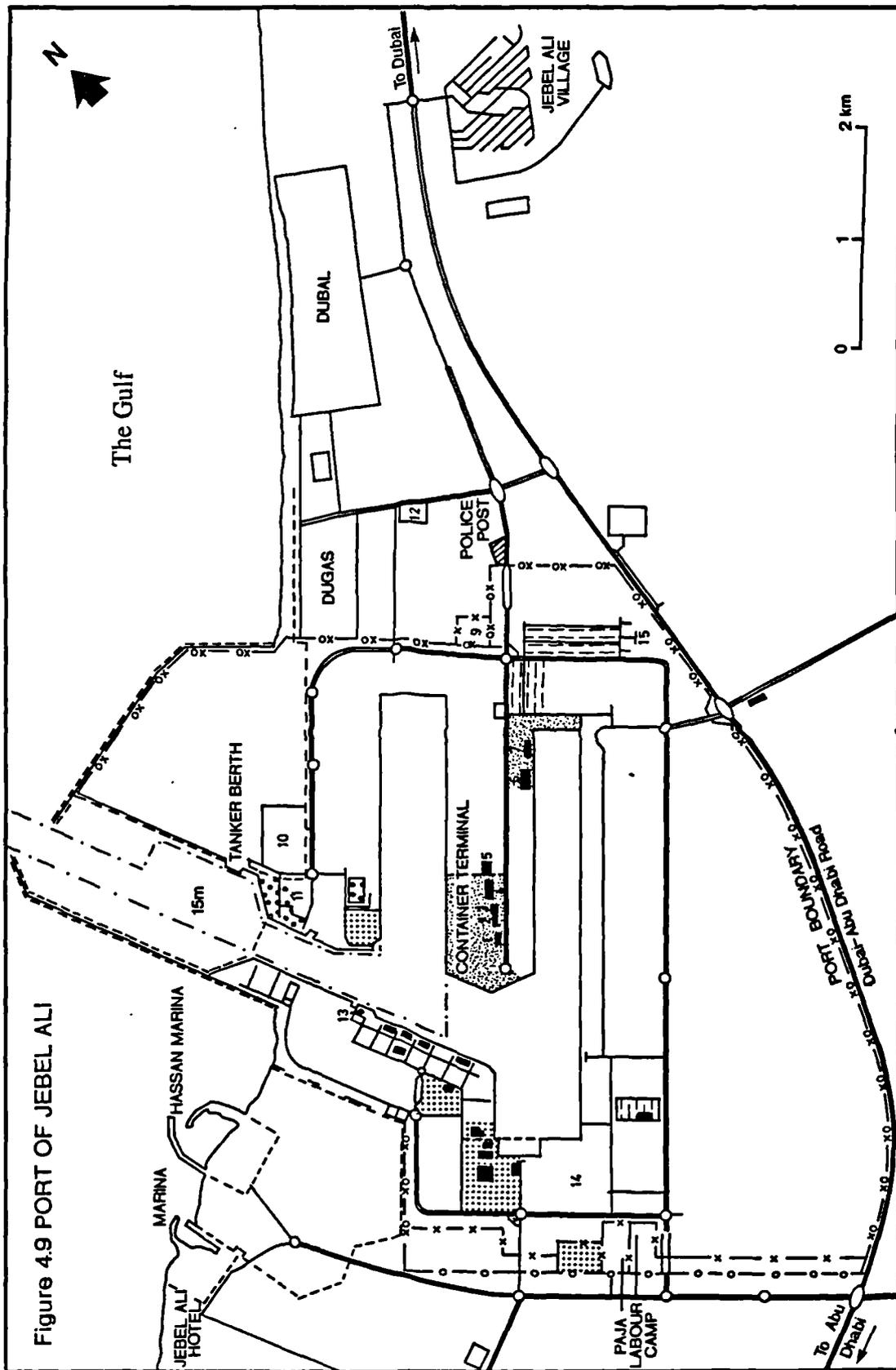
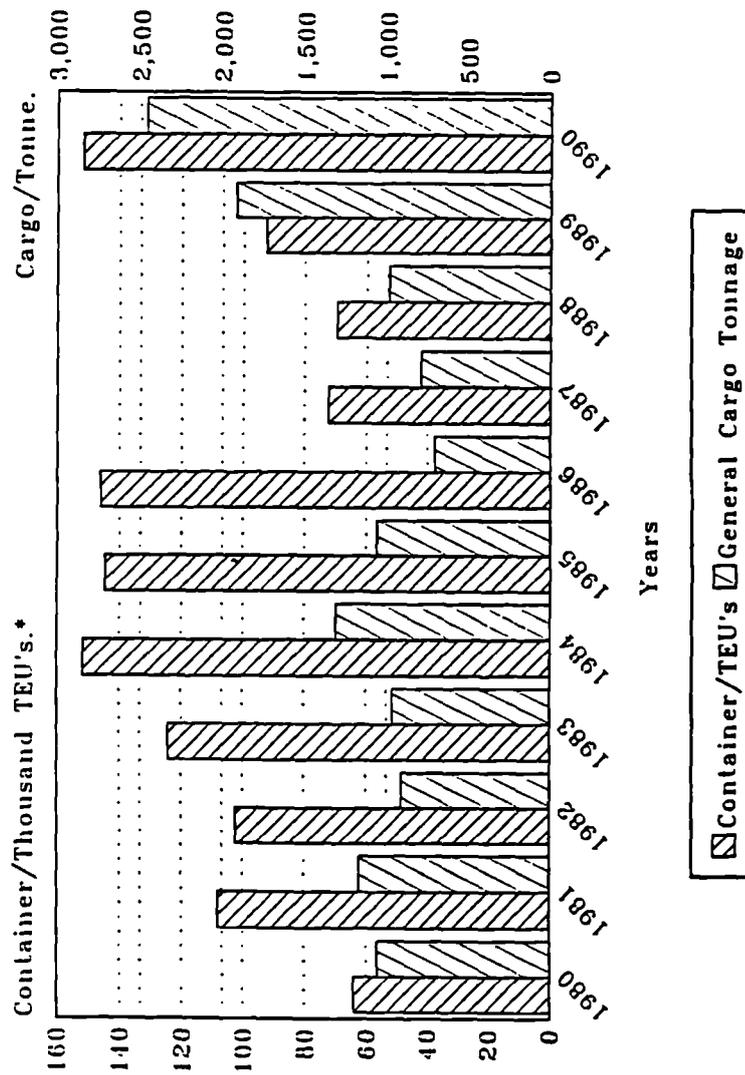


Figure 4.9 PORT OF JEBEL ALI

- 1. Maintenance Workshop
  - 2. Control Point Container Terminal
  - 3. Port Authority
  - 4. Container Freight Station
  - 5. Maintenance Workshop
  - 6. Cold Store
  - 7. Ro-Ro Terminal
  - 8. East Control Point
  - 9. Tenants Labour Camp
  - 10. ARCO, Storage of Condensates
  - 11. EBSCO, Storage of Bitumen
  - 12. Gas Bottling Plant
  - 13. Harbour Master Marine Control Tower
  - 14. McDermott Site
  - 15. Leased Warehouse Area
- Water Tower & Tanks
  - Asphalted Area
  - Fully Enclosed Sheds
  - Storage Area
  - Oil and Gas Tanks
- Public Services
  - Minor Industrial Establishments
  - Open Areas
  - Port Limits with Perimeter Fence

SOURCE: Dubai Ports Authorities, 1980

Figure 4.10 Cargo activity through Jebel Ali Port, from 1980 to 1990.



Source: Dubai Annual Trade Review, 1989.  
 \* 1981 figure from experimental work. The rest is based on the twenty-foot container (20 meter).

Another reason for its development was the new investment projects which were developing. Jebel Ali Free Zone (FZA) was established to attract foreign investment. It serves as a storage and distribution centre for goods from Dubai. The development of the Port of Jebel Ali went hand in hand with development of the Free Zone. A major feature in the policy of free-trade zones is that foreign investment is attracted by offering tax concessions. The Port of Jebel Ali offers low-cost warehousing and efficient goods-distribution facilities. These characteristics have been influenced by the nature of the spatial changes in its hinterland and the development seen therein has resulted in the expansion of both its size and capacity.

#### **4.3.1.4 The Port of Hamriyah**

The port of Hamriyah was established in 1972 to serve traders who deal in goods such as vegetables, foodstuff, livestock and other general cargo. The movement of these goods is carried out by dhows and other small boats, operating between Dubai and other Gulf countries, and Pakistan, India and East Africa, as shown in Table 4.6.

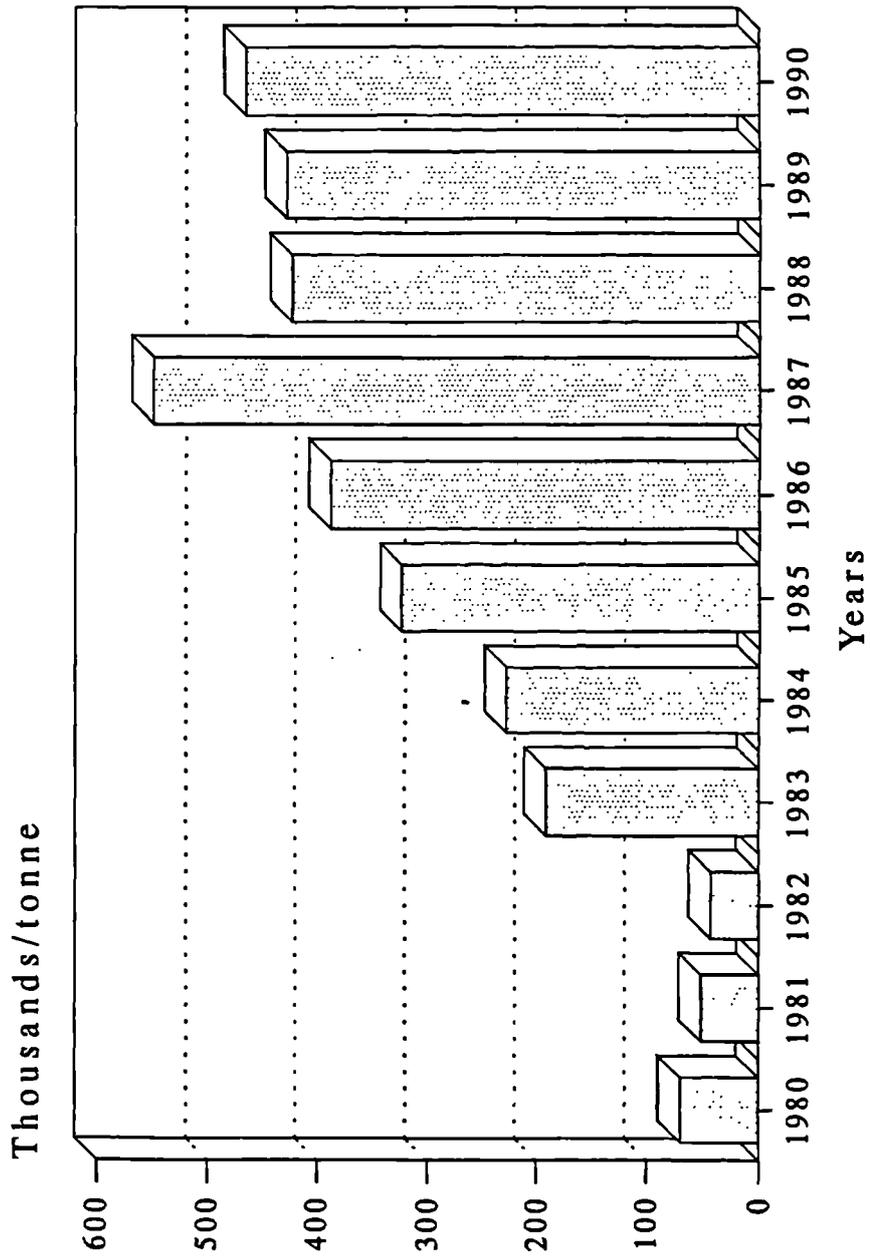
**Table 4.6:**  
**Countries of origin and destination of all craft using the Port of Hamriyah during 1988**

Country	Origin	Destination	Total
Iran	5825	5967	11792
UAE	783	632	1415
Pakistan	630	668	1298
India	620	525	1145
Bahrain	176	215	391
Somalia	219	56	275
Sri Lanka	67	27	94
Yemen	42	22	64
Kuwait	36	26	62
Oman	40	40	80
Qatar	25	22	47
Saudi Arabia	6	12	18
Maldives	2	2	4
Kenya	1	2	3
Total	8472	8216	16,688

*Source: Dubai Trade Review, 1989.*

The Port of Hamriyah has made less of an impact than have the other ports on the development of trade in the country. Nevertheless, between 1982 and 1987 this port gradually increased its activity, as addressed in Figure 4.11. This development was mainly due to the enormous expansion in regional trade, especially with Iran. Many Iranian businessmen travel to Dubai to buy goods, which they then send, via this port, to Iranian harbours (see Chapter 5).

Figure 4.11 Cargo cleared through the Port of Hamriya from 1980 to 1990.



Source: Trade & Industry Vol.13, 1988; Dubai Statistical File, 1991.

A second reason for the development of the Port of Hamriyah is explained by the distance between Dubai City and its market's location. This port has the advantage of offering the rapid transfer of goods by road, from the market to port itself, which makes for easy handling. The actual distance between the Port of Hamriyah and the CBD is about 2 km., and the easier port procedures compared with other main ports mean that it has become more accessible. In conclusion, it can be said that the sea transport system in Dubai is continuing to develop, thereby increasing the movement of goods locally, regionally and globally, as evidenced by the heavy dependence of trading activity on this vital means of transport; as will seen in the next section.

#### **4.3.2 Air Transport System**

The development of air transport had a major impact on the social aspects of communication between Emirates nationals and nationals of other modernised nations. The transition from a traditional to modern community, brought about by air travel, has been accompanied by many types of modernisation, such as information technology, new materials, access to international newspapers and books, an increase in travel to other countries and so on. Significantly, the development has also led to development of economic activities, not least the sea- air cargo developments to be discussed shortly.

Recently, air transportation has come to dominate the UAE international passenger movement figures, as it accounts for 81.2 per cent of all passenger movements into and out of the state.<sup>(24)</sup> Table 4.7 shows this movement, by the various means of transport, for the transport sectors of the UAE in 1989.

**Table 4.7:**  
**Passengers movement entering and leaving the UAE's transport system**  
**in 1989**

<b>Transport system</b>	<b>Arrivals</b>	<b>Departures</b>	<b>Total</b>
Road transport	299055	299003	598058
Sea transport	80090	79282	159372
Air transport	1657862	1612430	3270292

Source: Annual Statistical Abstract, 1990.

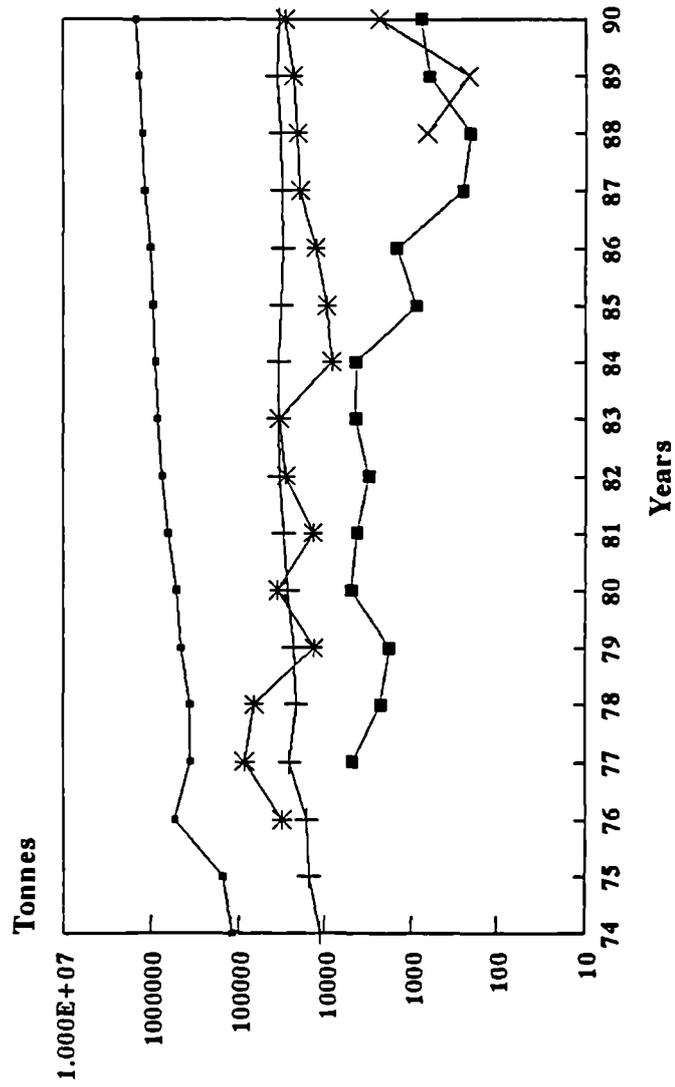
Dubai airport has a very convenient location being 4 km from the City centre and served by a good network of roads, thereby providing easy access to all main centres and not least, the seaports.

Air transportation is crucial when there is need for importing spare parts for speedy repairs to be effected to transportation (or other) machinery whenever they break down. Finally, global passenger travel does warrant speed. There are other factors that have made possible the large increase in air freight, as for instance discussed by Robinson and Bamford (1978):

*"1) freight rates, formerly prohibitively high, have begun to drop; 2) the carrying capacity of aircraft has been greatly increased; and 3) the use of standard type containers which can be handled as easily by aircraft as any other mode of transport."* (25)

Dubai airport has gained significance for commercial movement as a result of two principal factors. Firstly, Dubai's 'open skies' policy, which permits the use of the Dubai airport for international flights between the east and the west, and secondly the rapid growth in handling of freight traffic at Dubai airport, as shown in Figure 4.12, does mean that the commercial companies are preferring to use the Dubai airport amongst those in the UAE.

**Figure 4.12 Cargo movement within Emirates' airports from 1974 to 1990.**



+ Dubai  
 + Abu Dhabi  
 \* Sharjah  
 ■ Ras al Khaimah  
 × Fujairah

Source: Civil Aviation Authorities in UAE, 1990.

### 4.3.3 Sea-air transport

The concept of intermodal transport is based on the assumption that the movement of goods using more than one mode of transport can increase the efficiency and cost effectiveness of the total necessary movement. Intermodalism has been defined as:

*"the arrangement for through transportation, from a shipper to consignee, over the lines of two or more transportation modes and under through-liability, through-billing, and a single through-rate."* (26)

The role of the commercial firms and that of the international commerce bureaux has been enhanced by establishing their offices in Dubai in order to expand their business. These firms are dealing with Far East factories such as in Hong Kong and Taiwan, from whom they buy the goods, and then convey them westward for sale in Europe and in the Americas. This has been made commercially viable by the creation of the sea air transport system through Dubai. The concept of Sea-Air transport combines sea and air transport to achieve reductions in the sea freight time.<sup>(27)</sup>

Sea air transport routes began in the late 1970s. Many freight airlines were carrying general cargo from Europe to the Gulf, and did not wish to return empty to Europe; at the same time sea freight was passing through the Gulf states, such as Dubai and Bahrain, en route for Europe from the Indian sub-continent, discharged some goods such as food, woods and other construction materials. By a process of linking these two together, the goods bound westward by sea went as far as the Gulf, and then planes took over the cargo for the remaining sector of travel.

For this to work efficiently, careful co-ordination between the air and sea ports is crucial, not just in terms of the actual transport links, but especially as regards the paperwork aspects of cargo handling.

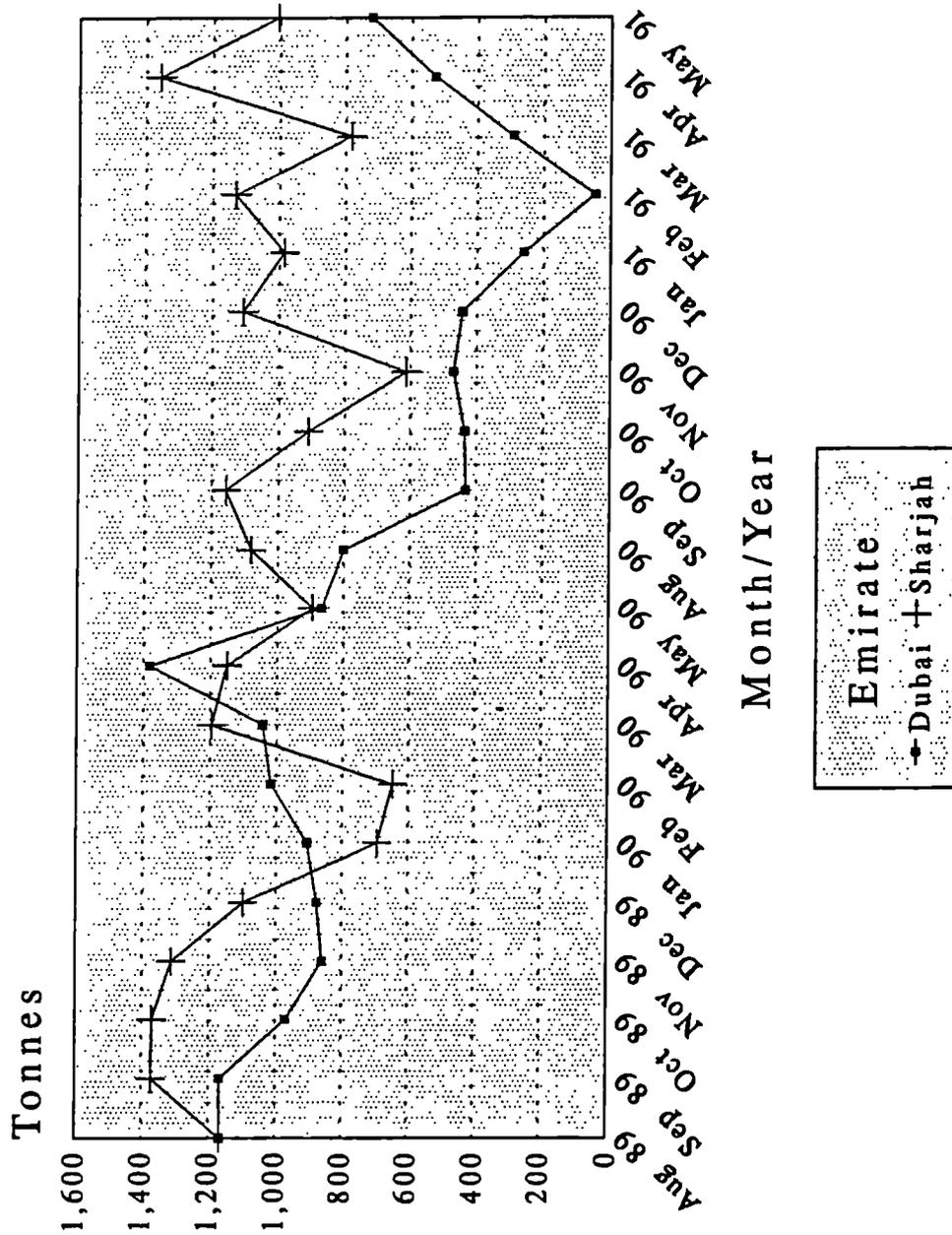
In recent years, the concept of sea-air transport has developed further, with cargo from Asian and Far East locations moving by sea to other ports such as Seattle, San Francisco, Singapore, as well as Dubai for onshipment by air to destinations in Europe, Africa and the Americas. Dubai's role in this transfer trade is now recognised as being that of a global leader and innovator. The policies for the development of sea air transport aim to confirm Dubai as the major centre for this trade. Over the past four years (1986 to 1990), sea air transport has developed fast in Dubai.

The relevant figures for the quantity involved are 8433, 16496, 16881, 17423, 14610 tonnes.

The growth in this system has provided the UAE's airports with new development in addition to the growth of passenger traffic. The main centres for this movement are in Sharjah, Fujairah, and, especially the Emirate of Dubai. Figure 4.13 shows the development of this system in the two emirates which have developed this sector most, indicating that there is strong competition between the two emirates. In addition, Fujairah has gained some benefit from its good location for the vessels which sail between Europe and the Far East. Not only is it strategically 'safer', but cutting out the Strait of Hormuz detour can save up to 72 hours in comparison with Dubai's port.<sup>(28)</sup> That movement may encourage sea-air transport to use Fujairah airport, when it is further developed.

Fujairah's involvement is only as a sea port. Goods using Fujairah port as part of sea-air cargo are transferred to other airports, particularly Abu Dhabi, Sharjah and Doha in Qatar (but noticeably not Dubai) for onward movement.

Figure 4.13 Comparison of the sea-air transport movement using both Dubai and Sharjah, 1989-1991.



Source: Dubai Cargo Village, 1991.

**Table 4.8:**  
**Sea-air volume (tonnes) and routes from the Far East in 1986-1987**

Route	Places	1986	1987
Pacific Route	Vancouver	3,000	5,000
	Seattle	21,000	35,000
	Los Angeles	5,000	12,000
	San Francisco	1,000	2,000
Western Route	Dubai	8,400	20,000
	Sharjah	2,500	5,000
	Fujairah*	3,600	5,000
	Singapore	3,732	4,976
Siberian Route	Vladivostok	5,000	8,000

\* Fujairah: for explanation see text

Source: Sharjah Airport Authority, Sea-Air Cargo Workshop, 1989.

In an interview, the chairman of the Department of Fujairah Civil Aviation said that the sea-air transport through Fujairah is more effective in reducing the cost of Far East imports into Europe.

On the other hand, by using the port of Fujairah, ships carrying goods for Dubai and other western emirate ports, save a lot of transshipment time; for instance to reach Dubai by ship would take a further day and a half, while by truck the same goods takes only an hour and a half.<sup>(29)</sup> Also, Abu Dhabi Airport has attracted some of Dubai's business in the sea-air activity.

During the years of 1989 to 1991, the movement of sea-air transport has changed in volume in Dubai and Sharjah. However, from May 1990 the sea-air movement has risen slightly in Dubai and might be increasing. The official authorities attribute the drop in the rate of growth in Dubai to many factors but the main one is higher shipping

through Dubai airport than Sharjah; and the lack of an actual policy for this business by attracting the freighters through incentive programmes, albeit Sharjah have plans to upgrade their facilities.<sup>(30)</sup>

The most important point with regard to this competition in the sea- air transport system, from a geographical point of view, is that Sharjah, the only one of the seven emirates to possess a continuous stretch of land from the east coast to the west coast, can exploit its significant location on both coasts, with the Port of Khalid on the western coast and Khor Fakkan seaport on the east coast, both of which showed an increase in this system using Sharjah airport by the existing efficient road network. Another factor in this matter is the attractiveness of Sharjah rather than Dubai owing to the higher landing and handling charges in Dubai airport.

From an economic point of view this combined type of transportation is cheaper than by air alone, and is much faster and forms a competitive means of transportation than by sea alone. The increase in use of this system is determined by the relationship between transport-time and cost.

#### **4.3.3.1 Dubai Cargo Village**

The great increase in the sea-air transport, discussed above, has led to the establishment of a facility to accommodate these expanded services within the environs of Dubai airport. In July 1991, Dubai Cargo Village was opened at a cost of US\$ 75 million. The Village, as shown in Figure 4.14, offers covered storage space for 5,300 tonnes; 24,985 sq. metres of bounded ground; 8,300 metres of handling space; 7,800 sq. metres of office space and other accommodation.<sup>(31)</sup>

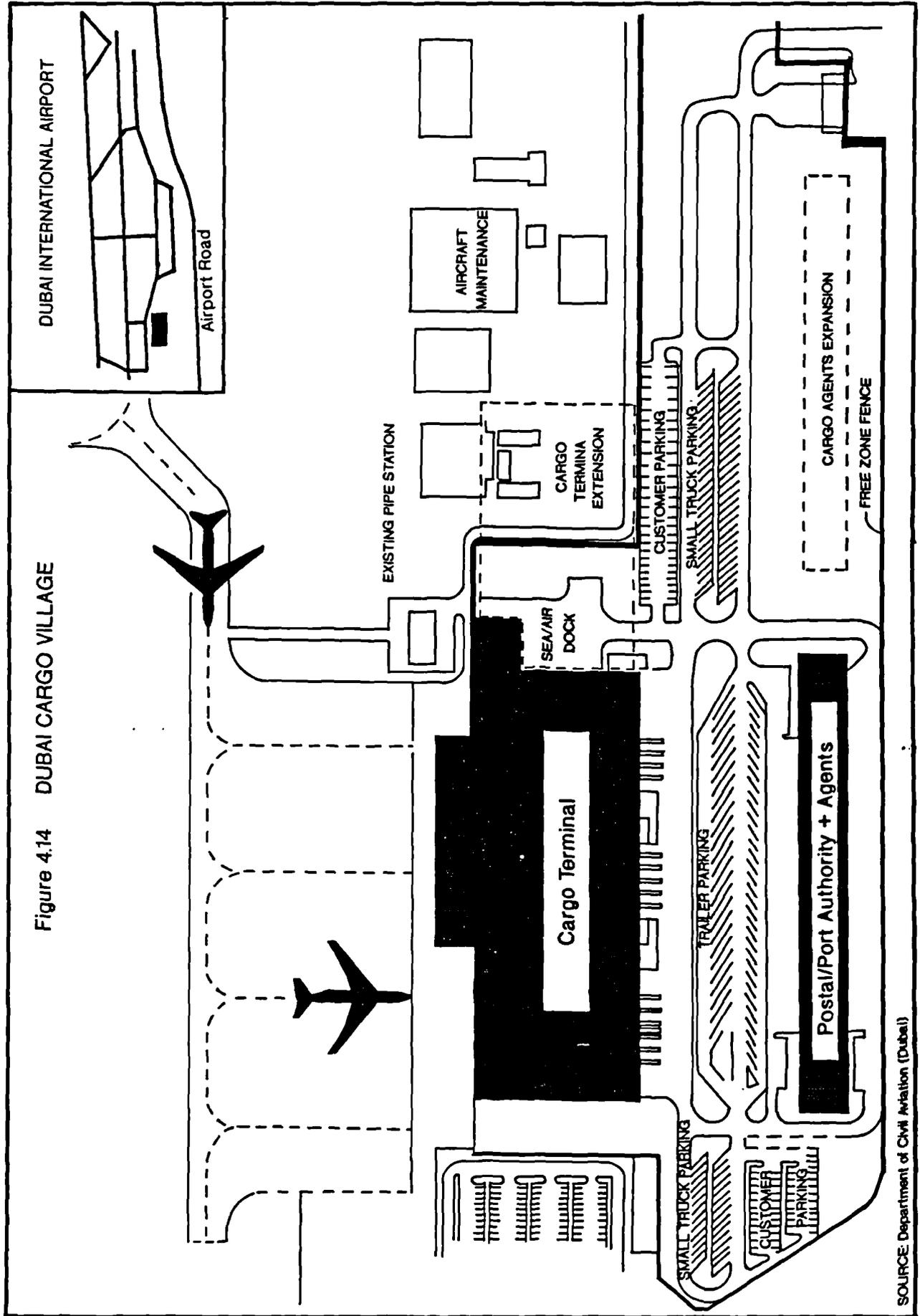


Figure 4.14 DUBAI CARGO VILLAGE

SOURCE: Department of Civil Aviation (Dubai)

These impressive developments in air freight are mainly attributed to the effective road network system which links the ports and the airport. Consequently, a new transport system has been developed by the Dubai Emirate; namely that of the sea-air transport system (see Figure 4.15). In 1990, sea-air transport system occupied 22 per cent of the business of Dubai Cargo Village, and its business is reported to be on the rise. There are three sea-air cargo routes linking Europe and North America and Japan and East Asia, the Pacific Route through Vancouver, Seattle, Los Angeles or San Francisco; the Western Route through Singapore, Dubai, Sharjah or Fujairah; and the Siberian Route via Vladivostok. Of these, the Russian route is seen to have limited potential. Currently, the main competition is therefore between the other two routes, and the rival ports along them. Table 4.9 gives some evidence for comparing their relative advantages.

The development of sea-air transport shows that the UAE, and in particular Dubai, occupies a key position in this system in the Middle East. The locational factor is critical in the development of sea-air transport. By location is meant not only occupying a nodal position, but also functioning effectively as a node; handling goods swiftly and efficiently. Distance affects the delivery of goods, and Table 4.9 below compares Dubai and the West coast of USA in terms of time and cost.



**Table 4.9:**  
**Average of time and cost using sea-air from the Far East to Europe and Africa, 1986-1987**

Country	Destination	via Dubai/Sharjah		via West Coast of USA	
		time (days)	cost \$(kgs.)	time (days)	cost \$(kgs.)
Hong Kong	Europe	17	1.53	17	1.57
Thailand	Europe	17	1.64	17	1.64
Singapore	Europe	16	1.52	17	1.57
Taiwan	Europe	17	1.47	17	1.54
South Korea	Europe	20	1.56	17	1.69
Hong Kong	Africa*	19	2.85	21	3.42
Thailand	Africa	19	2.85	22	3.30
Singapore	Africa	17	2.71	22	3.50
Taiwan	Africa	18	2.75	22	2.44
South Korea	Africa	21	2.73	21	3.40

\* Average of east and west coast destinations.

Source: Sharjah Airport Authority, Sea Air Cargo Workshop, 1989.

Table 4.9 shows the significance of the strategic location of Dubai and Sharjah in the movement of goods to Europe. There is competition in this business from the east for this system of transport for Dubai (UAE). This has meant that there is a continuing commercial struggle to establish this business in the area and make it a significant global centre for this system of transport. As a generalised explanation, the European destination are commercially attractive because of savings of distance; the African destinations are commercially attractive because of savings due to inadequate port facilities.

For instance, whilst there may be only marginal apparent advantages for the UAE over the rival centres on certain trade routes, the case of goods produced in the Far East and destined for Africa shows that Dubai and Sharjah can have enormous cost advantages over such possible alternatives as the West Coast of North America.

Factors influencing the development and growth of sea-air transport in Dubai include the following:

1. The geographical location of Dubai as a transit point. Dubai lies on international trade routes and is located at a point intermediate between the production centres of the Far East of Asia, and the markets of Europe and the Americas.
2. The technical skills of cargo agents in handling and shipping the goods efficiently to the airports and seaports, and the high technological level of transport facilities employed.
3. The commercial environment, which affects the easy accessibility to the transport departments and the offices concerned in this business to minimise the time needed for cargo shipment procedures.
4. Quality transport infrastructure provided by the local road and the vehicles employed.<sup>(32)</sup>

Container trucks ply between the Port of Rashid and Dubai airport. Containerisation is integrated into the intermodal system. The Port of Rashid has six container freight stations, which give priority to sea-air transport containers.<sup>(33)</sup>

Thus, sea-air transport has had an immense impact on the economic development of Dubai and the UAE. Dubai has achieved global recognition as a world node for sea-air transport, and it might develop further to become a second transit point after Seattle in USA.

The development of sea-air transport has helped improve some of the spatial aspects of Dubai's infrastructure, for example the transport sectors have enjoyed considerable expansion, technological development and new storage facilities to cope with the great increase in trading activity in the Port of Rashid. Another area of impact is seen in the increase in the number of cargo agents in Dubai and in other cities of the Emirates to facilitate the movement of goods to and from the emirate.

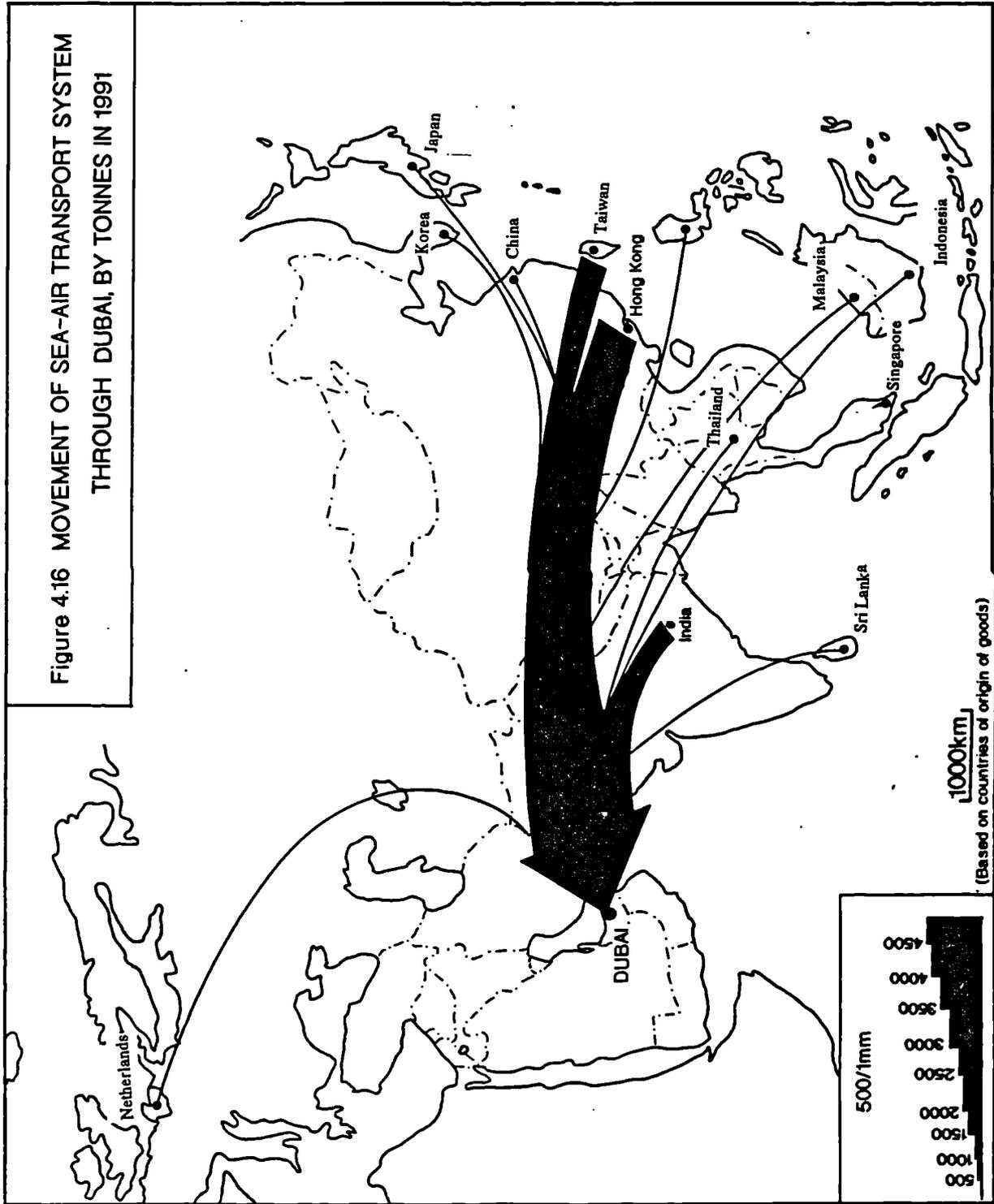
The major source countries which used this system through Dubai in 1991 are shown in Figure 4.16: Hong Kong, 37.9 per cent (4,339 tonnes); Taiwan, 24.4 per cent (2,790 tonnes) and India, 18 per cent (2,064 tonnes) dominated, with all other countries contributing just under 20% of the total.<sup>(34)</sup>

On the negative side, the increase in economic activity has led to problems such as greater traffic congestion, especially between the CBD and the airport (Al Maktoum Road to Airport Road). Much of the recent impact on the transport system is associated with the development of the Cargo Village, and is particularly caused by air freight container trucks distributing goods from the airport to other regions. Other negative consequences have developed along with this system due to its growth within Dubai City. The proximity of the air and sea ports to Dubai has led to the emergence of environmental problems such as air pollution, noise pollution, overcrowding and other associated problems. These aspects must be closely studied in order to seek appropriate solutions that could help solve the hazards.

#### **4.4 Conclusion**

There is a close relationship between economic development and the expansion of the international transport system in Dubai. There are indicators which established the relationship between the transport system and some of the economic activity, such as commerce and industry, rather than agricultural activity.

Figure 4.16 MOVEMENT OF SEA-AIR TRANSPORT SYSTEM THROUGH DUBAI, BY TONNES IN 1991



The above analysis centres around the importance of air and sea transportation in respect of the economic development of Dubai. The main revelations are that the development of transportation through the Emirate of Dubai has created new systems in the movement of goods, which are determined by the intermodal system. The inter-accessibility between the three transport systems has permitted the development of the sea-air transport system linked by the roads. This development has led indirectly to the improvement in the operation of ports in the system such as the Port of Rashid and the airport of Dubai, which led to the establishment of the Dubai Cargo Village.

In the UAE there is real competition in the sea-air transport system between Dubai and Sharjah emirates, in addition to which Fujairah is becoming increasingly important in this system. That has led to an increase in the activity of this system within each of the seaports and airports of the UAE. The question remains as to whether each of the ports involved in the development of trade is acting as part of the overall strategy of the UAE, or is acting in the interests of the individual emirate. Whether these two interests can be the same or are in potential conflict with each other is not yet resolved.

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## Chapter Five

# The relationship between commercial activity and the transport systems of Dubai

### 5.1 Introduction

The basic aim of this chapter is not to look at how manufacturing and commerce in general have stimulated or been stimulated by the internal transport system of Dubai, but specifically to consider the way in which Dubai's declared policy of international commercial orientation has been integrated with the transport developments, both road and port, of the Emirate. An analysis is offered of the linkages between commercial activities<sup>(1)</sup> in Dubai and the evolution of the internationally-oriented transport systems of the Emirate.

This impact is revealed by analysis of secondary data and by fieldwork findings. The fieldwork concentrated on the use of the transport system by commercial establishments within Dubai Emirate. The fieldwork was also intended to account for the prevailing patterns of commodity distribution and the spatial links between commercial firms in respect of their relative location. It has previously been hypothesised that the transport factors which influence commercial activity in Dubai depend on the location of the commercial firms. The interpretation of the results of fieldwork can expose the significance of the transport system in import and export activities.

As mentioned in earlier chapters, Dubai-based businesses have long been involved with the movement of goods through the market of Dubai. Facilitating this has been a local and external transport system. This chapter examines the importance that firms place on the transport element for their various activities, and the extent to which the transport systems in Dubai are sufficient for them.

## **5.2 Survey methods**

The fieldwork was conducted with commercial firms in Dubai Emirate. The firms chosen cover a variety of trade activities, dealing with goods such as foodstuffs, spare parts and machinery, furniture, building materials and textiles. The main objective of this survey was to find out to what extent commercial firms use the transport system in their commercial activity in Dubai, and the manner in which transport affects commercial activity in Dubai Emirate as a trade centre in the UAE. The survey was mainly carried out by using a questionnaire which, despite the sample of relatively small size, was arranged on a basis of stratification by both economic activity and national ownership. In the United States a small sample size was used to examine the role of highways to the local markets: Connally (1968) examined 54 commercial firms and used a ranking method in her study. Other sources of information were also utilised during the distribution of questionnaires. Interviews were also conducted with businessmen of the different nationalities involved in the commercial life of Dubai. Other sources were used to update data related to transport movement.

### **5.2.1 The questionnaire**

The bulk of the information employed in this chapter was collected by means of a questionnaire (see Appendix) distributed to commercial firms. This questionnaire consisted of 11 questions. The questions were worded to make it easy for the respondents to understand the questions and to answer clearly. There was also the opportunity for the respondent to add any relevant information.

The questionnaire was initially tested on some businessmen in the UAE, and on some colleagues in the University of UAE. Their comments led to the amendment of some questions before the wider distribution of the questionnaire to firms in Dubai.

The details requested were: type of commercial activity, ownership of establishment, nationality, the factors which affected the location of the commercial firm, annual expenditure, the type of transport system mostly used by the firm for imports and exports giving reasons, goods distribution in each area of Dubai, goods distribution from Dubai to the other Emirates, goods distribution from Dubai to other countries of the Gulf region, number of commercial vehicles operated by the firm, by what type of vehicle goods are distributed, transport problems faced by the firm, the extent to which the development of transport in Dubai has helped the firm, and lastly the firm's use of other Emirates' transport systems. The period over which this survey was carried out was August to November 1991.

### **5.2.2 The sample**

The firms approached for this study were drawn from commercial companies operating in Dubai Emirate, the full details being supplied by the Dubai Chamber of Commerce and Industry (DCCI). Of the 120 companies approached, 61 gave a fully usable response.

The principal purpose of statistical methods in empirical research is to obtain information about a large class of persons (or other statistical units) from a relatively small number (a sample) of subjects. The selected companies comprised a sample, and the group is referred to as the 'population' which in this case represents businesses in Dubai Emirate. However, it was not possible to obtain a strictly stratified random sample, which would be essential for making highly controlled generalisations. Several problems prevented the possibility of collecting a larger and more fully representative sample of commercial firms in Dubai Emirate. First, cost. Collecting a representative sample needs not only considerable financial support, but a level of team-work associated with an agency, thus putting it out of reach for one person. Second, target group characteristics. Many companies under study were unused to

any kind of investigation, and considered the questions asked an intrusion into their affairs. Blaming a lack of time, or the questionnaire, in order to avoid responding, 59 firms politely refused to co-operate. Third, inaccurate DCCI records. Many of the businesses for which details were supplied by the DCCI had either closed or been closed, or else had moved to a new address.

The sampling procedure involved two control stratifications. Of approximately 21,000 firms registered with the DCCI (1991), just over 7,000 satisfied the size criteria, namely a minimum of 10 employees and 100,000 Dirhams (£16k) capital. From these 7,003 a proportional random sample of 120 stratified by activity and nationality was selected.

**Table 5.1**  
**Distribution of the target population and response population**  
**according to the types of firms.\***

Type of commercial activity	Firms		Response firms	
	No.	%	No.	%
Foodstuffs	675	9.64	12	19.67
Furniture	968	13.82	8	13.11
Stationery and printing	520	7.43	3	4.93
Spare parts	1320	18.84	12	19.67
Building materials	1600	22.84	10	16.39
Textiles	424	6.05	6	9.84
Others	1496	21.36	10	16.39
<b>Total</b>	<b>7003</b>	<b>100.00</b>	<b>61</b>	<b>100.00</b>
* Firms with 10 and more employees are involved here.				

Source: DCCI, Dubai; Fieldwork, 1991.

**Table 5.2**  
**National ownership of firm, by type of trade activity.**

Nationality	Foodstuffs	Furniture	Stationery and printing	Spare parts/ Machinery	Buld. Materials	Textiles	Others	Total
Emirates	4	7	2	6	6	0	6	31
AGCC	2	0	0	0	2	0	1	5
Arab non AGCC	1	0	1	0	0	0	0	2
Iranian	1	1	0	1	0	0	1	4
Indian	2	0	0	1	1	5	1	10
Others Asian	1	0	0	1	0	0	1	3
Others	1	0	0	3	1	1	0	6
<b>TOTAL</b>	<b>12</b>	<b>8</b>	<b>3</b>	<b>12</b>	<b>10</b>	<b>6</b>	<b>10</b>	<b>61</b>

Source: Fieldwork, 1991.

Thus the computer analysis was therefore based on the completed sample of only 61.

### 5.2.3 The reliability of the questionnaire

Reliability can be defined as the level of internal consistency or stability of the measuring device over time. Reliability coefficients were used to examine the sample in order to discover how representative it was (Silk, J. 1979). The firms tested by the reliability coefficients showed an alpha value of 0.7855, and are therefore considered significantly reliable.

### 5.2.4 Data analysis statistical procedures

After collection, each item in each booklet was coded and scored using a system described below in this chapter. A computer program was used: the Statistical Package of Social Sciences (SPSS), one of the facilities used for most of the analyses.

Where statistical analysis involves differences between more than two matched conditions drawn from the same population with at least an ordinal scale the Fried-

man Two-way Analysis of Variance by Rank was used, along with Kendall's Coefficient of rank correlation. These tests were used in many places of the questionnaire. The Kendall test was applied to the ranking of factors which affects the location of commercial firms. The Friedman rank test was used to rank the distribution of goods which are destined from the commercial firms to particular areas such as areas of Dubai, cities of other Emirates, and neighbouring countries. Other forms of statistical analysis were used in order to produce frequency tables, cross-tabulation and correlation.

### **5.3 Impact of spatial aspects on the location of commercial establishments in Dubai**

A major factor which firms consider before establishing new premises or plant is where to locate. The factors behind this decision can be broken down into such components as:

1. proximity to primary and secondary markets;
2. access to road network;
3. access to port facilities (air, sea);
4. proximity to an industrial area;
5. proximity to residential areas;
6. availability and cost of land to rent;
7. availability, training and cost of labour;
8. availability of, and proximity to, (local) raw materials.

The purpose of this section is to measure the impact of transport considerations on commercial firm's location within Dubai. A study was carried out (fieldwork, 1991) to examine the general significance of different elements relating to the location of 61 commercial firms in Dubai, and to show that location of firms is primarily

dependent on the location of their market. The study demonstrated the importance of a modern internal and external transport system to the economic activity of Dubai Emirate.

The significance of locational factors has been classified by a numerical ranking of the factors, with 1 indicating the least important factor, and 8 indicating the most important factor.

Table 5.3 shows the ranking of factors which have affected the location of the surveyed commercial establishments in Dubai Emirate.

**Table 5.3**  
**Factors which are effects on the location of the commercial companies in Dubai.**

Factor	Mean Rank	M	Sum	Sig.	Rank
1. Proximity to market	6.73	8	411.0	0.000	1
2. Proximity to main road	6.30	8	378.0		2
3. Proximity to the port	4.72	6	275.0		3
4. Proximity to industrial areas	4.10	5	232.0		4
5. Proximity to residential areas	4.00	4	226.0		5
6. Relating to the land rents	3.96	5	226.0		6
7. Availability of labour	3.36	3	184.0		7
8. Proximity to raw material	2.83	2	154.0		8
Key: M: Mode; Sig: Significance.					

Source: Fieldwork, 1991.

The Kendall Coefficient test shows statistically significant differences between these factors and their impact on the location of commercial companies. Mean rankings indicate that the reported most important factors are proximity to market (6.73), followed by proximity to trunk road links (6.30), then proximity to a port (4.72). The least important factor affecting the location of a company by a significant margin is proximity to raw materials, with labour availability, given its generally even availability, also scoring very low.

Decision-makers priorities are the various factors relating to location, and are fundamentally concerned with the location of the markets, which is where goods and commodities are gathered.

### **5.3.1 Market factor**

The term market has at least two distinct meanings.<sup>(2)</sup> There is an economic concept which is related to the process of exchange, not necessarily taking place at a defined location. There is also the physical market which often indicates the type of trading within the area of the market, such as textiles, food and gold. This study focuses on both concepts. The general concept of market was investigated with the commercial firms. Details were supplied about the importance of the market in their activities.

Businesses are located throughout Dubai. This is a consequence of inevitable variance amongst firms in terms of their evaluation of a location's particular attraction, plus the element of inertia which makes firms stay put rather than relocating as soon as circumstances change. Many businesses are located in the Central Business District (CBD). There are also businesses scattered elsewhere in Dubai, in residential and in industrial areas. The road network plays an essential role in their commercial activity.

In Dubai CBD there are more than five types of (physical) market, each of which is distinguished by the concentration in the type of goods. Figure 5.1 shows types of economic activity and the location of these markets which are concentrated in and around Dubai CBD. Commercial activity is greater in Deira CBD than in Dubai CBD, a consequence of the former importance of economic activity in Deira.

A CBD is identified as 'the most accessible part of the urban system, at the focal point of the transport network'.<sup>(3)</sup> Dubai CBD, located on two sites (Deira and Bur Dubai) occupies nearly 5.5 per cent of the urban land area of Dubai city.<sup>(4)</sup> From the economic point of view the CBD is a recognisably significant part for economic development in Dubai:

*"The CBD is a major economic force in the Emirate. In 1985 it accounted for almost 40 per cent of all job positions. Four economic sectors which are prevalent in the CBD - trade, transport, finance and services - employed 75.2 per cent of the Emirate labour force."*<sup>(5)</sup>

There are three major economic sectors in Dubai CBD:

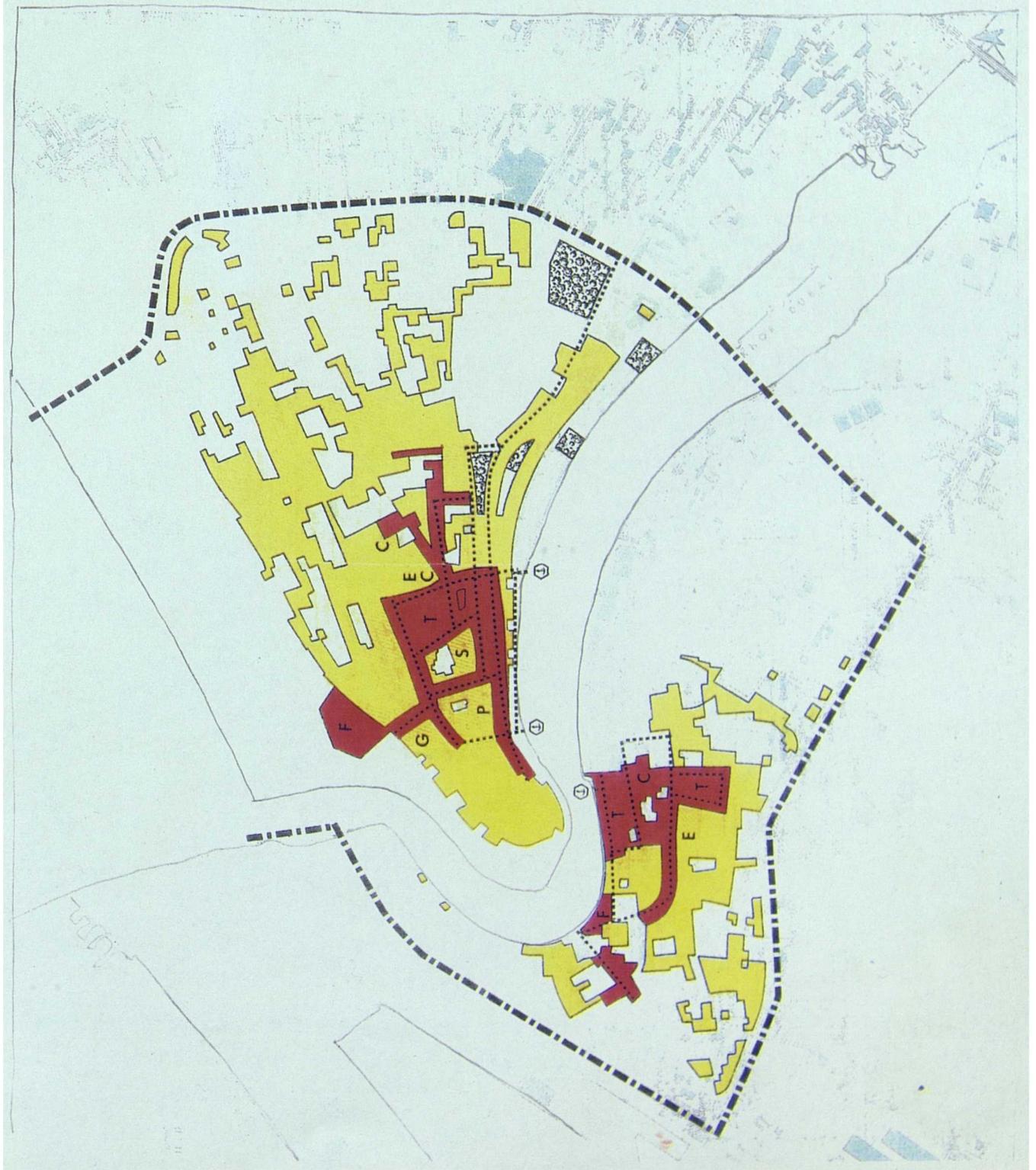
- 1) finance and commercial;
- 2) wholesale and;
- 3) retail markets.

These are all located at the heart of the CBD. There are also businesses in other areas of the city. Retail and wholesale can be found concentrated in particular areas, such as on the Dubai- Sharjah road; in Al Maktoum Street on the Deira side of the city, and in the Bu Hail area which represents a commercial area second to the CBD.

Fig. 5.1

# أنماط مختارة لاستعمالات الاراضي والأنشطة في ١٩٨٥م

## SELECTED LAND USE AND ACTIVITY PATTERNS, 1985



Residential / Commercial	سكني / تجاري
Recreational	ترفيهي
Soups and Markets	سوق
Pedestrian Paths	مسار مشاة
Abra Crossings	مسير سيارات
Food Market	سوق مواد غذائية
Gold Souq	سوق ذهب
Perfumes Souq	سوق طيارة
Spices Souq	سوق قارول
Textiles Souq	سوق منسوجات
Electronics Market	سوق أجهزة الكترونية
Clothes and Shoes Market	سوق الية وأحذية
CBD Boundary	حد منطقة الأعمال المركزية

### 5.3.2 Road factor

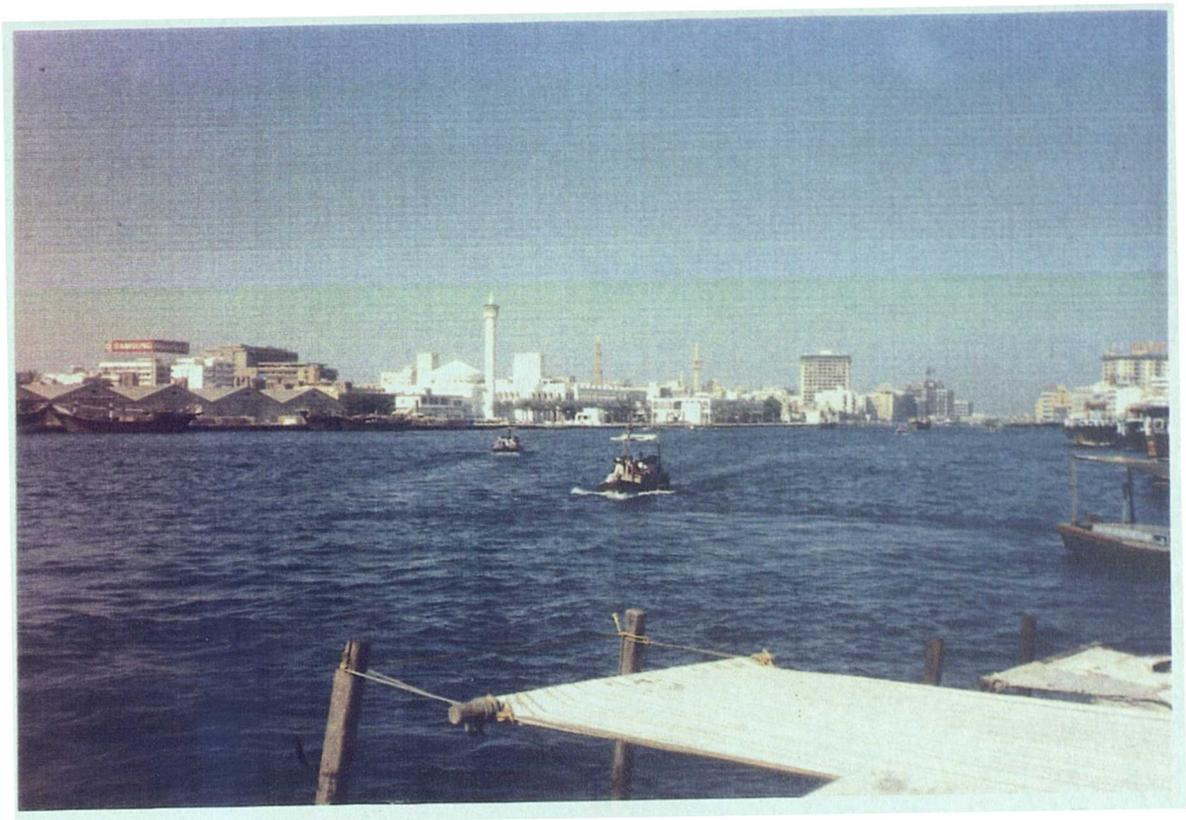
Table 5.3 shows that respondents ranked proximity to a main road second, indicating the importance placed on accessibility by commercial companies, in terms of movement of goods to other places. Were access to customers poor, business would be harmed. The selection of road access as an important factor is related to the policy and the activity of firms as shown below in this chapter.

The road network into the CBD incorporates links from both sides of Dubai Emirate: by Al Maktoum Bridge and Shandagah Tunnel. In addition, local small boats (*Abra*) traditionally operate between Bur Dubai and Deira (as seen in Figure 5.2). As a result of an increase in the commercial and services activity, the CBD has suffered from increasing traffic congestion and lack of parking space (see Chapter 8).

According to a survey (DHC, 1991) regarding *Abra* movement, the total number of passengers using *Abra* transport services on the survey day was 43,000. The most common trip purpose was 'home-based other trips' (38%), followed closely by 'home-based work trips' (37%).

Of *Abra* passengers, 83% are of Asian nationality, and fewer than 7% are Emirates nationals or other Gulf Arabs.

The problem of congestion is exacerbated by the high rate of urban trips involving the CBD, recorded as 16 per cent of the total urban daily trips of urban Dubai.<sup>(6)</sup> Figure 5.3 shows the trips generated in the CBD zones, in which work-related trips figured highest.



*Fig. 5.2 The traditional local small boats Abra ply between Diera and Bur Dubai.*





### **5.3.3 Ports factor**

The massive development of Dubai's sea ports has benefited the commercial sector. Given that the commercial sector is dominated by private investment, which has to see clear evidence of sound financial returns before deciding on new locations, this sector, especially when it involves foreign firms, is very conscious of the beneficial locational facilities which Dubai offer. Considerable evidence exists that this kind of market research is undertaken before selecting Dubai as a base.

Proximity to port ranked third overall in importance for the location of a commercial company. The ports here relate to Dubai's ports: Rashid Port, Jebel Ali Port, Hamriyah Port and the Creek. The old Creek port has, as a result of all the developments, been much affected, because historically the Creek, as a natural harbour for the traditional boats which ply between Dubai and other parts of the Gulf, was a major factor in the development of the re-export trade in Dubai. Both Port of Rashid and Port of Jebel Ali, but especially Port of Rashid, were constructed as a planned integrated part of a complex modern transport infrastructure; neither existed without good road communications.

This illustrates again Dubai's realisation that the income to be derived from a successful commercial harbour is dependent on the excellence of that harbour's linkages, not just by sea but with its land hinterland. That land hinterland can be expanded by good use of the feeder road network. This is true for both of these ports, but especially for Rashid Port which is intended to serve the needs of Dubai and the Emirates primarily. Jebel Ali Port is somewhat different, having been created as a 'stand alone' free trade zone.

### **5.3.4 Other locational factors**

Other factors affect the location of commercial companies, albeit to a lesser degree than the market or transport factors. These include: proximity to industrial and residential areas, availability and cost of land to rent, availability of labour and proximity to raw materials. The level of significance attached to these factors obviously varied. Proximity to industrial areas stands out, as it can be considered a commercial part of the market. Availability of labour was regarded as being of little importance because of the ready availability of employees in Dubai, making labour an easily and widely available, cheap commodity.

The relative proportions of annual expenditure can be taken as another indicator identifying the importance of the transport factor to commercial firms (Table 5.4). It was impossible to obtain an absolute value for business expenditure on rent, and this has been estimated on the basis of local knowledge of ground, etc. rent cost, as a percentage of annual expenditure. Rent is the greatest component of the annual expenditure of commercial firms, particularly on the estates located near and in the CBD area. Between 26 per cent and 50 per cent of total expenditure goes on shop rents. Transport expenses are determined by fuel, vehicle and transport charges, and account for around 20 per cent of annual expenditure.

**Table 5.4**  
**Annual expenditure of Commercial Firms in Dubai in 1991.**

Expenses	Mean Rank	Rank
Rents	3.77	1
Labour	3.75	2
Transport	2.79	3
Other Expenses	2.68	4
Utilities *	2.01	5
Key: 1. Less than 10 % of annual expenditure. 2. 11 - 25 % of annual expenditure 3. 26 - 50 % of annual expenditure 4. 51 - 75 % of annual expenditure 5. More than 75 % of annual expenditure * i.e Electric, water, telephones.		

Source: Field work, 1991.

Some types of business, such as retail, may be small in size and are located in residential areas, far from the city centre, in order to serve these areas. Large companies may depend on the use of industrial land on the fringe of the urban area.

Thus, the location of commercial firms is more affected by the market and transport system than by others factors. Consequently this leads to an increase in the density of a commercial firm's activity in the market, which is mostly in Dubai CBD.

#### **5.4 The nationality and the location of commercial firms**

In order to examine the importance of the transport system within the factors which affected the location of commercial firms, the nationality factor indicates that some significance can be attached to differences between them.

Table 5.5 details these differences for the factors of road, market and port. Greatest importance relates to numbers 6 to 8, and least importance to numbers 1 to 3; meaning that ranking levels 4 and 5 (not shown) were used for 'medium' importance.

**Table 5.5**  
**Nationality and patterns in the importance of road, market and port to the location of commercial firm, by percentages.**

Nationality	Road (6-8)	Road (1-3)	Market (6-8)	Market (1-3)	Port (6-8)	Port (1-3)
Emirates	83.9	6.5	87	12.9	60.7	28.6
AGCC*	100	0	100	0	60	40
Arab non-AGCC	0	0	100	0	100	0
Iranian	25	75	50	50	50	25
Indian	88.9	11.1	100	0	40	20
Others Asian	100	0	100	0	50	0
Others	83.3	0	83.3	16.7	16.7	16.7
Total of number of cases, by %	77 %	8.2 %	88.5 %	11.5 %	22.9 %	22.9 %
* Arab firm from Gulf Co-operation Council countries.						

Source: Fieldwork, 1991.

The market factor is considered the most important factor in the location of commercial firms in Dubai. In terms of the firm's nationality, all firms from GCC countries, Arab firms from non-GCC countries, Indian firms, and firms from other Asian countries, such as Pakistan and the Philippines, chose the market as a more important factor than road or port.

The importance of the road network as one element of the transport system has also been considered from the nationality point of view. All the GCC firms selected the road as a very important factor, with only 60 per cent of them regarding the port factor

as of similar importance. This is because their commercial activity depends on relations with other immediately neighbouring countries such as Saudi Arabia, Kuwait, Bahrain and Qatar to which sea transport is relatively slow. Road transport is used more than the sea ports for exporting goods to those countries. In summary, for Gulf businesses, transport factors (port, road) are more significant for their commercial activity than the market factor.

Among the four Iranian businesses which replied, more importance is attached to port and market than to road, which suggests that their high level of activity in exporting goods to Iran makes use of sea transport. This use of sea transport results from the geographical relationship of the two countries. It takes less than a day to reach the other coast (whereas the land journey is slow and hazardous).

With the exception of the Iranian users, variation in the use of the transport system did not really vary with nationality. Such variation depended more on the type of commercial activity, such as foodstuffs or spare parts, and their relationship with customers. The road is considered significant to the development of their business, but proximity to the port is not an important factor in their activity.

## **5.5 Trade activity and the location of commercial firms**

The commercial firms operate in a wide variety of trades, from foodstuffs to furniture. These different trades depend on locational factors such as road, market and port to different degrees. Table 5.6 shows that significant differences in importance are placed on each of these factors.

**Table 5.6**

**Trade activity and patterns in the importance of road, market and port to the location of commercial firm, (by percentage).**

Trade activity	Road (6-8)	Road (1-3)	Market (6-8)	Market (1-3)	Port (6-8)	Port (1-3)
Foodstuffs	66.7	16.7	83.3	16.7	75	16.7
Furniture	87.5	12.5	75	25	57.1	28.6
Stationery/printing	100	0	100	0	50	50
Spare parts/ Machinery	90.9	9.1	83.3	16.7	45.5	27.3
Building materials	100	0	100	0	44.4	22.2
Textiles	80	20	100	0	16.7	16.7
Others	60	10	90	0	55.6	33.3
Total of number of cases, by %	77	8.2	90.2	9.8	47.5	22.9

Source: Fieldwork, 1991.

Examination of the trade activities of the commercial firms shows that 87.5 per cent of furniture firms in Dubai chose the road as a most important factor. Their choice may be due to the type of trade, being distinguished by the bulky size of its goods, and the weight of its materials, needing roads with good access in order to deliver these materials by pick-up vehicles to the clients.

A market place in use is normally crowded with people and goods, and consequently experiences traffic congestion. In response, these firms are mostly located on the main roads of Dubai, such as the Sharjah-Dubai Road in Deira, and the Za'abeel Road in Bur Dubai, well away from the CBD areas, as is now common in most cities of many countries.

Of the building materials and stationery firms represented, all of them considered both the market and road access to be very important for their business activity. This

can be seen as a combined accessibility factor: being in the centre of city, this is where people from all parts of the urban area gather to obtain their commodities.

The textile trade in Dubai is very active. The most popular location for this trade is the market of Bur Dubai and Deira where there is a complex of shops selling materials. This trade reflects the success of business in general in Dubai. UAE women in particular, but women of other nationalities as well, buy much material. This has boosted trade, and as a consequence there has been rapid growth in the number of dressmakers shops.

Of these firms, all considered the market a very important factor in their activity. Their businesses are concentrated in the Souk, and more precisely in the centre of the CBDs of Dubai. This type of trade is mostly run by Indian people, historically famous textile merchants. Roads are important, but to lesser degree: just two-thirds have attached great importance to road access.

Table 5.6 shows that the transport factors which affect the location of commercial firms differ from one activity to another. From the point of view of importance, transport factors attracted 77 per cent for roads, and 47.5 per cent for the port. Consequently, the transport factors occupied second level in the commercial activity in Dubai, and as a complementary factor for the distribution of goods.

## **5.6 Commercial firms and the imports and exports through the transport system of Dubai**

The movement of imports and exports through the transport system is based on the development of economic activity of the country. In Dubai Emirate, foreign trade has rapidly increased as a result of oil revenue and the development of commercial activity since the establishment of the UAE in 1971. Improvements in economic policies, such as the establishment of new roads linking major centres of the economic

sector, i.e. Jabel Ali road which links Dubai City with the industrial area of Jabel Ali, have also permitted the trade sector to expand.

These political and economic developments have led to an increase in commercial activity within Dubai Emirate. This can be demonstrated in the growth in the number of wholesale and retail establishments from 6,361 in 1980 to 8,360 in 1985.<sup>(7)</sup>

Figure 5.4 shows the differences in use of the transport system by commercial firms in Dubai which depend for their activity on the import and export of goods. Sea transport predominates (Rashid, Jebel Ali, Hamriyah, and Creek ports) over other systems. Sea transport, a dominant system in the import trade, was used by 54 firms of the sample in Dubai. This is attributable to a number of reasons, in particular low unit cost, and low transport costs by the various general transport companies operating between the ports and the sites of the firms. Road and air transport attract a smaller proportion of importing activities.

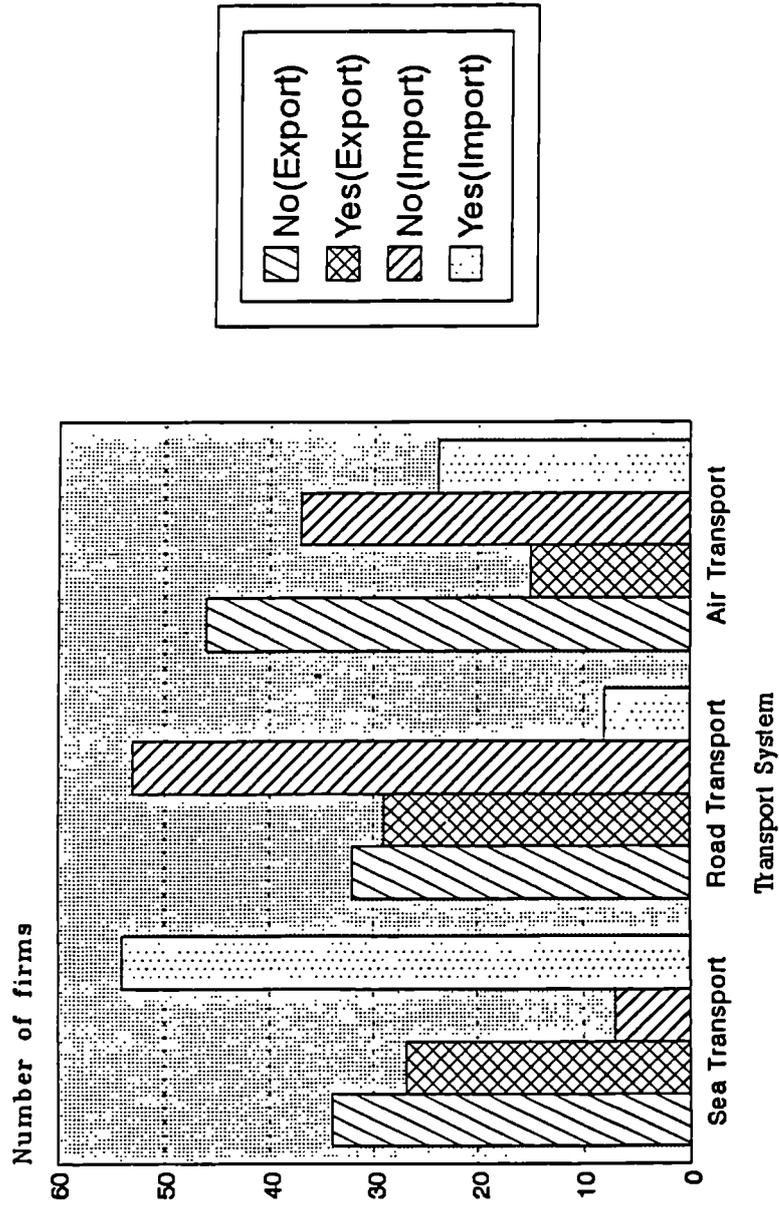
Table 5.7 shows some significant indicators relating to the reasons given by commercial firms for using the Dubai transport system.

**Table 5.7**  
**Stated reasons for different transport methods used by commercial firms in Dubai, by percentage**

Transport system		Cheapness	Speed	Safety	Others
Sea	Export	81.5	0	0	18.5
	Import	71.7	0	5.7	22.7
Road	Export	39.3	28.6	3.6	28.6
	Import	50	25	12.5	12.5
Air	Export	16.7	80	0	13.3
	Import	41.7	87.5	0	8.3

Source: Fieldwork, 1991.

Figure 5.4 The use of the transport system by the commercial companies in their exports and imports in Dubai Emirate in 1991.



Source: Feildwork, 1991.

Firms in Dubai involved in importing and exporting use different parts of the transport system for various reasons. Sea transport, being the cheapest, is used for this reason by over 70 per cent of firms. Road transport tends to be used for speed, but also because it is cheap.

Together, road transport fleets and the road network link all the Emirates with neighbouring countries. Of firms which used road transport for export, 28.6 per cent mentioned other reasons for doing so, mainly emphasising the 'efficiency' of the road network as a positive factor. Air transport is usually used by firms needing fast transport for high value or perishable goods, but Dubai has concentrated much effort on expanding this sector so that it is no longer the sector used just by these high value commodities.

## **5.7 Nationality of commercial firms and the use of the transport system**

The transport system in Dubai Emirate is used by commercial firms of different nationalities in different ways. This results from the differences in the type of economic activity performed by each nationality group, and in particular their commercial relationship with other countries and customers.

Table 5.8 shows that 83.9 per cent of commercial firms owned by UAE nationals import their goods by sea. This compares with 25.8 per cent of commercial firms owned by UAE nationals which export their goods by sea. Local firms tend to distribute their goods within the UAE local market, rather than to the Gulf regional market.

Firms based in Dubai Emirate and owned by Gulf Co-operation Council (GCC) nationals, or by Arabs of non-GCC countries, tend to use the sea and road transport when exporting and importing their commodities. All of these firms import some or most of their goods using the seaports; all of them export some or most of their goods by road, and many use at least two of the three methods of movement.

**Table 5.8**  
**Proportion of firms, by nationality group, which make use of sea, road,**  
**and air transport in their import and export structure**

Transport		Emirates	AGCC	Arab non AGCC	Iranian	Indian	Others Asian	Others
Sea	E	25.8	80.8	0.00	75.0	60.0	100.0	50.0
	I	83.9	100.0	100.0	75.0	90.0	100.0	100.0
Road	E	29.0	100.0	100.0	25.0	60.0	100.0	50.0
	I	12.9	0.00	50.0	0.00	20.0	0.00	16.7
Air	E	12.9	20.0	50.0	50.0	50.0	0.00	33.3
	I	32.3	40.0	100.0	25.0	40.0	33.3	66.7
Key: E: Exports; I: Imports								

Source: Fieldwork, 1991.

The commercial relationship the UAE enjoys with Iran has always been strong. During and after the Iran-Iraq War, Iran was, and remains, dependent on Dubai for importing many goods. Iranian businessmen and Iranian commercial firms have always done business in Dubai.<sup>(8)</sup> The political atmosphere between these two countries during the 1980s increased the economic and commercial activities. This remained the case during the Gulf War. As Iran has moved toward more liberal policies in economic and commercial affairs, there has been a corresponding expansion of development with Dubai and with the UAE. The movement of exported goods from Dubai to Iran may increase as a result of the break up of the Soviet Union and the creation of the new Islamic republics to the south of Russia. Iran may play a mediating role between these new republics, with Dubai as a nominated re-export point.<sup>(9)</sup>

Sea and air transport have, therefore, been dominant systems in their commercial activity. Scheduled ships ply between Dubai and Iranian harbours. Sea transport is used by three of the four Iranian- owned firms for exports, and air transport by two of them. The latter tends to focus on high value goods such as electronics, computers and scientific equipment. During 1990, for instance, there were four flights a day from Iran to Dubai.

Air transport accounts for more imports than export for all nationalities. In particular, non-GCC Arab firms tend to use air transport to import their goods, probably explained by their concentration in the foodstuffs sector.

In conclusion, sea transport was used by all nationalities, albeit in different proportions. Other systems are also used for import and export activity, but not to the same extent as sea transport.

## **5.8 Types of trade activity and use of the transport system in Dubai**

The importance of Dubai as a redistribution centre for Gulf countries and for the rest of the world has been mentioned above. The imports and exports relate to the activity of commercial firms based in Dubai. The importing of goods into Dubai, therefore, is highly significant because it is related to the function of this Emirate, in relation to the other Emirates, in terms of the redistribution of goods to other countries.

Table 5.9 shows the different trade activities of the firms making use of the transport system for importing and exporting. In general, importing is higher than exporting for all type of trade activity. This shows the nature of the Emirates community, both as a re-exporter and a consumer. Of commercial firms, 88.5 per cent used the sea transport system to import goods.

Foodstuffs were imported by means of the three transport systems but to different degrees. All firms used sea transport, 25 per cent of them road transport, and 16.7 per cent air transport. The chief food items imported were rice, wheat, fruit and livestock. These were imported from major Asian countries and from Australia. In addition, half of these firms exported foodstuffs to other places.

Other systems also play an important role in transportation activity in Dubai. There has been significant growth in the importing of goods by air. For instance, in comparing the three transport systems in the importing of spare parts and machinery, building materials and textiles, all use air transport in high proportion. Of firms requiring spare parts, 58.3 per cent used air transport, whereas no firms used international roads. Commercial firms are becoming increasingly dependent on air transport.

**Table 5.9**  
**Proportion of firms, by different categories of trade activity, which make use of sea, road and air transport in their import and export structure**

Transport		Foodstuffs	Furniture	Stationery	Spare parts/ machinery	Building materials	Textiles	Others
Sea	E	50.0	25.0	33.3	41.7	40.0	83.3	40.0
	I	100.0	75.0	100.0	83.3	90.0	100.0	80.0
Road	E	50.0	50.0	100.0	25.0	50.0	83.3	30.0
	I	25.0	0.00	33.3	0.00	20.0	16.7	10.0
Air	E	8.3	23.0	66.7	25.0	20.0	50.0	20.0
	I	16.7	37.5	66.7	58.3	40.0	33.3	40.0

Key: E: Exports; I: Imports

Source: Fieldwork, 1991.

The use of road transport for export and re-export is slightly higher than the use of sea transport. This indicates the importance of Dubai as a redistribution centre for all the neighbouring countries. Table 5.9 demonstrates the essential role of road

transport in the movement of goods to the Gulf region. The types of goods commonly moved in this way are stationery materials, foodstuffs and textiles. It is more convenient for Dubai's firms to send these goods by road for many important reasons:

- 1) the transportation costs are much cheaper than air transport;
- 2) the commercial dependency of other neighbouring countries on Dubai;
- 3) the adequate road network which links Dubai with other countries.
- 4) border controls, including these effected by the Saudi Government between the UAE and Qatar, are currently quick and efficient, and therefore do not detract from this route's political implications as an international route.

In order to examine the significance of the relationship between the movement of imports and exports through the transport system in Dubai, the correlation coefficient was used to measure the degree of association between each of these variables.

**Table 5.10**  
**Cross correlation of the transport system in exports and imports by the commercial companies in Dubai**

Transport System	Sea Transport (Imports)	Road Transport (Imports)	Air Transport (Imports)
Sea Transport (Exports)	0.2173 P = .046*	0.0449 P = .366	-0.1096 P = .200
Road Transport (Exports)	0.3427 P = .003***	0.1164 P = .186	0.1069 P = .206
Air Transport (Exports)	0.0862 P = .255	0.1165 P = .186	0.3973 P = .001***
Key: * Sig. = 0.05; ** Sig. = 0.01; *** Sig. = 0.001.			

Source: Fieldwork, 1991.

In Table 5.10, the correlation analysis test shows statistically significant correlations between transport systems and the import and export of goods. There is a strong relationship (0.003) between the importing of goods by sea and the exporting of goods by road. This is manifested on the ground by the increase in the quantity of imports moving through the ports of Dubai leading to an increase in the movement of exports by means of road transport to other Gulf countries such as Oman and Saudi Arabia. These destinations highlight the short distances between Dubai Emirate and Oman and Saudi Arabia. This trade raises questions regarding other dimensions of these activities in the future, such as the spatial consequences of the expansion of ports into their hinterlands, the enhancement of facilities, and improvement in the road network within Dubai to cope with this growth.

There is also some correlation between imports and exports by sea transport moving through Dubai's ports and the movement of ships in these ports. The coefficient of 0.046 indicates the importance of the Dubai's sea ports for the re-export of goods to other Gulf countries. The reasons for this are low cost and speed.

During the 1991 Gulf War, many goods bound for Kuwait or further north, beyond the Gulf states, were unloaded in Dubai and loaded onto other ships, and lorries, in place of the international ships which were unable to reach the north of the Gulf because of the war. This transfer to road transport, because of strategic considerations, added a new, but hopefully temporary, dimension to Dubai's entrepot role.

There is a highly significant correlation (0.001) between imports and exports using the air transport system, which means that this system holds a very important position in the transport system of Dubai. That is the result of three main points:

- 1) commercial firms in Dubai want quick delivery of their goods to and from Dubai;

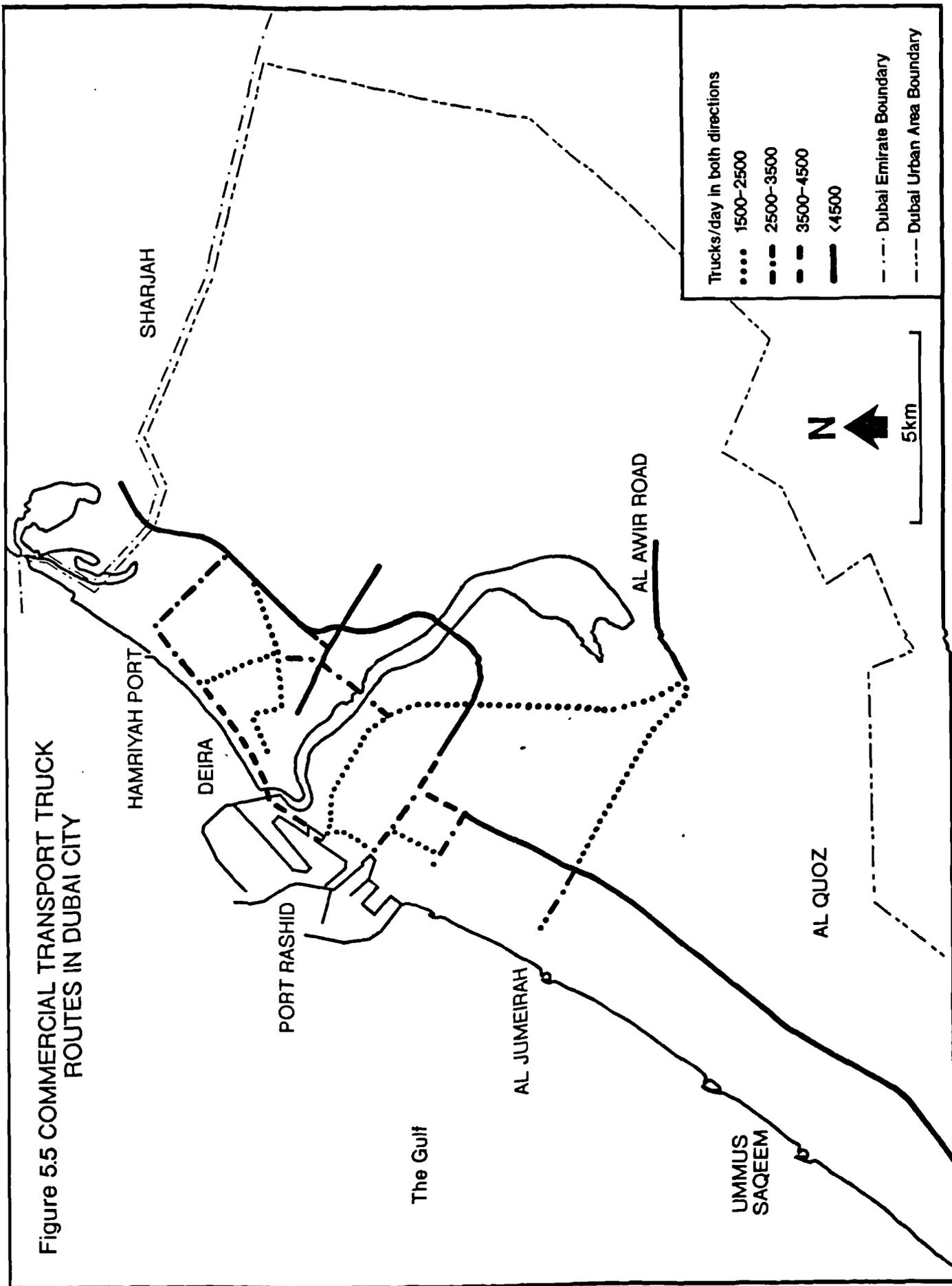
- 2) the massive development of the air transport system, such as the establishment of more facilities for cargo clearing (Cargo Village), and competitive charges for cargo between the cargo agents in Dubai and airline companies;
- 3) the rapid development of sea-air transport system through Dubai Airport.

## **5.9 The use of vehicles in the distribution of goods by road**

The nature of commodities transportation within Dubai Emirate is related to the role of vehicles as a main transport mode in the cities. Over a range of commercial activities, the distribution of goods was mainly associated with company vehicles, general transport vehicles and customers' vehicles.

In 1985, of 15,300 trips made by commercial vehicles surveyed (Dubai Municipality, Doxiadis, 1985) in the urban area of Dubai, 87.5 per cent of trips were generated within and destined for the urban area of Dubai; 53 per cent were going to Sharjah, 7 per cent to Abu Dhabi, 5 per cent to Oman, 4.5 per cent to Al Ain, and about 19 per cent to rural areas of Dubai, including Hatta. The importance of Rashid Port, Jebel Ali Port, and the Airport, is emphasised by an analysis of 2600 trips by commercial vehicles: represented respectively by 57 per cent, 33 per cent and 10 per cent from the airport. Figure 5.5 shows the volume of movement of commercial vehicles in Dubai.

Table 5.12 shows the differences among them in commodities movement. In general, the company vehicles play a very important role in the delivery of goods to customer locations. In commercial firms the vehicle is identified as one of the fundamental resources in the development of their trade. Field work has shown that different types of goods attract the use of various vehicles.



SOURCE: DHC, 1985

For instance, foodstuffs depend heavily on the use of company vehicles, but 58.3 per cent of customers make use of their own vehicles to deliver foodstuffs from the markets to wherever. This produced a high proportion of private vehicles used in this type transportation (see Chapter 6). However, 66.7 per cent of foodstuffs were also carried by general transport companies. This relates to commercial firms which rent these vehicles for delivering goods to places outside Dubai, such as Sharjah and Al Ain.

Other indicators according to the use of customer vehicles relate to nationals of other Gulf states. Omani people drive to Dubai in their pick ups in order to buy goods, a significant proportion of Omani merchants and customers commuting on a daily basis. Customers from the other Emirates also use their vehicles to carry goods, for instance bringing their fish to sell in Dubai market, and taking home their purchases.

**Table 5.11**  
**Distribution of goods by means of ownership of vehicles, by percentage.**

Type of Activity	By company vehicles	By General Transport	By Customer vehicles
Foodstuff	75.0	66.7	58.3
Furniture	100.0	12.5	25.0
Stationery/printing	100.0	33.3	0
Spare parts/Machinery	91.7	58.3	50.0
Building material	90.0	30.0	70.0
Textile	50.0	66.7	50.0
Others	90.0	60.0	50.0
Total of firms	52	30	30

Source: Fieldwork, 1991.: estimates of interviewers were based on volume of commodities.

Of customers' vehicles, 70 per cent were used to transport building materials. This high proportion is due to building construction companies encouraging customers,

for the sake of speed, to use their own vehicles to move materials to the building site, rather than waiting around for a company vehicle. The materials transported include bags of cement, planks of wood and house blocks. A high proportion (90 per cent) of companies also used company vehicles to transport building materials. The role of vehicles in the movement of building construction is high. Dubai has long experienced growth in this commercial sector, leading to the expansion of the urban areas.

The role of general transport companies in the movement of goods is essential. In 1985, 2,400 vehicles were owned by 123 general transport companies. The survey carried out by the Dubai Municipality (Doxiadis, 1988) showed that 56.6 per cent of trips made by commercial vehicles were made with the vehicle empty. These vehicles were small commercial trucks, pick ups and lorries. Thus, that leads to congestion, much of it could be resolved by eliminating 'empty' journeys, not, it was argued, by building new roads. The importance of company vehicles in the movement of goods has increased.

Vehicles of UAE customers are not the primary means by which goods are moved except those relating to certain trades. For instance, customers from other Gulf states who come to Dubai for shopping primarily use their own cars in the movement of their goods.

### **5.10 Commercial firms in Dubai and their use of other Emirates' transport systems**

Whilst Dubai is the major entrepot for movement in and out of the Emirates, some firms make use of the transport systems of other Emirates. Of those surveyed, 80 per cent used one or more of the non-Dubai outlets. This is for a variety of reasons. Table 5.13 shows this use for each system. For instance, 39.5 per cent of these commercial firms have made use of Sharjah sea port, because, being only 13 km distant, it is the

nearest sea port to Dubai City, and because the relationship of these firms with Sharjah relates to the importance of the Port of Sharjah in the regional export movement such as to Iran and to other Gulf countries. Movement between Dubai and Sharjah is the highest between any of the Emirates, both for passengers and for goods.

Other transport systems are also used by these firms, the most important of which are the Khor Fakkan (Sharjah) and Fujairah sea ports on the east coast of the Emirates. Of these firms, 25 per cent use Khor Fakkan. This port has been built as a container trans-shipment port. By using this port, some firms can save time and money: reducing distances by between 160 and 240 miles, compared with Sharjah or Dubai. It has developed itself as a feeder services port to the Indian sub-continent, as well as to other places in the Gulf region.<sup>(10)</sup> Its importance has been heightened by security problems, actual and perceived, associated with the Gulf.

Of the transport systems of other Emirates, Fujairah port ranks third in use by commercial firms in Dubai, 17.6 per cent of which used the port. Dubai firms import a lot of goods through this port. Rapid transportation from the port to Dubai explains their use. The port is mainly a container trans-shipment port, and is particularly used by the American President Line.

**Table 5.12**  
**Use of the transport system in the other Emirates by the commercial firms in Dubai in 1991, by percentage.**

Transport system	Percentage using	Rank
Sharjah Seaport	39.50	1
Khor Fakkan Seaport	25.00	2
Fujairah Seaport	17.64	3
Abu Dhabi Seaport	11.11	4
Sharjah Airport	5.30	5
Abu Dhabi Airport	3.45	6
Fujairah Airport	0.00	7

Source: Fieldwork, 1991.

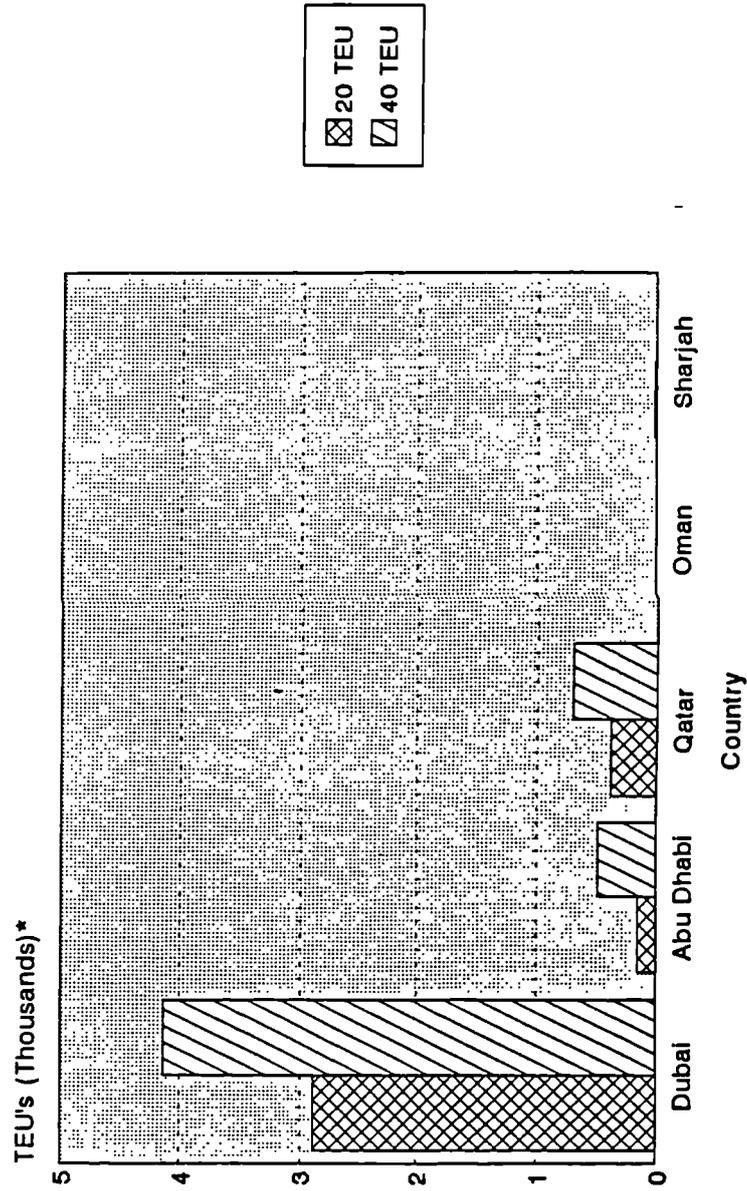
Figure 5.6 shows that of containers landed at the Port of Fujairah many more were destined for Dubai than for other countries. There has been a rapid increase in movement between east coast ports and west coast ports, in particular with Dubai, which lends importance to the east coast in terms of transportation in the UAE.

### **5.11 Destination of goods within Dubai Emirate**

The main purposes of this section are:

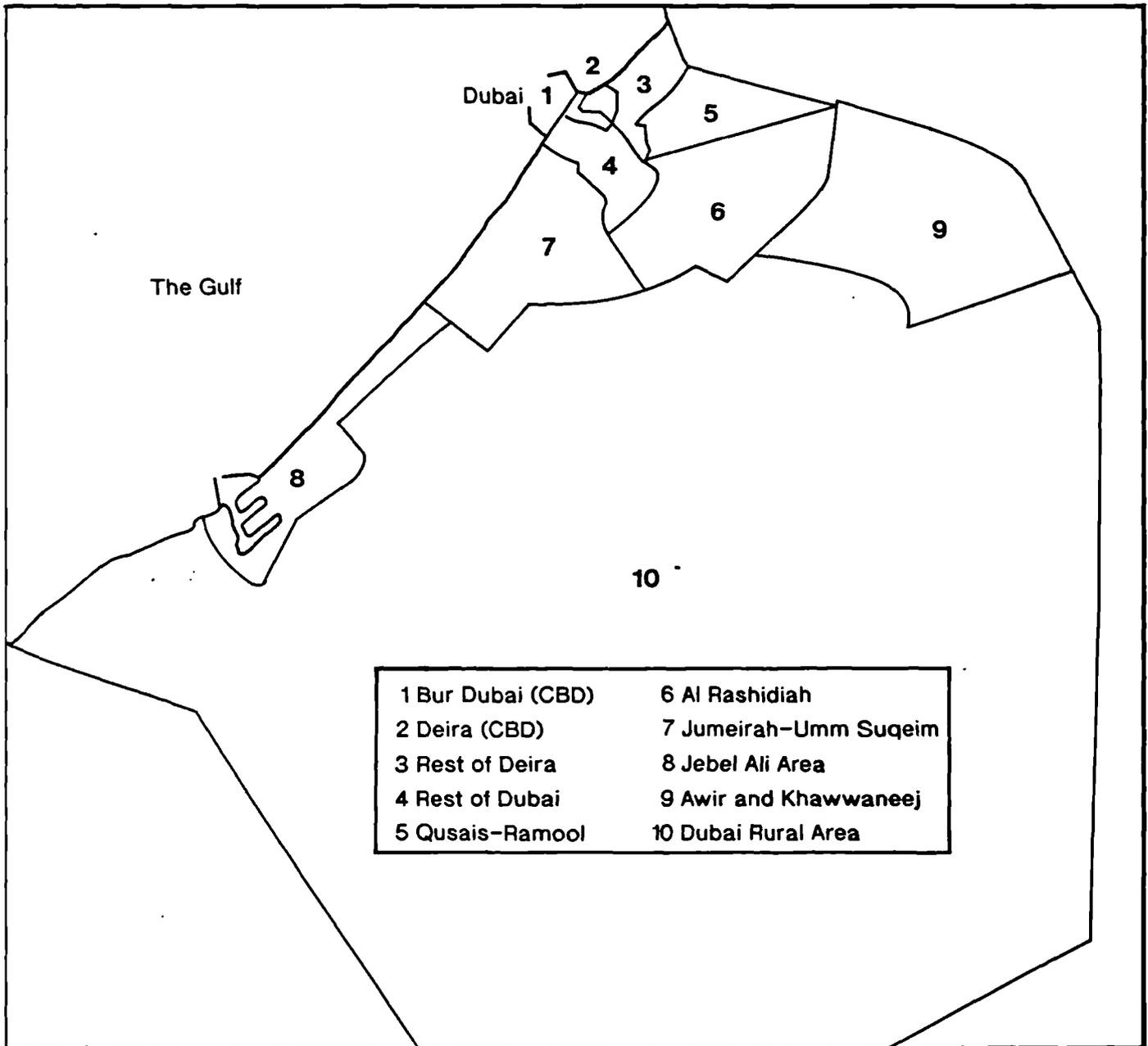
- 1) to account for the relative proportions in the destinations of goods as a measure of impact of mobility upon the areas of the CBD;
- 2) to explain the variations in proportion of different types of goods to the different sectors of the CBD.

Figure 5.6 The containers landed at the Port of Fujairah during 1988 and destined for other Emirates and Gulf countries.



Source: Dubai Annual Trade Review, 1988.  
 \*100 Twenty foot equivalent unit. The unit is based on the twenty foot container of average

Figure 5.7 THE MAIN DISTRICTS OF THE EMIRATE OF DUBAI



SOURCE: DHC, 1985

The 10 recognised divisions of Dubai Emirate are shown in Figure 5.7: the CBD areas in Bur Dubai, and in Deira; the rest of Deira; the rest of Bur Dubai; Al Qusais and Ramool; Rashidiya; Jumeirah and Umm suqeim; Awir and Khawaneej; and the rural areas of Dubai. The CBD will be examined in terms of its accessibility within the area, and in terms of type of trade.

The volume of movement of goods is normally measured in terms of weight or value. However, as a result of difficulty in obtaining this business information, the percentage of distribution of goods has been taken as a reasonable approximation. The type of trade is broken down among foodstuffs, furniture, stationery and printing materials, building materials, textiles, and other related goods.

The geographical patterns of movement of goods in the area might be expected to match both the geographical distribution of population concentrations, or functional aspect of the areas such as land use activity. These factors tend to play a major role in the distribution of goods. Where the population is highly concentrated, there is likely to be an increase in attracting the movement of goods.

The limits of the distribution of goods can be used to help define the urban hinterland of a city. Geographical aspects of the city include residential, commercial, and services divisions, all of which are major elements in the generation of the movement of goods.

Commercial firms which deliver goods to city areas are divided into two types, wholesale and retail firms. The demand factor creates a variation of economic activity and produces spatial patterns of goods movement within the city areas.<sup>(11)</sup> This section will take one area of Dubai in order to estimate the movement of goods (see also aerial photos in Chapter 8).

### 5.11.1 The Central Business District (CBD) of Dubai

Dubai CBD is not only the most accessible part of the urban system but is also the principal locus of commercial activity within it. Its official area is some 500 hectares, divided into two parts: Bur Dubai (37.4 per cent) and Deira (62.6 per cent). The CBD is recognised as not only the most active quarter of the Dubai urban area in terms of commercial activity but also in terms of density of population. Concentrated in a relatively small area are the governmental authorities, hotels, banks and other commercial activities.

**Table 5.13**  
**Population, employment, area and density characteristics in Dubai**  
**Central Business District, 1985.**

Name of area	Population 1985	Jobs in CBD in 1985.	Population percentage (employees)	Land use area (Hectares)	Net residential* density
CBD Bur Dubai	22,240	9,642	23.49	187.6	297
CBD Deira	51,480	31,409	76.51	312.1	361
Total	73,720	41,051	100.00	499.7	339
* Persons per hectare.					

Source: Dubai Municipality, Doxiadis, 1988.

Table 5.13 indicates the importance of, and degree of concentration within, the CBD in Dubai Emirate. In 1985, the population was 73,720, i.e. 25 per cent of the total population of Dubai. Employment within the CBD accounted for 40 per cent of all Emirate jobs. The importance of this area was shown in the study by Doxiadis (1985) which revealed the very great importance of traditional and local trading activity within the CBD. Compared with the movement of goods in the CBDs of other cities throughout the world, Dubai CBD experiences relatively high movement, this being assessed by analysis of city traffic movement across the 'cordon line' of the CBD. Table 5.14 compares this concentration of movement with a selection of other CBDs.

**Table 5.14****Comparison of movement in the CBDs of Dubai and other world cities.**

City	Area of CBD / Sq.Km.	Movement size (Vehicle/Peak hour)*
Dubai	3.88	40,415
London	32.33	79,652
Glasgow	2.04	29,393
Cardiff	0.85	8,922
Madrid (Spain)	2.97	25,200
Stockholm (Sweden)	3.40	12,900
Los Angeles (USA)	3.23	40,000
* measured by Passenger Car Unit per Hour		

Source: Rodeny, Vaughan (1987) p.186.; C.D.P.(1985).

Movement within Dubai's CBD is busy partly because of the location of the major economic establishments. Dubai's CBD contains two features no longer characteristic of the CBD of the 'modern Western city': a large resident population and considerable manufacturing activity; and partly because the CBD has been supplied with an accessible road network.

The destination of goods generated by commercial firms differs in amount of distribution within the CBD. This is because of the geographical characteristics of the CBD:

- 1) a concentration of all types of commercial stores and firms (wholesale and retail);
- 2) a concentration of business offices located in the Al Ras area and along the Creek side (Bani Yas Road) which are more accessible for the customers;
- 3) a high residential population in both CBDs, accounting for 23.7 per cent of the total population of Dubai. That characteristic predates the 1980s, when there was no precise policy in residential areas in the CBD over a rapid building of premises used for both resident and offices purposes. This led to a high ratio of

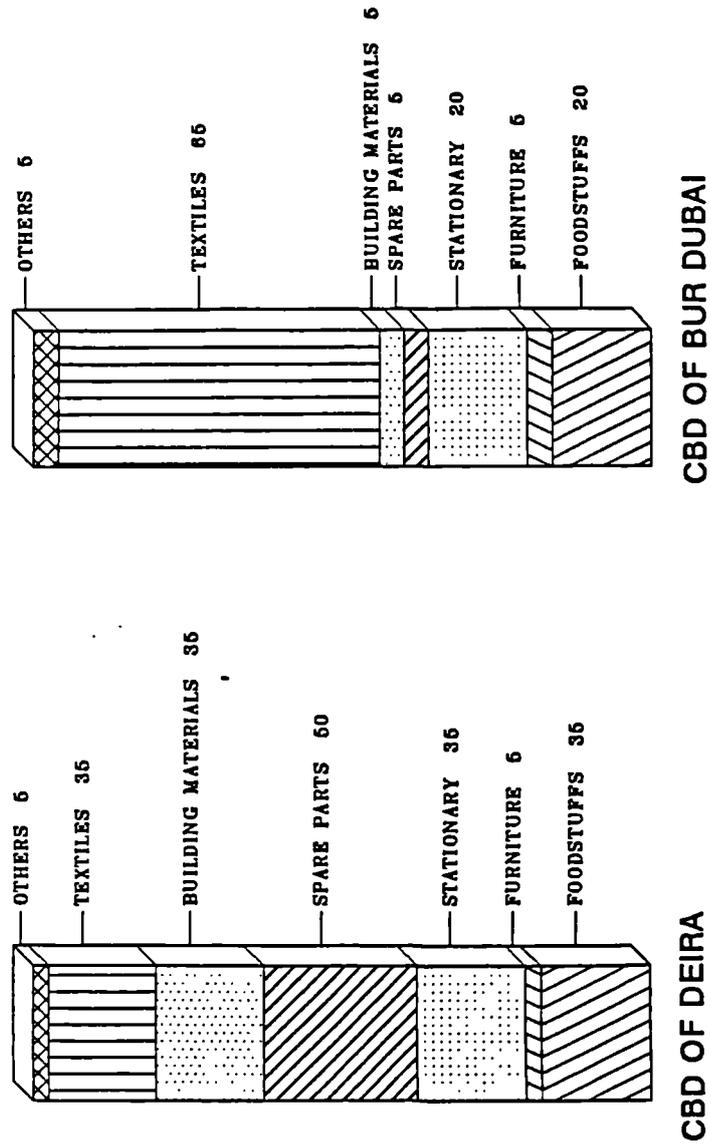
population in these otherwise business areas. However, more recently, new plans for these areas recommend that the residential building be converted into commercial offices. Despite high land values in these areas, skilled and unskilled expatriate workers still live here.

Variation in the distribution of goods to Dubai CBD might be related to reasons which regulate the distribution of those type of goods in general. Figure 5.8 shows the proportional destination of goods to Dubai CBD, indicating the differences in that distribution. Reasons are recognised in the size of that area, population and volume of commercial activity. For instance, the textile market is shown to be more active in Bur Dubai due to a concentration of textile shops and textile businesses operating in that area more than in Deira. This may result from the greater accessibility of Bur Dubai over Deira even though it is smaller in area than Deira. Bur Dubai received 65 per cent of all textiles destined for Dubai, whereas Deira received only 35 per cent. In contrast, less than 20 per cent of foodstuffs were destined for Bur Dubai, whereas Deira accounted for 65 per cent. This is because Deira has a significantly higher population density, and greater commercial activity than Bur Dubai.

Most firms distributing goods in Deira represented wholesale trade firms, because of the concentration of this type of trade in Deira as an active part of the CBD. In contrast, most firms distributing goods in Bur Dubai represented the retail trade.

The two areas differ in importance as a result of distinct spatial aspects of activity, such as the type of economic activity in the area. For instance, the destination of spare parts for vehicles, machinery, and technical equipment involves proximity to the location of garages, workshops, and related activities, as is the case with Deira. Accordingly, spare parts tended to be destined more for Deira (50 per cent) than for Bur Dubai (5 per cent)

Figure 5.8 Destination of goods to CBD of Dubai.  
By Percentage.



Source: Fieldwork, 1991.

Then importance of movement of goods was assessed by:

- 1) the accessibility of the road network which links all parts of the CBD area in terms of use by commercial firms that use road transport in their activities;
- 2) the availability of services and facilities such as car parks intended to facilitate commercial activity, and the upgrading of car parks in areas associated with a daily influx of commercial activity.

### 5.12 Movement of goods destined to the other Emirates

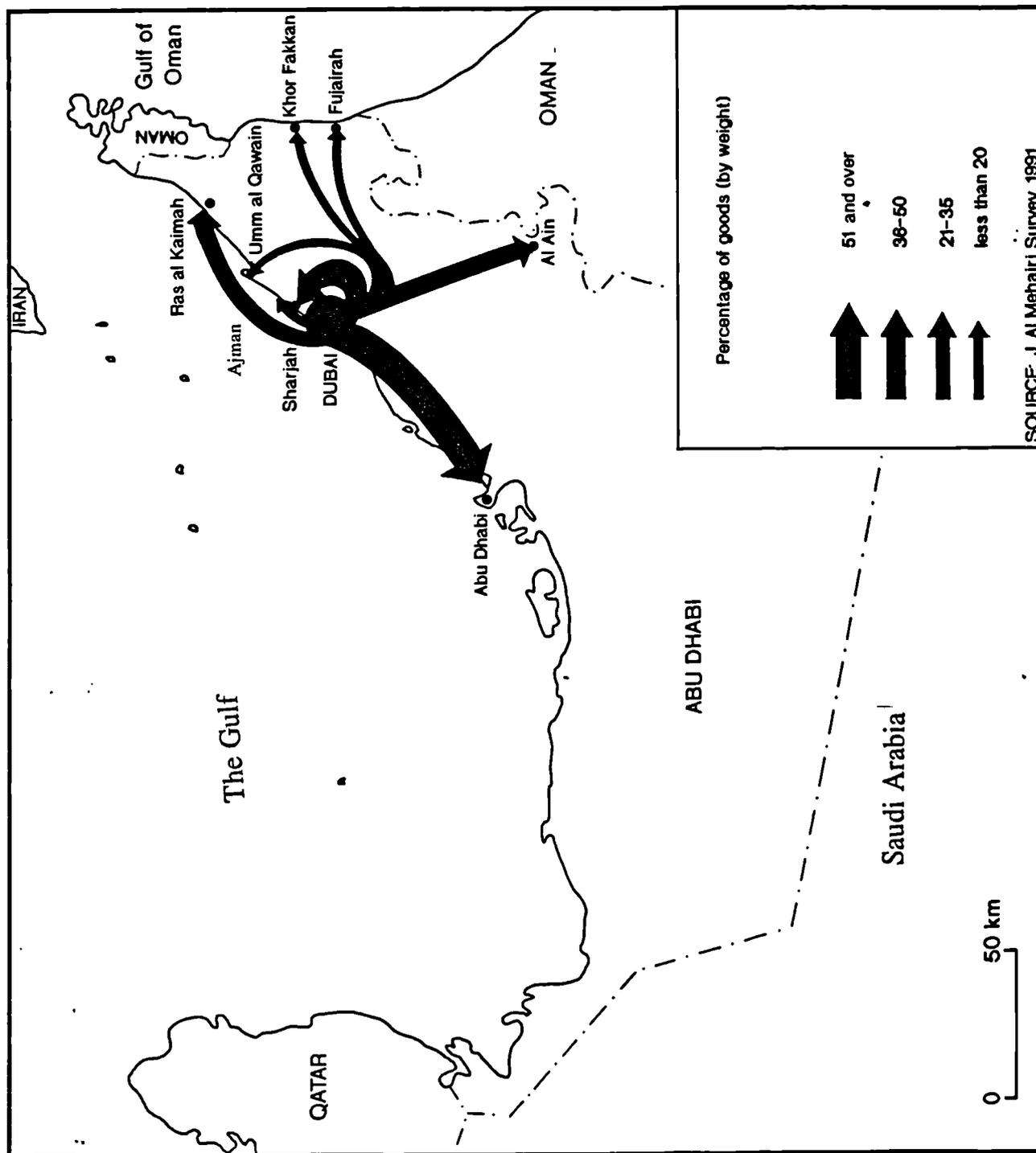
A majority of goods transported from Dubai to other Emirates were being sent by wholesale firms in Dubai to retail firms in the other Emirates. The goods were of a wide range of commodities. Table 5.15 shows that distribution of goods to those Emirates revealed significant differences between the Emirates (as seen in Figure 5.9).

**Table 5.15**  
**Destination of goods from Dubai to other Emirates cities in 1991.**

Destination	Mean rank	Significance	Rank
Abu Dhabi	6.01	0.000	1
Sharjah	5.85		2
Al Ain	4.75		3
Ras Al Khaimah	4.42		4
Ajman	3.89		5
Fujairah	3.86		6
Khor Fakkan	3.62		7
Umm al Qaiwain	3.60		8

Source: Fieldwork, 1991.

Figure 5.9 INTERNAL GOODS DISTRIBUTION IN THE U.A.E. OF COMMODITIES PRODUCED IN DUBAI, AS DISTRIBUTED BY WEIGHT (1991)



These results indicate the importance of Dubai as a re-distribution centre to the rest of the UAE, and are made clear in the light of the following:

- 1) apart from Dubai, the UAE population is concentrated in three major cities: Abu Dhabi, Al Ain and Sharjah. Significantly these appear consecutively in the results;
- 2) in addition to Dubai, commercial activity is mainly concentrated in Abu Dhabi, Sharjah and Al Ain which are recognised as the major cities of the Emirates;
- 3) the income factor in these cities is higher than in other towns and cities;
- 4) Ras al Khaimah is ranked fourth, which reflects reality because whilst it has a large population, there is little commercial activity;
- 5) compared to other places on the east coast, the coast of the Emirate of Fujairah occupies a good position in terms of commercial activity, related to its dependence on Dubai Emirate for importing its goods. More recently Fujairah has seen a slight improvement in commercial investment in the local market.

Thus, the movement of goods towards these various places differs significantly. Looked at from another viewpoint, the role of Dubai in commercial activity is equally important in the distribution activity on the local scale as on the regional scale. This is examined below.

### **5.13 Movement of goods destined to the Gulf region**

The movement of goods from Dubai is based on the export and re-export trade to other countries as indicated in Chapter 4. This section examines the importance of the role of transport in the movement of goods from Dubai to other Gulf states. There are three transport systems operating between Dubai and other Gulf states: air transport represents a small percentage in the cargo movement to these countries; road transport ranks second after sea transport, as addressed in Table 5.16.

**Table 5.16**  
**Re-exports by mode of transport from Dubai in 1989**

<b>Transport system</b>	<b>Dirhams</b>	<b>Kilos</b>
Sea Transport	3892,285,176	693,703,608
Road Transport	1000,695,195	231,395,395
Air Transport	1621,128,188	16,255,767
<b>Total</b>	<b>6514,108,559</b>	<b>941,354,770</b>

*Source: Dubai Annual Trade Review, 1991.*

Road transport, as we saw, is distinguished as the preferred means of transport in the Gulf region for the movement of goods or freight. There is increasing use of this sector by the commercial establishment and by individuals in the Emirates in terms of exporting their goods to neighbouring countries, a factor which is closely related to the completion of good tarmac links to Oman on the one hand, which is, literally, the 'end of the road', and on the other hand to Saudi Arabia and thence, potentially, to the rest of the world.

Dubai's commercial role lies in the export and re-export of goods which come through the ports of Dubai. Table 5.17 shows the number of local and foreign trucks outbound from Dubai, the most remarkable fact being that Qatar, despite its small population, emerges as the most important recipient of goods by this mode of transport.

**Table 5.17**  
**Number of local and foreign trucks cleared outward**  
**at Dubai Customs Land Transport in 1989.**

<b>Destination</b>	<b>Number of Trucks</b>
Qatār	11027
Oman	7677
S.Arabia	5229
Kuwait	2269
Iraq	1375
Syria	701
Lebanon	367
Jordan	317
Bahrain	120
Turkey	111
N.Yemen	61
Egypt	32
S.Yemen	16
Sudan	15
<b>Total</b>	<b>29317</b>

Source: Dubai Annual Trade Review, 1990.

Figure 5.17 shows that of a total of 29317 outward bound trucks cleared at Dubai customs, only 17% were not destined for one of the UAE's three immediate neighbours, and only a negligible 1% were headed for destinations beyond the Arabian peninsula and the Arab states immediately to the north.

The explanation for this movement relates to the importance which Dubai attaches to its transport infrastructure, which is highly developed, as seen in the efficient sea ports and low shipping and storage costs. As well as Qatar, other Gulf, Middle Eastern, and East African countries have arranged for Dubai to be their trade centre

in the Gulf. The importance of Iran in its dependence on Dubai is essential, but Iran is not shown in the data because of political circumstances surrounding the war with Iraq. Taking the entire transport system of Dubai, and examining the destination of goods from commercial firms in Dubai, trade with Oman is greatest. Fieldwork has provided information about the type of movement from these firms to other countries and its reasons. Dubai sends more goods to the Sultanate of Oman than to any other country. The Friedman test shows statistically significant differences between Gulf states (Table 5.18). Qatar, although ranked second as destination country for goods from Dubai, is the state most dependent on Dubai for imported goods.

**Table 5.18**  
**Destination of Goods from Commercial Firms in Dubai in 1991**  
**(all modes of transport).**

State	Mean Rank	Significance	Rank
Oman	6.32	0.0000	1
Qatar	5.50		2
Kuwait	5.47		3
Iran	5.40		4
Bahrain	4.80		5
Saudi Arabia	4.78		6
Other Countries	4.34		7

Source: Fieldwork, 1991.

The role of Dubai as a trade centre for other countries, by redistributing goods and commodities, is essential. Oman not only buys a wide variety of goods from Dubai, but also imports goods from more distant destinations using Dubai's facilities. This increased reliance on Dubai indicates the success of Dubai's policies for both port infrastructural development and the good road links to Oman which it initiated and

paid for. This is clear evidence of the strengthening of Dubai's position as a regional transport centre for eastern Arabia.

Most of the movement of goods to Oman was by road. The trunk road linking Dubai with Oman was funded by the Dubai government for several reasons, not least of which was the development of economic relations, and the creation of some sort of political stability between the two states (see Chapter 7).

Kuwait ranks third as destination state for goods from Dubai. This movement has been strengthened since the liberation of Kuwait from occupation by Iraq, as materials are needed for rebuilding the infrastructure. In August 1991, for instance, about 300 goods trucks drove from Dubai to Kuwait.

A feature of the growing fame of Dubai's commercial market is its attraction of commercial exhibitions of all type of commercial activity. The government policy is to improve the commercial structure in the future so as to reduce the dependency upon oil as an income source. Many international companies come to Dubai to exhibit their products, recognising it as a place of trade and re-distribution for other Gulf countries.

#### **5.14 Development of the transport system and its impact on the commercial firms**

Commercial activity is associated with the degree of development of a transport sector either as a positive stimulant or a negative constraint. The establishment of new projects in the transport system in Dubai such as new roads, improvement in the ports system, either regulating or in terms of new building are examples of positive interventionist measures by the government. From the fieldwork project in 1991, it has been shown "*to what extent commercial firms, in their opinion, believe that the new developments in transport systems have assisted their business*". The result (Table 5.19)

showed that, although 42.6 per cent were not sure about the importance of the developments in this system for them, 41 per cent answered yes, indicating a positive attitude towards transport changes and their impact upon the activity of commercial firms in Dubai. In particular, the main favourable points which emerged were as follows:

- 1) Fast clearing of goods from the ports, as a result of efficient services and easy loading;
- 2) Improvement in the storage system in the Ports thus reducing the damaging or spoiling of goods;
- 3) Lower cost in transport in ports charges, and in road transport.

The firms which deny any impact for transport development upon their commercial activity might be looking more at the importance of the market rather than the transport system, although they might believe that the transport system gives them more facilities for their activity.

**Table 5.19**  
**Responses of commercial firms to the recent development in the transport system in Dubai Emirate in 1991**

Response	Frequency	Percent %
Yes*	25	41
No	10	16.4
Not Sure	26	42.6
*Has the new development in transport systems assisted your business?		

Source: Fieldwork, 1991.

## **5.15 Conclusion**

Transport activity through the Emirate of Dubai has been gathering in importance in terms of the movement of goods and re-distribution to other countries of the region. The movement both of passengers and of goods is constantly increasing the importance of Dubai as a transport centre in the Gulf.

Commercial firms focus much attention on the importance of Dubai as a market because of its significance as a regional trade centre in which they would like to find the ideal place to sell their products. However, transport still occupies a high priority for them ranking just after the market. The huge development in the transport sector, represented by the sea ports, the road network, and air transport arrangements have had a profound impact on commercial activities.

Variation among the nationalities in the use of the transport system in Dubai did not in itself explain variation, because it depended more on the type of commercial activity and its relationship with their customers, than on nationalities of the operator.

Thus, from the point of view of the fieldwork results, there is evidence of significance concerning the relationship between the transport and economic and commercial activity in Dubai, most notably the visible impact of transport on the development of the commercial sector as represented by the commercial firms working in Dubai.

Another aspect raised in this study is the relationship between commercial firms in Dubai and their use of other Emirates' transport sectors, and in particular, the east coast seaports. This has led to the creation of strategic significance for those areas of the Emirates, and to a unique relationship between the Emirate of Dubai and the east coast.

From the political and strategic point of view, the east coast will remain important for commercial activity based in Dubai or in other Emirates, because of the unstable political situation in the Gulf. The east coast offers the most convenient port in terms of an outlet for the Emirates to other countries in the world and, whilst this might help to maintain the UAE's overall importance as a global transport node, further uncertainties within the Gulf could lead to a declining proportion of trade for Arabia's Gulf ports.

## References

- (1) Firms involved in 'commercial activities', for the purposes of this chapter are defined as those firms which are officially recognised as having some direct link with imports, exports or both. Excluded are firms which are exclusively concerned with the internal market of the UAE and those in financial services, but, included are firms involved with the distribution of imported materials goods, in addition to the many manufacturing firms which dominate the official lists.
- (2) See Clark, Audrey N.(1985), *Dictionary of Geography: Human & Physical Geography Terms explained*, Longman, London. p.371.
- (3) Daniel, P. & Hopkinson, M.(1990) *The Geography of Settlement*, 2nd ed., Oliver & Bond, Essex. p.221.
- (4) Dubai Municipality, *Comprehensive Development Plan for Dubai Emirate, Existing Conditions*, Doxiadis Associates International, Report 2, Vol.2, Dubai. June 1986.
- (5) Dubai Municipality, *Comprehensive Development Plan for Dubai Emirate, Dubai Urban Area Plan*, Doxiadis Associates International, Report 7, Dubai. July 1988. p.2-4.
- (6) Ibid,
- (7) Dubai Municipality, *Statistical Yearbook 1990*, Statistics Centre, Dubai,1991.
- (8) See Allen, Robin (1986), 'Dubai plays a key role in Iran's export drive', *Meed*, Vol.30, No.35. pp. 42-43.
- (9) *Al-Sharq Al-Awast*, The region circumstances is rolled by the new global order, 12.2.1992. (Arabic).
- (10) *Lloyds List*, Khor Fakkan prepares for round- the world services, Special report, 14 May 1988.
- (11) Healey, M.J. & Ilbery, B.W.(1990) *Location & Change: Perspectives on Economic Geography*, Oxford University Press. p.71.

## **Chapter Six**

# **The impact of the improvement of transport on social development in the Emirates**

### **6.1 Introduction**

The impact of the development of transport upon social aspects of life in the Emirates community is recognised as having both positive and negative consequences. The development of transport is reflected both in population mobility within the Emirates, and in transforming the traditional life of the people therein.

The positive consequences of transportation are related to modernisation of the lifestyle of the Emirates community, which is associated with the use of fast but cheap modes of transport to gain access to public services, such as parks, shops, hospitals and to other social service centres.

The negative consequences stemming from the development of the transport system lie in the volume of road accidents, noise, air pollution and other hazards. However, evidence to demonstrate the extent of these problems is hard to find due to the lack of data on these hazards. The problems tend to be related to the manner in which the vehicles are used, which in turn reflects the lifestyle and behavioural patterns of the people of the Emirates, many of whom make several trips each day.

These effects will be demonstrated in this chapter which will illustrate the differences in respect of journeys made in three cities in the Emirates, all of which have different geographical factors that act as determinants for these behavioural patterns.

Drastic changes have been brought about in the United Arab Emirates, with regard to spatial organisation, by the impact of the development of the transport system.

First, it is as a result of the expansion of the road network that the development of social services has taken place throughout the Emirates, such as the construction of hospitals, schools, sports clubs, post offices and other social services. In addition, the enormous increase in car ownership throughout the Emirates permitted greater social integration of the people of the U.A.E.. The establishment of seaports and airports have contributed to the development of cities, and at the same time changed the lifestyle of the city dweller (see Chapter 8).

## 6.2 Population of Dubai Emirate

The total population of the United Arab Emirates has grown rapidly from 320,000<sup>(1)</sup> in 1971 to 1,040,000<sup>(2)</sup> in 1980 and was estimated at two million in 1992. No real census has defined the numbers of citizens within this total, but it is certain that their proportion is declining.

In Dubai Emirate the total population grew at an annual rate of 8.6 per cent between 1975 and 1980.<sup>(3)</sup> This was mainly due to the government policy of encouraging foreign labour to enter the Emirates to set up and work in commercial and industrial projects in Dubai. So a population growth is certainly caused by the inflow of immigrants into the Emirates. It is possible that there has also been a natural increase in the national population.

The growth in population has led to an expansion in the size of urban and rural settlement areas. A movement towards the interior is permitted by the use of cars, and has in turn resulted in the growth in car ownership. A majority of the population still live in the seven cities or in the main villages.

Table 6.1 compares population growth in the U.A.E. as a whole, with Dubai Emirate.

**Table 6.1**  
Population of U.A.E. and Dubai Emirate ('000s).

	1900	1939	1968	1975	1980	1985
U.A.E.	80	....	180	557	1045	1622
Dubai	11	21	59	183	276	419

Source: Gabriel, Erhard (1987). p.77.

These increases are attributable primarily to the discovery and production of oil. In this regard, it has been said that:

*"The population increase in the Emirates which began in the sixties was mainly caused by oil production which in turn attracted immigrants into the country for employment in the many fields of activity." (4)*

Immigration into the Emirates was a result of people seeking work in response to the discovery of oil in the 1960s. This immigration was particularly from countries such as Oman, Iran, Pakistan and India and was chiefly directed towards Abu Dhabi because of its oil and Dubai because it is a major commercial port.

For instance, in 1968, the total number of immigrants was 66,193, forming 36.7 per cent of the then total population of the Emirates.<sup>(5)</sup> They settled in the coastal cities of Dubai and Abu Dhabi as these cities provided more job opportunities. Moreover, as the seaports and airports were located therein, these places formed the main gateway to the Emirates which facilitated their easy entry. This immigrant surge was carefully controlled by the government agencies concerned, both in terms of employment and location of residence.

According to the labour force classification, the economically active population<sup>(6)</sup> of Dubai showed a very marked distinction between the national and non-national population. Overall, 66.6 percent of the economically active population was em-

ployed, but this was the statistical consequence of a huge distinction between national population (36.5 percent employed) and the non-national population (74.5 percent).

The economic activity of the population of Dubai is related mainly to social and public services and to personal business. Commercial activities, both wholesale and retail, also trade, are shown in Figure 6.1. Given the logarithmic scale, this figure shows the high proportion of non-citizen employees in all sectors, which characterises Dubai's then-current population employment structure. Sectoral differences in the economic activities of the population reflect distinctions between the respective functions of different emirates: for example Abu Dhabi as an 'oil emirate' and Dubai as major commercial centre. These functions have led to selective expansions of the work force in different fields.

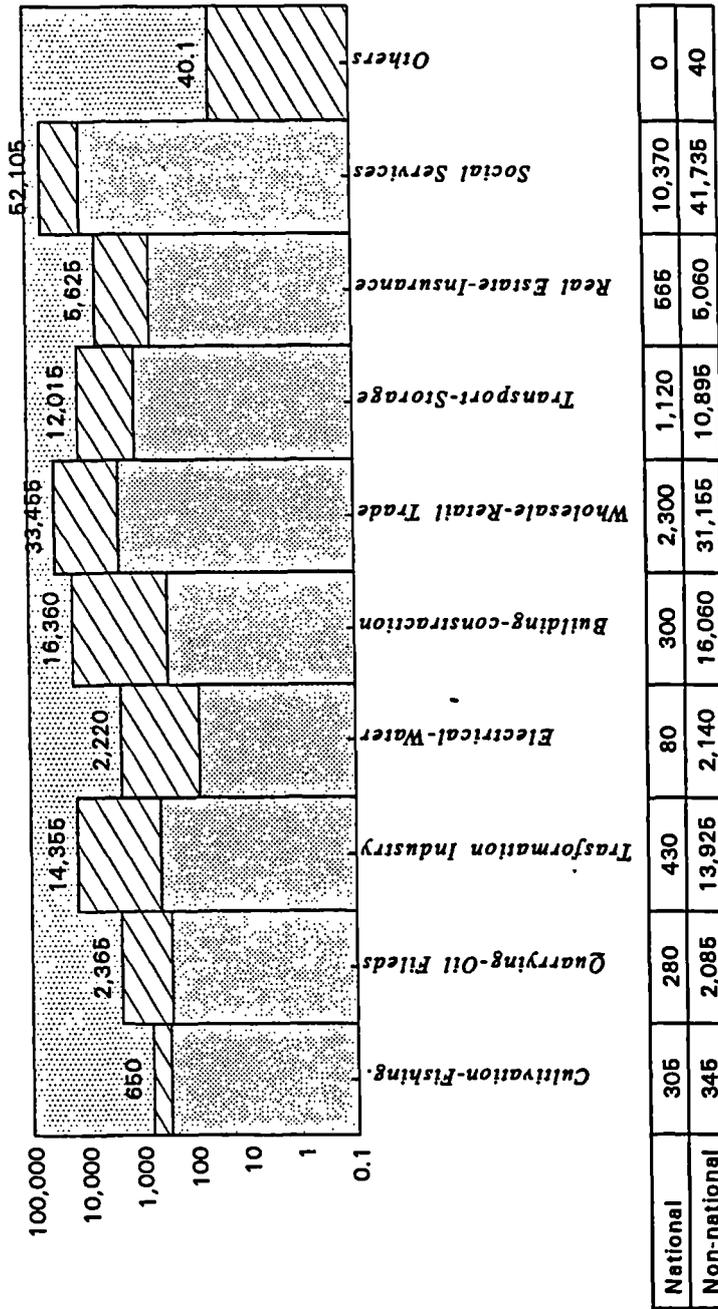
### **6.3 Population growth in the U.A.E. and car ownership**

The increase in population in the urban areas has led to an increase in the movement of the population within the Emirates by utilising the various means of transport. However, official data on the precise number of cars in the Emirates is not available for the period prior to the 1960s (see Chapter 2).

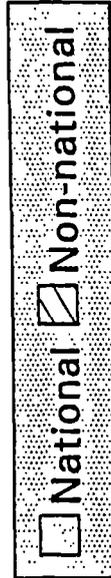
Car ownership increased greatly from the 1970s onwards. This was a result of several factors: a significant increase in the population of the Emirates; an increase in personal income (the U.A.E. boasts the highest *per capita* G.N.P. in the world, see Chapter 1), and the development of a society in which a car has become a necessary part of daily life.

In 1974 there were 18,680 private cars registered in the U.A.E.. In 1975 this number had increased to 28,333, which meant that there was one vehicle for every 20 people. By 1985 there were 196,175 private cars, increasing the ratio to one vehicle for every eight people.<sup>(7)</sup> In 1990, estimated numbers were 224,921 private cars, thus maintaining the ratio of one vehicle to eight people, although it is worth noting that there is a great discrepancy between car ownership rates amongst citizens and rates for the rest of the population.

Figure 6.1 Economic Activity of the population of Dubai in 1985.  
(LOGARATHMIC SCALE)



Type of Economic Activity



Source: Dubai Municipality, Doxiadis, 1985.

The impact of this development of car ownership and access is, of course, most visibly obvious in the urban areas along the coast where, because of the concentration of population in these areas, most of the cars are based and most of the congestion is experienced. However, the impact of these changes on the remaining rural population is also great. Although no official disaggregated data exists to show *rural* car ownership rates, it is clear that, given that the ratio of citizens to non-citizens is higher in rural areas than in urban areas, car ownership rates are also likely to be higher in rural areas than the national rates. This is both a cause and a consequence of the integration, via the expanded road network, of all parts of Dubai with the urban core area. This means that major service provision is only available in the key urban centres, and it is assumed by the planning authorities, emergency services notwithstanding, that the rural population is able to make its own way, by private transport to these services.

Despite the movement of villagers to the cities, the roads were built with an intention to link the villages with the towns and cities.

As with any programme of road expansion, the aims for road development and integration and the consequences are often both complex and distant. Dubai's road building programme had a primary aim of linking the port city to other centres of commercial importance. Thus, villages astride or close to such routes found themselves linked, as it were, by accident. In other cases, roads were constructed for the purpose of rural penetration and improved contact, the twin objects being both to allow rural access to new services and to take smaller scale services directly into these rural areas.

These goals of the Federal government will be discussed in a later section of this chapter.

Figure 6.2 shows trends in population growth *vis a vis* car ownership for the period 1978 to 1990. The increase in car ownership parallels the increase of population in response to the needs of people to travel and move. The increase also reflects the economic development represented by the increase in commercial activity, and the social development which the people of the U.A.E. needs to become more integrated.

Apart from the population factor, there are others which have assisted car ownership, such as the expansion in the length of both local and regional roads. In 1972 there were 500 km of road. By 1989 this had increased to 3000 km (see Chapter 2). The extension of the road network was made possible by the massive oil revenues which were channelled into the economic and social development of the U.A.E., and was designed with integration of all inhabited (and some uninhabited) areas in mind.

The next section will deal with the development programme, and its relationship with other factors in Dubai Emirate.

### **6.3.1 Car ownership in Dubai**

Dubai's infrastructure has been much developed both in urban and rural areas. People's needs are various and encompass many activities which means that they have to move about. The expansion of Dubai's urban areas, both in terms of housing and of commercial buildings, entails an increase in the movement of passengers and goods throughout the emirate, as well to other emirates. This increase has prompted more people and more businesses to use cars, private and commercial, and has resulted in the spread of car ownership to the local community. The import of cars has increased ever since the establishment of the Federal state. Figure 6.3 shows the development of the car owning population of Dubai from 1978 to 1990. Based on recent car ownership trends in Dubai the Emirate has been classified amongst countries which have the highest car ownership rate per person.<sup>(8)</sup> Table 6.2 shows that in Dubai there

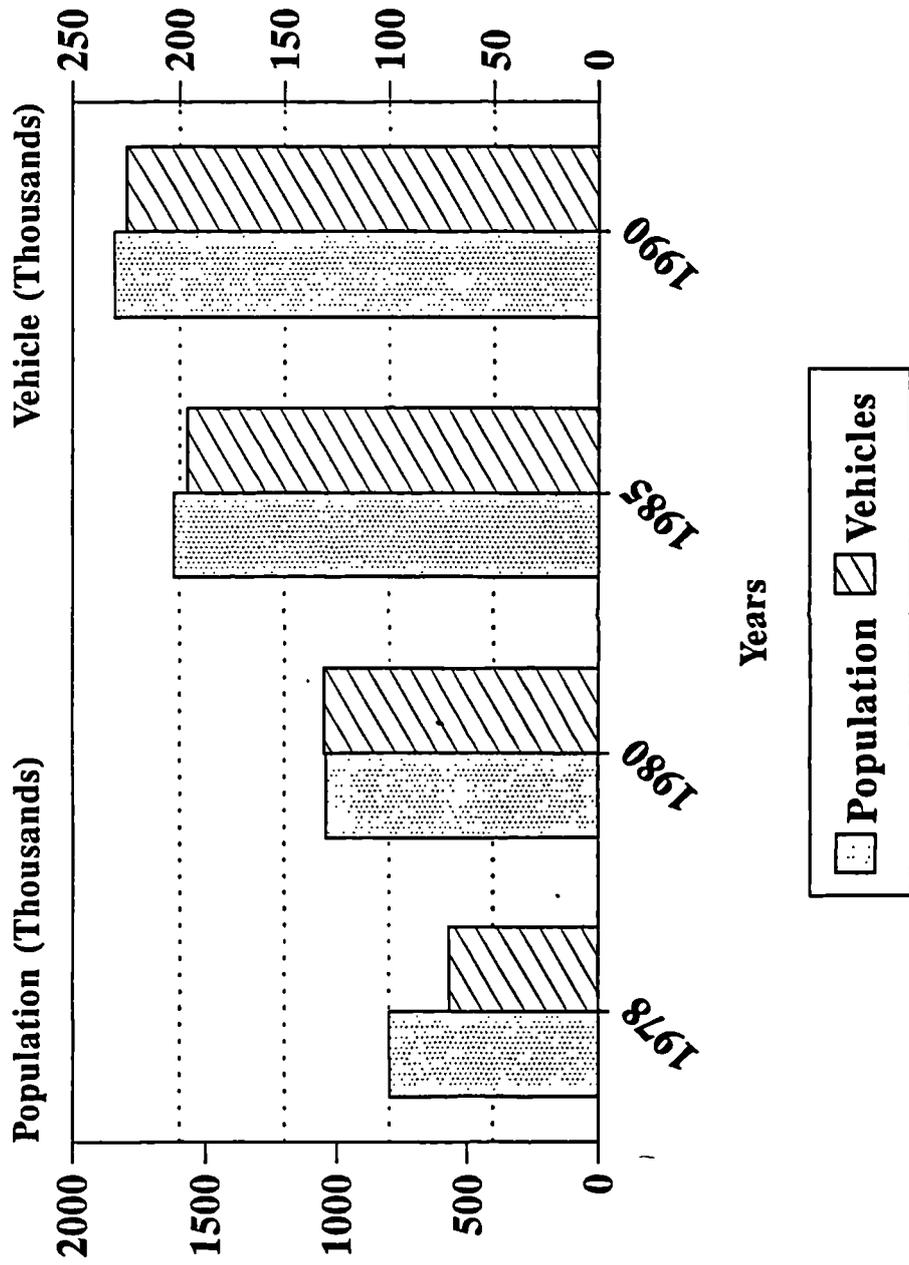
was one car for every 6 persons in 1984. This rate looks low for the U.A.E. as one of the richest states in the world, but is explained because it reflects the high numbers of foreign workers who are distinguished by their use of taxis and public bus transport rather than private cars. If this group could be excluded, the rate of car ownership would be seen to be high in comparison with other nations. This is directly attributable to the high *per capita* income of the Emirates people and to the emergence of the air-conditioned car as a social necessity, and indirectly to the increase in the economic and social activity of the population.

This very large increase in car ownership is an outcome of the social consequences of the development of the Emirates community, such as an expansion in the size of settlements which resulted in the residential areas moving further out from the centre of the city, thereby resulting in longer journeys to work. Moreover, cars have also become necessary for travel to the rural and mountainous areas for recreation, and are now symbols of 'normal' life, allowing the population of citizens to move around not only speedily and privately, but sealed off from the rest of the population in a comfortable, air-conditioned climate.

#### **6.3.1.1 Car ownership and nationality in U.A.E.**

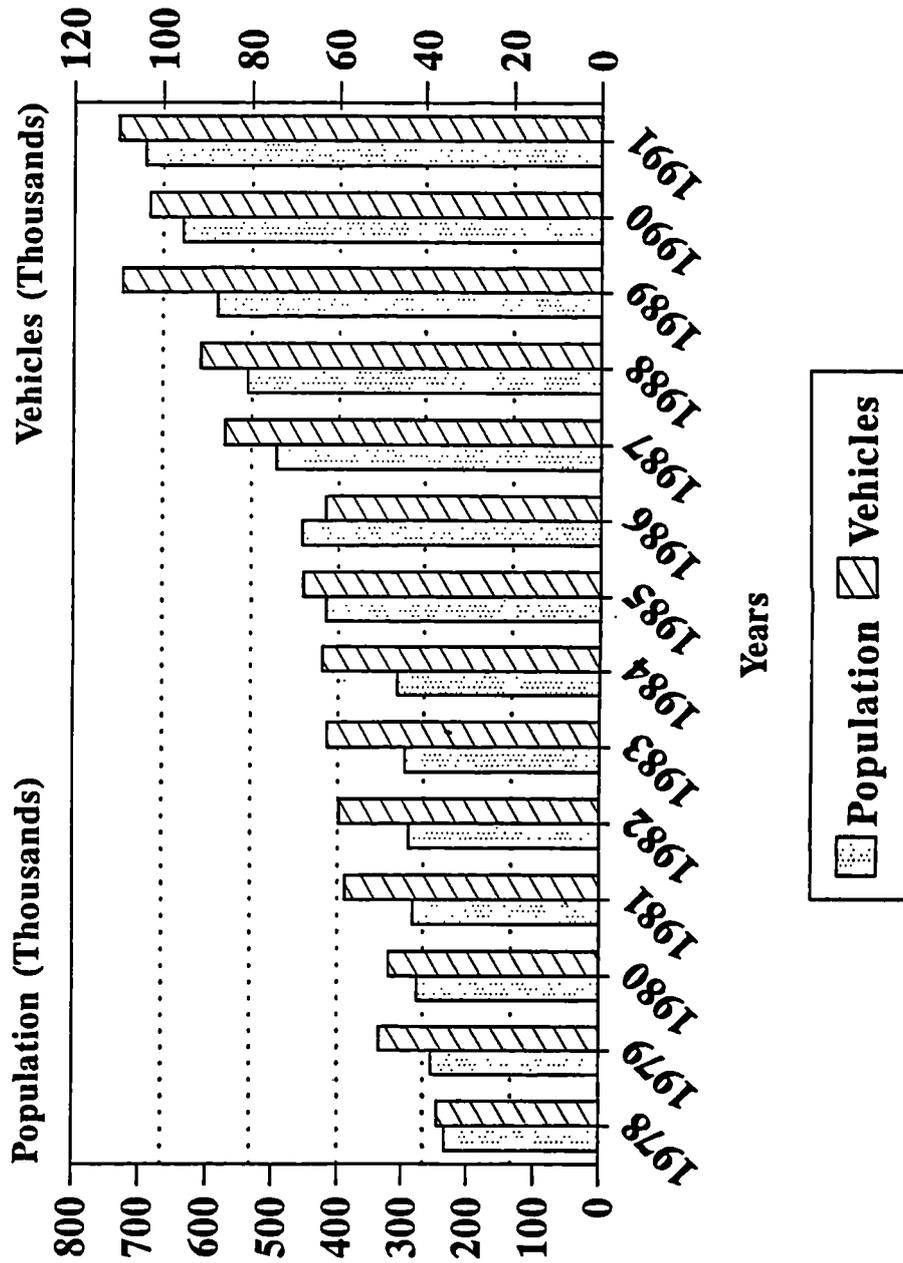
The Doxiadis survey of Dubai Emirate, carried out in 1985, studied a total of 67,475 families in Dubai to examine the interaction of transportation and spatial factors. The findings showed that the car ownership average was 1.27 for the national family and 0.59 for the non-national family. The survey also revealed that 77.6 percent of national families have at least one car; whereas amongst the non-national families only 48.6 per cent owned a car, as shown in Table 6.3.

Figure 6.2 Development of car ownership and population growth in the UAE within the period of 1978 to 1990.



Source: Ministry of Planning, Statistical Abstracts, 1978 to 1991.

Figure 6.3 Development of car ownership and population growth in Dubai 1978-1991.



Source: Ministry of Planning, Statistical Abstracts, 1978 to 1991.

**Table 6.2:**  
**Rates of car ownership in some countries in 1983**

Country	Person per car
USA	1.9
Australia	2.3
W. Germany	2.5
France	2.6
Italy	2.8
Great Britain	2.4
Spain	4.4
Japan	4.5
E. Germany	6.0
Dubai Emirate*	6.2
Brazil	15.0
Mexico	16.0
USSR	26.0
Taiwan	27.6
South Korea	104.9
Nigeria	125.0
China	10,200.0
* Dubai in 1984	

Source: *Dubai Municipality, Doxiadis, 1988.*

The inference that one could make from the (above) table is that, the high proportion of car ownership prevalent amongst the nationals is related to the income factor which in turn is associated to their social standing in the community. This has other consequences if not problems which are connected not only with owning a car, but wanting to own a luxury car.

The usual practice amongst the non-nationals is to own a small car, or else to use a taxi, public transport or to walk. This is largely a consequence of the location of their residence in relation to their work. Travel by taxi or other public transport means that it is far cheaper than travel by private car. Only the taxi, within the public sector, is frequently used by the citizen.

**Table 6.3:**  
**Car ownership and nationality in Dubai in 1985**

Car ownership	National Family	Non-national	Total
Yes	77.6%	48.6%	54.2%
No	22.4%	51.4%	45.8%
Total %	100.0%	100.0%	100.0%
No. of Families	13,005	54,470	67,475
No. of Cars	16,475	31,930	48,405
Ave. of cars for each family	1.267	0.586	0.717

Source: *Dubai Municipality, Doxiadls, 1985*

### 6.3.1.2 Car ownership and family size

As mentioned above, the population in this part of Arabia has increased rapidly as a result of huge numbers of immigrants entering the country. As migrant workers, many of these immigrants arrived without families.

From the data for 1985, the mean size of the family in the Dubai Emirate was 5.<sup>(9)</sup> In 1991 the mean size of the national family was 6.3 persons, whilst non-nationals averaged 4 persons in a family, which is a major demographic difference between the population of nationals and non-nationals.

Table 6.4 reveals a variation in the relationship between family size and car ownership. The percentage of families owning a single car decreases with an increase in the family size, but strangely the percentage of those owning more than four cars increases with an increase in family size. This is an indication of the economic strength of some large families. Such families may have over ten cars, one for each, the husband, wife and sons buying cars for private use, either using their own resources or by raising a bank loan. Generally, the national families own more vehicles than the others as they belong to the high income group in the country.

**Table 6.4:**  
**Car ownership and family size in Dubai in 1990**

Family size	Number of vehicles					%
	0	1	2	3	4+	
1-5	24,456 49%	20,706 41.5%	4,248 8.5%	393 0.8%	90 0.2%	65
6-10	10,109 43.3%	9,034 38.8%	3,198 13.7%	721 3.1%	294 1.3%	30.4
11-14	852 34.4%	936 37.8%	180 7.3%	184 7.4%	324 13.1%	3.2
+ 15	455 45.1%	181 17.9%	182.5 18.1%	0.00 0%	191 18.9%	1.3
Column Total	35,872 46.7%	30,875 40.2%	7,808.5 10.2%	1,298 1.69%	899 1.3%	100

Source: DHC (1991) (adapted from unpublished data).

However, this pattern is not repeated in the northern Emirates, which are poorer, and incomes are smaller. There may be some families which enjoy a similar lifestyle to people in Dubai, but these are likely to be related to particular families, such as the ruling or merchant family.

Table 6.4 also reveals other indications of the relationship between car ownership and family size in Dubai. That 47 percent of the families had no car at all is related to the non-national families who are working in Dubai, and their dependence on public transport.

### **6.3.1.3 Car ownership and income**

There is a strong positive correlation between car ownership and income. This is well established by the transportation survey of 1985. The higher the income of a family in the Emirates the larger is the number of cars owned by them. This is evidenced by the fact that amongst those with incomes less than 1,000 Dirhams per month (£159) there are 12 cars for every 1,000 persons, whereas amongst those with an income in excess of 30,000 Dirhams per month (£4516) there are 293 cars for 1,000 persons.

Table 6.5 shows income distribution amongst national and non-national families. It reveals that the average monthly income of the national population living in urban areas is 23 per cent higher than that of the non-national population.<sup>(10)</sup>

**Table 6.5:**  
**Monthly income by percent for national and non-national families in Dubai Emirate in 1985.**

Monthly income group (Dirhams)	National Family %	Non-national Family %	Total %
Less than 1000	1.5	1.4	1.4
1001-2000	5.5	7.8	7.4
2001-4000	19.1	30.3	28.1
4001-7500	36.8	34.1	34.6
7501-15000	27.2	21.8	22.9
15001-30000	7.9	3.9	4.6
More than 30000	1.7	0.5	0.8
Unknown	0.3	0.2	0.2
Total %	100.0	100.0	100.0
Average income	8.409 Dhs.	6.581 Dhs.	

*Source: Dubai Municipality, Doxiadis, 1985.*

#### **6.4 Car ownership by districts in Dubai 1991**

Dubai Emirate's urban area has been classified into the 44 specific districts of Dubai Municipality. Put together they form the urban area of Dubai. The rural areas, which account for most of the area, have not been included in this classification account for only about 2.3% (7175 in 1985) of the total population. Lack of information about car ownership in rural areas prevents this section from covering this rural sector. The main purpose of this section is to assess car ownership amongst urban districts so as to establish the density of car ownership in each district.

On analysing the raw data collected from Dubai Municipality, the region could be divided into three categories based on car ownership:

1. High level car ownership districts.
2. Medium level car ownership districts.
3. Low level car ownership districts.

Table 6.6 shows four districts as belonging to the high level ownership category and located in different areas, with two of the districts in urban areas (Hamriyah and Al Baraha) recognised by the high concentration of nationals and the other two on the fringe of the urban area (Nad al Shiba and Mardaf), also inhabited by nationals. These areas might have a function different from the others in terms of type of population such as a higher concentration of nationals than other districts. These areas are also where high income people tend to live. For instance, Nad al Shiba is not just a high class area, but includes one of the residences of the ruler of Dubai and his entourage.

**Table 6.6:**  
**Car ownership in Dubai Emirate Districts in 1991**

District	Code No.	L.C.*	No of vehicles owned/households						Row Total (No. of surveyed households)
			0	1	2	3	4+	Mean**	
Hamriyah	134	High Level			77	77	77	4.333	231
Mardaf	217			70		140		2.333	210
Nad Al Sheba	442				145	72		2.333	217
Al Baraha	122			352	117	117	117	2.000	703
Al Safa	343	Middle Level		702	408	272	138	1.896	1618
Madinat Badr	234			925	173	87	173	1.893	1354
Jumeirah No. 1	332		199	398	697	100	100	1.667	1493
Al Garhood	214			142	284			1.667	426
Jumeirah No. 4	351		91	183	548			1.556	822
Al Wasl	335			205	205			1.500	410
Al Twar	226			795	114	114		1.333	1023
Jumeirah No. 2	357			579	116			1.167	695
Hamriyah S.	133		74	449	148			1.111	671

Al Mankhool	352			1563	113			1.068	1676
Al Dhiyafa	331			325				1.000	325
Jumeirah No. 3	352		579	347	347	116		1.000	1390
Rashidiya	216		1146	729	417	104	104	1.000	2500
Hor Alanz	127	Low Level	1717	1919	505		101	0.810	4242
Regga	124		2046	2935	801			0.785	5782
Karama	318		2822	2935	801			0.772	5782
Burj Nahar	123		1166	1076	269		90	0.759	2601
Al Quoz	354		467	841	93			0.733	1401
Old Hamriyah	126		878	559	80		80	0.600	1597
Al Bada'a	333		1304	932	280			0.593	2516
Al Satwa East	323		568	474	95			0.584	1138
New Hamriyah	132		468	655				0.583	1123
Al Satwa	334		1351	1447	97			0.567	2895
Al Qusais Ind.	237		368	460				0.556	828
Dubai Hamriyah	313		1026	684	171			0.545	1881
Umm Suqaim	361		116	116				0.500	232
Hudaiba	322		906	503	101			0.467	1510
Al Qusais	232		1569	1256				0.444	2825
New Murar	114		2229	811	304			0.424	3344
Ber Dubai	312		2925	1462	86			0.365	4473
Deira	113		1333	250	83			0.250	1666
Al Shamal	112		1932	552				0.222	2484
Al Nakhal	115		3405	811	84			0.178	4300
Ma'asharat Al Baharna	316		163	96				0.056	1733
Za'abeel	325		341					0.000	341
*L.C.: Level of car ownership									
** Mean: Mean of car ownership									

Source: DHC (1991)

In addition to areas where there is a majority of U.A.E. nationals resident, and to high class areas, there are other populated pockets with a high proportion of car ownership. Hamriyah district records a high level of ownership with a mean of 4.3. The areas of Mardif and al Baraha have similar levels. Figure 6.4 shows that car ownership in Dubai is not uniform. Middle levels of car ownership are found in areas where U.A.E. nationals are resident, such as Jumeirah. Not all U.A.E. nationals earn a high income.

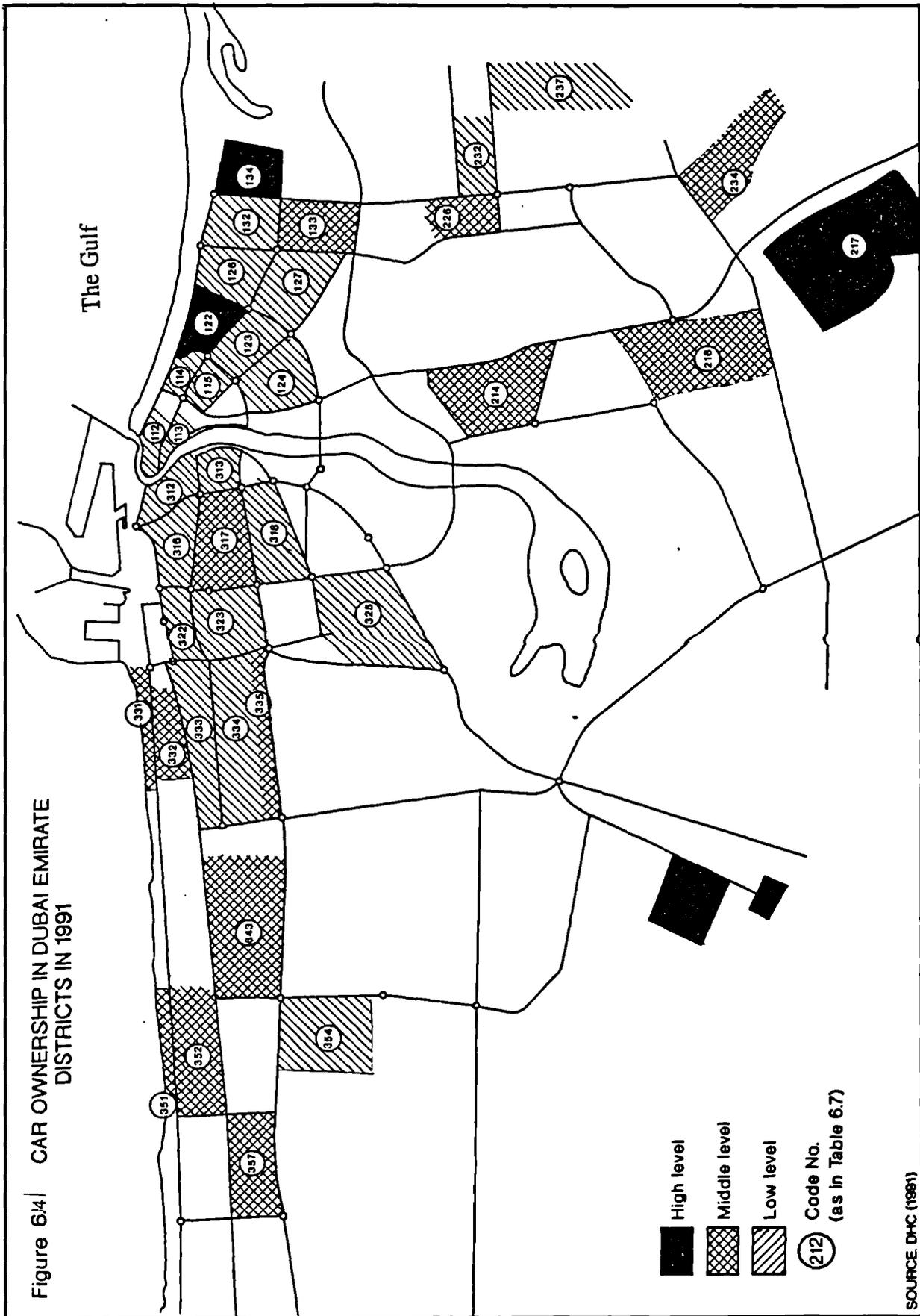
In conclusion, it should be noted that, as desirable as owning cars may be, high car ownership leads to many problems: increasing congestion, road accidents and pollution in the cities.

## **6.5 Population mobility variations in the Emirates**

Historically, movement between centres was slight as travel to neighbouring areas to obtain food or other items was difficult and time consuming. Today (1993), for instance the centres of the twin cities of Dubai and Sharjah, now internally one conurbation, can be only 15 minutes apart (excluding congestion) using modern means of transportation (see Chapter 2), whilst the 180 km to Abu Dhabi would take a modern car only 75 to 90 minutes.

There is much variation in the social and economic aspects of life of the people of the Emirates. This is because there is much disparity in the socio-economic resources within the Emirates which is reflected in an inequality in the *per capita* income within the different emirates.

Figure 6.4/ CAR OWNERSHIP IN DUBAI EMIRATE DISTRICTS IN 1991

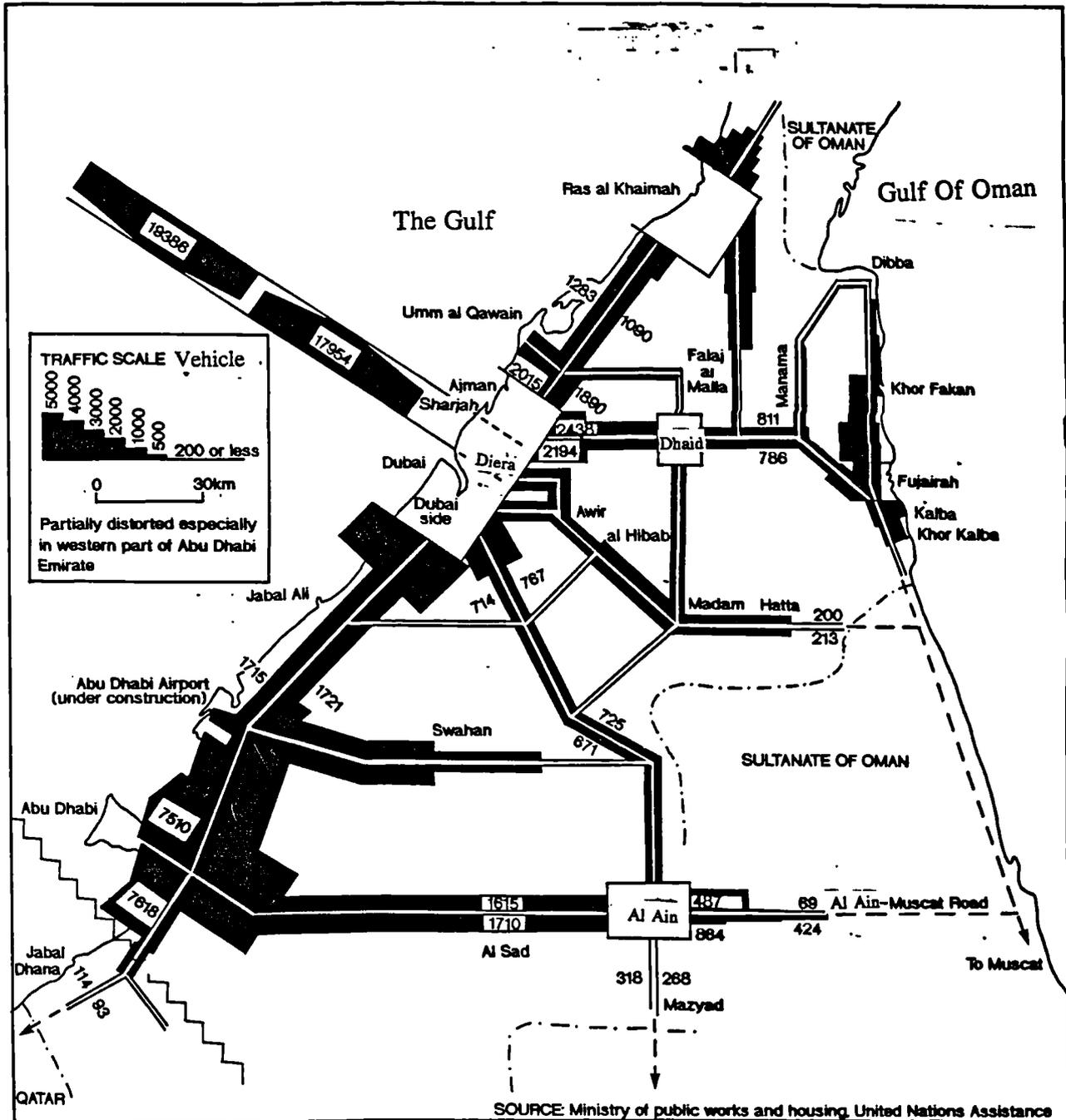


SOURCE: DHC (1991)

Despite the 1980 Report about transportation planning, which envisaged a single and relatively homogeneous U.A.E.-wide system, variations in socio-economic factors influence the degree and type of mobility in each emirate. These differences in patterns of use are visible in the movement of people to work, for shopping and social calls within the community, and for other travel related to leisure and pleasure. This movement amongst the Emirates' cities and villages is illustrated in Figure 6.5. This movement is, not surprisingly, dominated by the massive proportion of total traffic flow which is confined to the inter-centre traffic along the west coast. However, what is also very marked is the evidence of movement between the west coast and both Fujairah on the east coast and the rapidly expanding centre of Al Ain in the interior. Both of these key routes show movement levels which are proportionately considerably higher than either the population at one end seem to warrant, or than they were before these fast new roads had been built. This in itself suggests the positive impact of the policy of the U.A.E. to 'open up' and 'integrate' other areas of the country to and with the west coast centres.

What is also noticeable is the very low level of international movement at this time. Though the roads to the south east or south west had already been completed, they had yet to generate a major economic response, and the U.A.E.'s road movement system in 1980 resembled more that of a closed network than that of an integrated corner of the Arabian Peninsula.

Figure 6.5 Traffic movement amongst the UAE's cities, traffic volumes in one day (0600-1800 o'clock) in 1980.



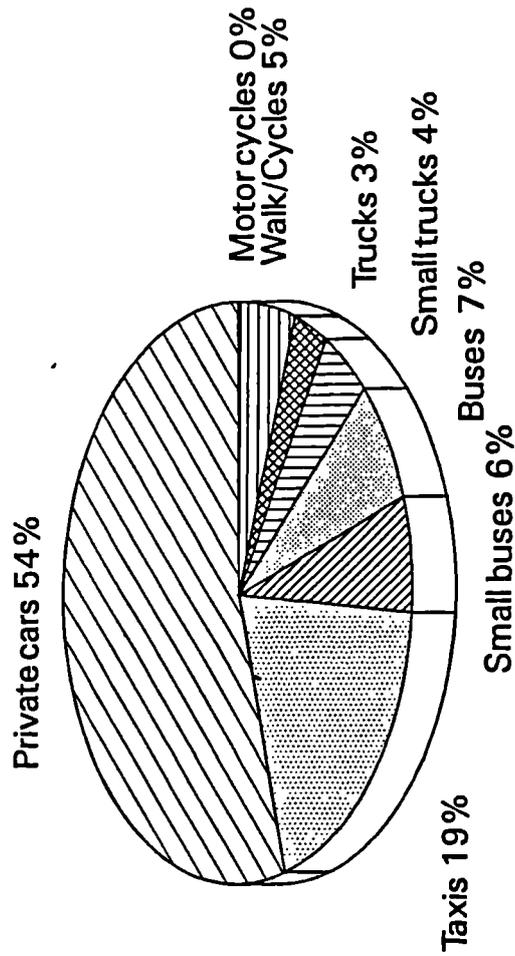
### 6.5.1 Type of mobility by mode of travel

In this regard, it needs to be stressed that it is the private car and the utilisation of the road network which have linked the different parts of the Emirates, and thereby helped to bring about social integration within the Emirates. Air transport plays a very minor role in this direction due to the absence of an internal service for all emirates. However, Abu Dhabi and Dubai have established a new route linking the two emirates for economic and business purposes (see Chapter 2).

The greater percentage of the people living in the urban areas use their private cars as the means of transportation, and the people who do not have private cars use other public transport such as buses, taxis, or other means of transport such as motorcycles or walking. The transportation survey of 1980 attempted to study the mobility pattern of the population with a view to establishing a national transportation policy for the Emirates. The findings of the survey revealed that 35 per cent of the household-based trips made were to get to and from work; trips made for domestic needs amounted to 30 per cent and those made for non-essential shopping and to attend to medical needs was 20 per cent.

There has been a recent change in trends in the utilisation of private cars for mobility in the Emirates. Table 6.7, which shows the different modes of transport used by the emirates' population in the year 1980, indicates the dominance of private cars over other modes of transport. This is portrayed in Figure 6.6 which shows that in 1985, 54 per cent of passengers used private cars for their travel with the use of taxi being next in importance. Public transportation means, like buses, are not popular, as only 7 per cent appear to make use of it.

Figure 6.6 Passengers trips distribution by transport means in Urban area of Dubai in 1985.



Source: Dubai Municipality, Doxiadis, 1985.

**Table 6.7:****Percentage of persons transported by transport vehicles in 1980 in the U.A.E.**

<b>Vehicle category</b>	<b>Home-work %</b>	<b>Business %</b>	<b>Shop - Medical %</b>	<b>Freight %</b>	<b>Total</b>
Public bus	6	7	4	1	5
School bus	4	0	1	0	1
Other bus	8	1	3	0	4
Taxi	16	39	40	1	28
Private car	66	53	52	15	52
Medium truck	0	0	0	43	5
Heavy truck	0	0	0	40	5
All vehicles	100	100	100	100	100

Source: Ministry of Public Works and Housing, Transportation Planning, Final Technical Report (1980), p.17.

Moreover, the Dubai Municipality has recently completed a study projecting future transportation modes and trends in the City of Dubai and found that private cars would continue to dominate the transportation scene. Table 6.8 shows the relative position of private cars and taxis to other modes of transport.

**Table 6.8:**  
**Trips by transport modes in Dubai Emirate in 1991**

<b>Transport mode</b>	<b>No. of trips</b>	<b>Percent</b>
Private car	841,958	54.9
Taxi	298,431	19.5
Light commercial vehicle	213,583	13.9
Heavy vehicle	14,164	0.9
Non-scheduled bus	103,590	6.8
Scheduled bus	18,535	1.2
Abra (Small local ferries)	43,168	2.8
<b>Total</b>	<b>1,533,429</b>	<b>100.0</b>

Source: DHC, 1991.

Since taxis rank second in importance to private cars in Dubai Emirate, steps have been taken to solve the traffic problems caused by taxis in the city. There were more than 7,000 taxis in Dubai in 1990, accounting for more than 19 per cent of the total journeys made by passengers. Inter-emirate taxi stations have been established in some districts of Dubai to cope with the increasing numbers in taxis.

Compared to public bus transportation the taxi is a more suitable means of travel for most people due to the flexibility it provides in respect of access to destinations and also due to its greater availability compared to the buses. (The capacity of the standard bus is 52 passengers whereas that of the taxi is 4 passengers.) This is because there are 30 to 50 per cent more taxis than buses in the public transportation network. The scheduled buses provide only a limited service for they contribute only 1.2 per cent of the journeys made by passengers as revealed in Table 6.8 which is based on 1991

data. Around 86 per cent of bus passengers are of Asian nationality, whereas fewer than 6 per cent are Emirates' nationals or other Gulf Arabs.

### **6.5.2 Purposes of trips**

The trips made by individuals have been classified as follows: home based work, education, shopping and non-home based work. Studies were carried out in the cities of Dubai, Al Ain and Abu Dhabi to assess any differences in the use of private cars for the movement of the population within the cities.

Data obtained from the transportation survey carried out by the Dubai Municipality in 1985 reveals that daily 45 per cent of trips made in Dubai are to attend work, 9.42 per cent for shopping and 1.69 per cent for educational purposes. This tends to show Dubai's major function as a work place for people working either in government ministries or in commercial firms.

A consequence of playing such a functional role is the heavy traffic congestion on some of the CBD roads during peak hours where commercial establishments and firms are located. Here, it can be more reliable to use other transport means such as the Abra which is ideal for avoiding the urban congestion in trans-creek traffic. This traditional method of transport's future potential is discussed in section 6.7.

Table 6.9 shows modes of transport used for travel to attend to different purposes. Whilst recognising that many journeys serve more than one purpose, this data identifies the stated main purpose for the journey. Those travelling for work use the non-scheduled bus. Since the majority of employees work for commercial establishments and for firms, they usually take the small buses or the taxis provided by the companies.

**Table 6.9:**  
**Percentage of private car/bus and taxi in movement**  
**by trip purposes in Dubai in 1990**

Trip purpose	Personal Movements			Total %
	% Trips by private vehicle	% Trips by shared taxi	% Trips by non-scheduled bus*	
<i>Home based trips</i>				
Work	31.5	30.0	32.9	45.1
Education	7.1	2.3	1.8	6.5
Others	33.7	37.5	29.9	5.9
Employers business	13.0	7.9	8.6	38.1
<i>Non home based</i>	14.7	22.3	26.8	4.4
Total	100	100	100	100

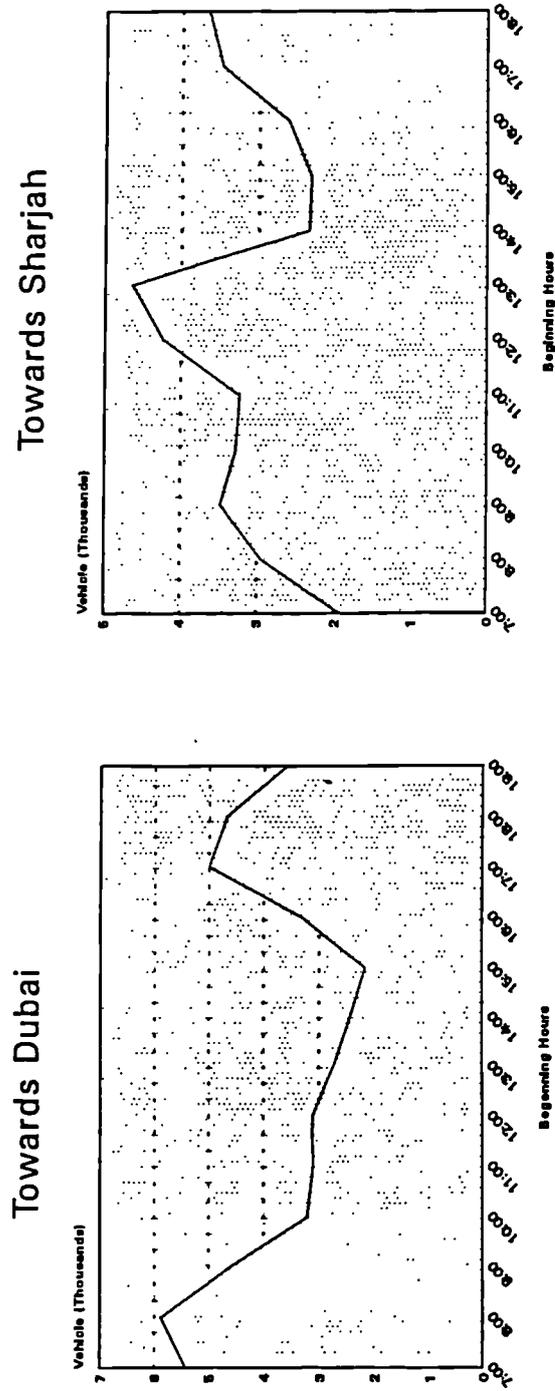
\* Non-scheduled buses include all works buses, school buses, private coaches and good vehicles used as buses.

Source: DFC (1991).

Next in importance to the non-scheduled buses are the private vehicle which account for 31.5 per cent of the movement, followed by the shared taxi, on 30.0 per cent.

Such travel is undertaken during the working days from Saturday to Thursday and according to the transport survey carried out, some cities experience peak hours in travel. This travel pattern is more striking between the Emirates of Dubai and Sharjah because many of those are expatriate workers working in Dubai and living in Sharjah because of the availability of cheaper housing in Sharjah than in Dubai. Figure 6.7 shows this traffic flow between these two cities at 07.00 and at 19.00.

Figure 6.7 Traffic Flow along the Dubai and Sharjah Road.



Source: Transportation Study, Dubai Municipality, DHC, 1981.

According to Figure 6.8, Al Ain differs from Dubai and Abu Dhabi in respect of the motives for travel. This could be attributed to the fact that Abu Dhabi is the capital, and along with Al Ain forms the administrative centre with ministries and federal department located there.

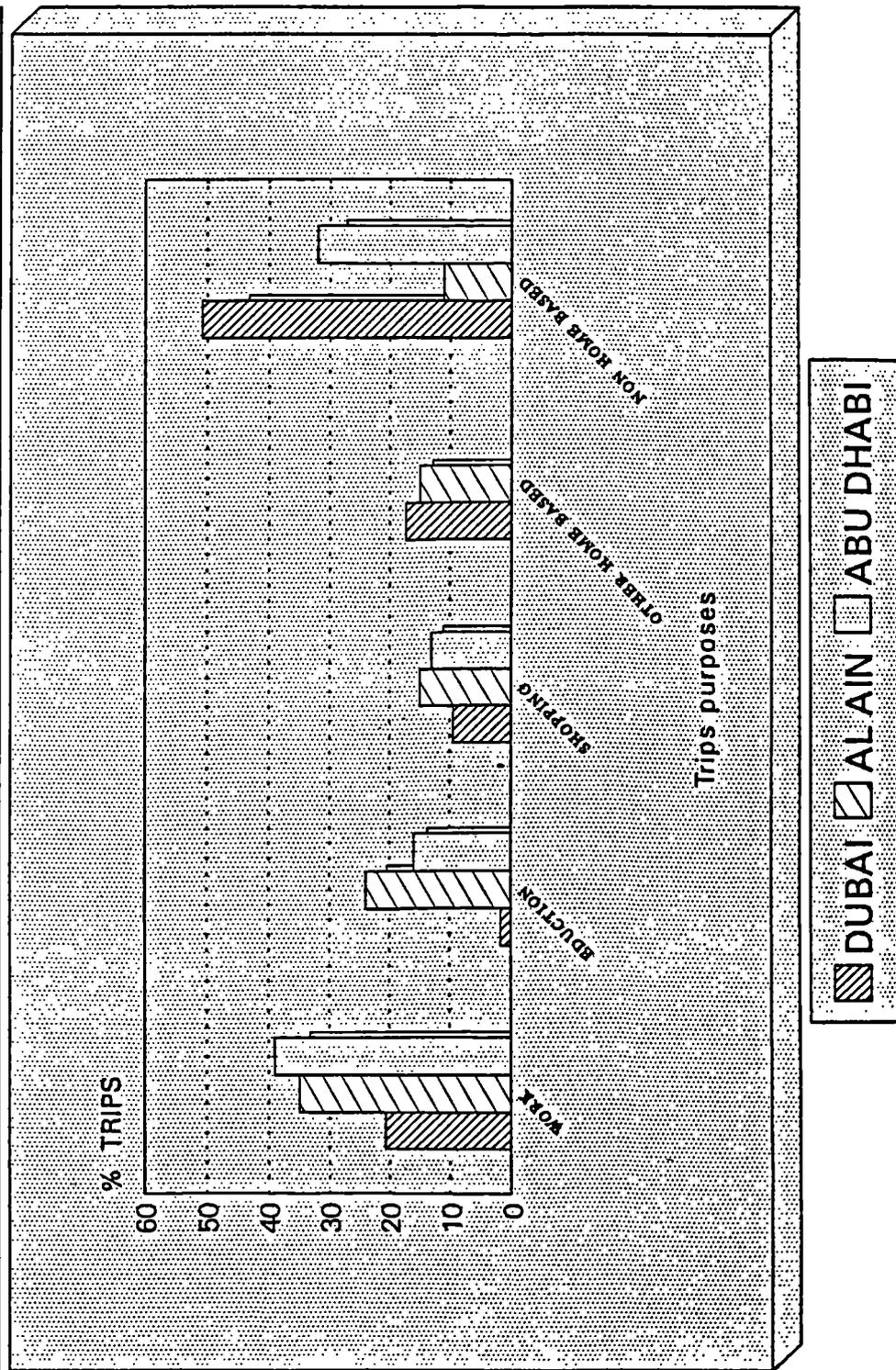
Nevertheless, there is a high percentage of non-home based trips<sup>(11)</sup> being made to Dubai solely because it is a commercial centre with people commuting from offices to markets and other establishments which are found there. On the other hand Figure 6.8 reveals that Al Ain has a higher percentage of travel related to education than the other cities. This is because Al Ain has a university as well as the schools, and it is a characteristic feature of student mobility that the large majority of (male) students commute weekly to and from Al Ain in their own cars.

The 1990 study makes some interesting new points about travel related to recreation and socialising. Whereas 39 per cent of trips recorded were for attending work, 20 per cent of trips were for recreational and socialising purposes. This suggests a tendency towards social integration amongst the people of Abu Dhabi, facilitated by the presence of many parks.

## **6.6 The impact of roads on the social structure in the U.A.E.**

Before the creation of the United Arab Emirates in 1971, the degree of social integration among the people of emirates was very poor. Whilst this was for many reasons, such as lack of economic resources, the most important point to be highlighted is related to the absence of roads linking all parts of the emirates. Although there were caravan routes, the small number of vehicles meant that connectivity between these places was poor.

Figure 6.8 Comparative Purposes of Trips within Dubai, Al Ain and Abu Dhabi.  
Percentage proportions for each city.



Source: Dubai Municipality, 1990; Al Ain Municipality, Master Plan of Region of Al Ain, Vol.3.

Later, during the 1970s and 1980s, there was a drastic development in the entire infrastructure of the U.A.E., of which the road network was the most important factor in the integration of the people of the U.A.E.. Construction of roads and the spread of car ownership into the countryside have changed the lifestyle of the national population of the rural areas. People who live in the villages and remote places have changed their lifestyle and their mobility by using the car and roads. This is related to the rapid increase in car ownership among the population.

This section is based on some official data and personal investigation which has provided some useful evaluation of the impact of roads on the social change in the U.A.E. with some reference to Dubai Emirate. The increase of social services among the Emirates has led to improvements in the mobility of people to hospitals, schools and other social places. The relationship between the development of roads and the social structure and social services in the Emirates is clear. These services, represented by hospitals, clinics, schools, shopping centres, supermarkets, etc., have developed greatly over the past twenty years, paralleling the development of roads.

The geographical distances between the emirates was identified as a major obstacle to communication between the population of the emirates both in eastern and western areas as mentioned in Chapter 2. The distance factor has diminished as an obstacle for the population as a result of road expansion.

The impact of roads on social services is illustrated by the way in which roads have affected the development and distribution of hospitals and schools and other services. Road building is a result of government policy to provide the population in every place with access to all amenities. Prior to the arrival of roads, most of the settlements outside the few major centres had no modern services, in the conventional sense of the words. The arrival of roads did not, therefore, endanger the existing social services

infrastructure, as none existed beyond the local, private and informal. The road thus became part of the process of development of these places, and it is distinguished as the most important part in that process. There has been a concentration on the eastern coast in preference to the western coast because the eastern coastal areas suffered from very poor conditions during the 1950s and 1960s in terms of roads and social services. By contrast, the western coast, where the main cities are located, has enjoyed the benefits of significant developments, such as schools, clinics and paved roads. For this reason the following points will illustrate the impact of roads on the social change in the U.A.E.

### **6.6.1 The impact on the Health sector**

The seven emirates were suffering from the sparseness and availability of the social services as a result of poor resourcing. Rural areas were very poor in services because of their remoteness from the main towns and the lack of roads. This point will be considered only briefly because of the problem of data. Areas such as the eastern coast villages (Kalba, Fujairah and Khor Fakkan), also Abu Dhabi Emirate and Dubai Emirate will be examined.

Before 1962, Abu Dhabi Emirate, the first emirate to have oil discovered within it, had no integrated health services, but depended instead on local medical treatment the quality of which was usually poor.

In the 1960s the first clinics were opened to serve all the emirate's people in Abu Dhabi. Staffed by Indian and Iranian doctors, these clinics were located in Abu Dhabi city and were established to cope with the rapidly increasing population seeking job opportunities. Abu Dhabi Island is only small (94 sq.km.). Sandy roads linked the populated areas, thus providing some means of mobility for the population to the social services. More significantly, in the remote areas of Abu Dhabi such as Liwa,

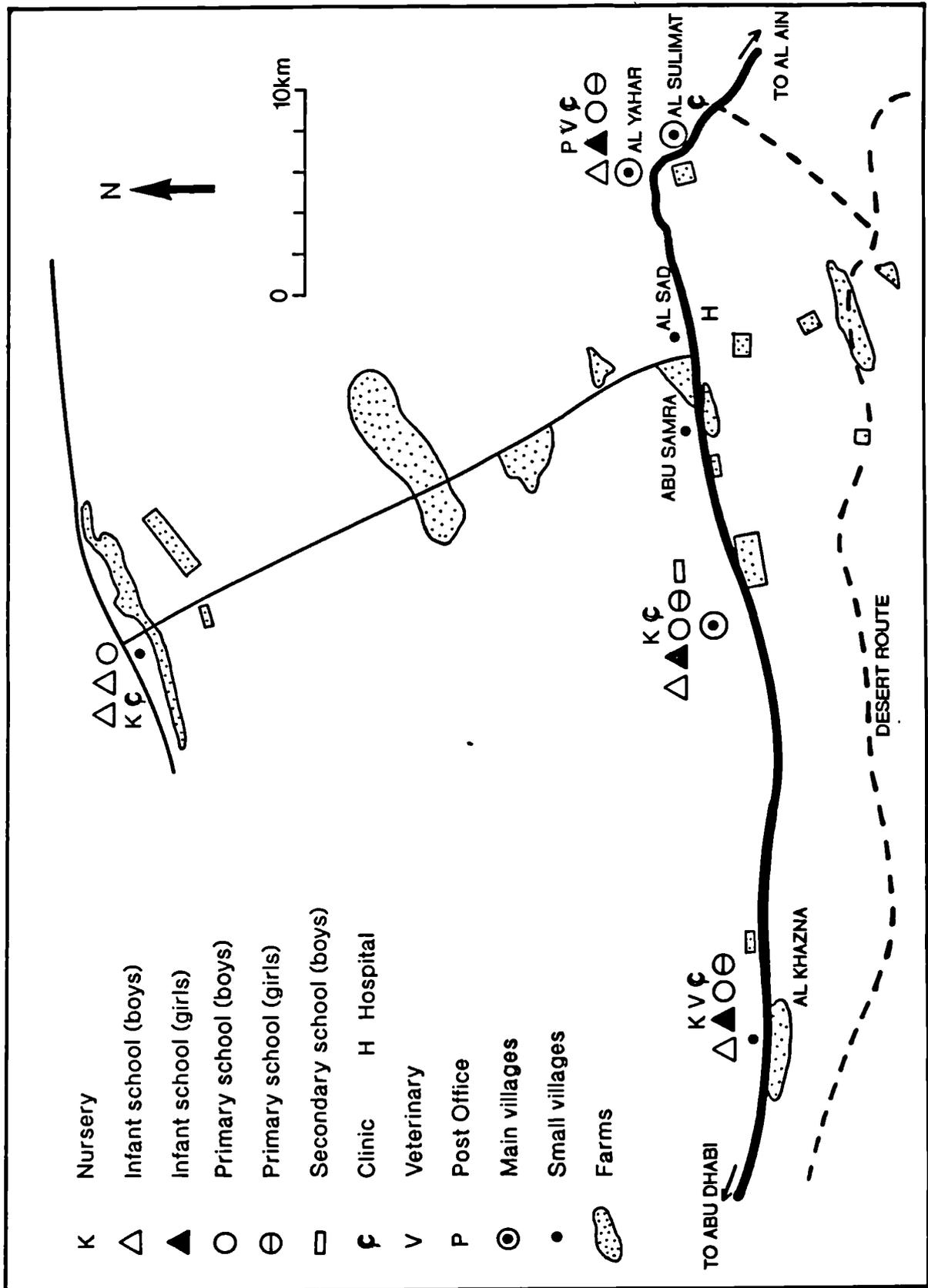
where there were no health care units, a patient suffering from a serious disease was at much greater risk of death unless he or she could be transported to Abu Dhabi by car for up to 4 days over very bad terrain for 150 kilometres.<sup>(12)</sup>

After the rapid development as a result of oil revenue and expansion of roads, the medical centres have sprung up in all the villages and towns as a result of the policy of government to settle the Bedouin in the interior places such as Liwa oasis, and the villages of Al Ain-Abu Dhabi, and expanding the roads to those areas, and eventually providing all social services. The number of main hospitals jumped from two in 1981 to 13 in 1990 in both urban and rural areas of Abu Dhabi.<sup>(13)</sup>

As a specific example, Figure 6.9 illustrates a section of the Al Ain to Abu Dhabi road which passes beside many villages. These Bedouin people did not formerly have schools or clinics because of the lack of roads to their home areas. Their students and patients were sent to Abu Dhabi and Al Ain. Figure 6.9 shows the social services which had come to some of the villages which had themselves been created by 1980 as part of a government policy, not only of social provision but of sedentarisation. This process of sedenterisation, which these new villages illustrate was justified by the Abu Dhabi authorities on the ground that this was the means of providing this new range of social services.. Where these villages are now, before 1970 were Bedouin camps, with camels but no roads.

Other examples may be illustrated by the east coast towns such as Fujairah, Kalba and Khor Fakkan, and other northern emirates. These areas were suffering from underdevelopment in modern health care facilities. In Kalba, 1950 is distinguished as the year when vehicles arrived: the British gave a car to the Sheikh of Kalba, even though there were no asphalt roads through the area.

Figure 6.9 THE DISTRIBUTION OF SOCIAL SERVICES ALONG THE AL AIN-ABU DHABI ROAD



SOURCE: Alasadi, 1980

As there were no links from Kalba or Fujairah to Sharjah and the western coast through the mountains, the route taken went a long way to the south through north Oman (Khatm Malaha, Wadi Al Gor and then many places to Sharjah). The trip took between one and two days by Land Rover to reach Sharjah or Dubai assuming the vehicle was up to the job. If vehicles broke down, there was no solution other than to wait, possibly for many days, for repair or a replacement vehicle.

Thus, the medical development in Kalba was dependent on a small clinic established by a British woman doctor just for first aid treatment. In cases which were hard to treat, the patient had to be taken to Dubai at that time by Land Rover through the wadis' routes, which took one to one and a half days. Sometimes a British Army helicopter would airlift patients who were more seriously ill to Dubai.<sup>(14)</sup> Later, in the 1970s and even today, a high proportion of patients travelled to the northern emirate's hospitals because they have better facilities than those in rural areas.

The establishment of roads between the east coast and western cities of the Emirates has enabled many people to visit Dubai's hospitals. About 70 per cent of patients attending Dubai Hospital are from northern emirates, such as Ras al Khaimah and the east coast.<sup>(15)</sup>

Another example of the impact of the development of roads is on the improvement of hospitals and clinics of east coast villages. Health care was problematic and underdeveloped before Federation, but is now better developed as a result of the expansion of roads and increase of car ownership among the population.

A clinic was established in Dubai in 1943, which later developed into 'Al Maktoom Hospital, established in October 1951. From the beginning of the Federation when the number of hospitals in the U.A.E. was seven, the number jumped to 29 hospitals in 1990.

The best examples of the impact of roads in the distribution and development of health sectors in the Emirates is represented by the development of the east coast towns and villages, and in Dubai Emirate. The initial stages towards the real development of the whole state and especially on the starting of roads expansion began before 1970. Construction of the Transpeninsular Road began in 1967. That marks the first step towards the change in social activities such as the construction of hospitals, schools and shops on the east coast (see chapter 2).

Subsequent developments have led to the gradual improvement in those services, allowing more advantage to be taken of them. The road has encouraged people to visit cities such as Dubai, Sharjah, and even Abu Dhabi, for many purposes such as medical treatment in their hospitals, and shopping.

However, the rural provision in the social services has not been lost because of that dependency on the main cities. The small clinics and shops remain to provide the basic needs of goods and foods for the rural population.

Hospitals have been established in all cities of the Emirates, and even in some villages. In rural areas the hospitals and clinics have raised the standard of medical level among their population.

Khor Fakkan on the east coast was, in the 1970s, a very small community with a population of 3000, and was an undeveloped area. The roads were in very limited areas and there were no major asphalt road links between Khor Fakkan and Fujairah and southern areas. Medical treatment was based on the traditional methods which led mostly to poor results and had a higher death rate among the population.

The health services were improved and established by foreign aid to these areas, such as by Britain, Kuwait and other Arab countries. The hospital was opened in the early

1970s,<sup>(16)</sup> whereas other areas such as Fujairah and Kalba had no hospitals; thus, people requiring medical treatment were forced to travel to Khor Fakkan, enduring a journey lasting anything between five to eight hours and potentially aggravating the patient's condition. This situation reflected the absence of roads or cars to carry the patient to the health centres. The attention of the newly-formed federal government turned immediately to the provision of comprehensive services in all areas. Roads were developed in most areas to link all places into one network.

The lack of roads in Fujairah meant that medical development was difficult. During the 1950s there was a clinic in Fujairah, and the patients who attended for treatment were from nearby areas. People who lived in places further afield, such as in the mountain areas, could not attend because there was no road. The doctor had a Land Rover and had to visit those areas to see the patients. After the 1960s the routes began to be more suitable to facilitate the mobility of the patients so that they could visit the clinics in the towns.<sup>(17)</sup>

From the above, it can thus be seen that a centre like Dubai has emerged as a major node for other places in terms of level of health services. Places like the east coast towns depended on Dubai hospitals. In Dubai Emirate, the medical services expanded very fast, because of wide scale improvements across a range of fields such as increases in income after oil production began in 1969; and as a result of increases in the population and urban expansion which at that time needed more facilities and services. In 1943 there was merely a clinic in the middle of Dubai city, serving the people of Dubai.

Between 1970 and 1980 the urban areas extended into the interior, creating new residential areas. Government policy planned this expansion in order to cope with the increase of the population. The hospitals had been established in the main urban

areas located close to the CBD. As the new residential areas were developed, clinics were established to serve the new areas. The road network has linked these areas and facilitates the movement of the people to these clinics.

### **6.6.2 The impact on schools**

The expansion of roads is a vital factor in the development process of the country, and has had a profound impact on the development of settlements and social services.

The beginnings of modern education were around 1900, which marks the first stage in the new development of the western cities of the U.A.E. That is because of the concentration of population in these areas compared to other places and more communications with other nations such as Kuwait, Saudi Arabia and even Egypt. The number of pupils receiving formal education in this part of the emirates rapidly increased from 230 students in 1953 to 32,862 in 1971 in a pre-federation expansion.

The development of education paralleled other services which began with federation after 1971. Before that date, the expansion of school education had experienced difficulties. Not only were trained teachers lacking, but the spatial infrastructure was still insufficient to allow the establishment of schools and the distribution of staff to all areas identified as in need. Consequently, the post-federation expansion of the road network had a dramatic impact on schools, especially in east coast settlements.

Some examples serve to illustrate the development of roads and its impact on the education process. The first modern schools were established in the 1960s in many areas such as Fujairah, Khor Fakkan and Kalba. Before the establishment of roads in those areas, the students of the interior villages travelled by Land Rover to the school in Kalba, although sometimes they used animals. This school was the only secondary school on the east coast, and was only for boys.

Travel was very difficult to keep the educational process going on. The students of northern areas such as Khor Fakkan and Fujairah came to Kalba every day by any means of transport such as trucks and Land Rovers. Later on, in the 1970s, the roads were just established to link some major places like Fujairah and Khor Fakkan with Kalba. Then other schools were established in those villages as a result of the existence of roads and as a result of the increase in the population. Government policy assisted to offer such services to concentrate the population.

The road which links the east coast with Dubai and western cities was established in the late 1960s, which encouraged school teachers who were working in these places to take a vacation roughly once a month to go to Dubai to buy those necessities of their lives which were still unavailable on the east coast. This illustrates the degree of social difference and service provision which, prior to their greater integration, characterised these 'far flung' parts of the U.A.E.. Also, in Massafi village, which consisted of a small population, the school located there received students from 15 small villages from the area surrounding Massafi. Those students who lived in those villages came to school by Land Rover through the wadis. There were only a few students, around 20, in 1975; later, after these routes were improved, the numbers of students increased to 400 in 1993. This is clearly related to the improved roads to these areas.<sup>(17)</sup>

This section also attempts to identify some of the changes in the social development affected by the development of transport means in the U.A.E..

The social structure of the people of the U.A.E. was altered by the use of car and roads. There still remain different lifestyles between the rural areas or east coast cities and western coast cities such as Dubai, Abu Dhabi and Sharjah. The east coast and other northern emirates' people usually make trips every weekend to Sharjah for

shopping, for example, where there is a variety of goods and restaurants and other recreational places, and also to Dubai, for instance, where there are more than five modern shopping centres located in different areas of Dubai.

In Hatta village, for example, which is located in the rural area of Dubai Emirate, its population consists of national and non-national (20 per cent of total population of rural areas of Dubai in 1985). The non-national population work on farms and gardens belonging to the national people, and also work on construction projects in the village. At the weekend (Thursday and Friday) they make trips to Dubai, to enjoy themselves in the recreational places such as cinemas, restaurants or other recreational centres. This might be because of the lack of such centres in the rural areas. The national population also enjoy themselves by making trips to Dubai city for shopping or other purposes such as medical visits to hospitals. Thus, the major point of that development brings us back to the use of the car, which has indirectly helped the building of roads which penetrated the land to the remotest places.

On the other hand, the city's population also visits other places, such as interior areas of the Emirates. Therefore, some of the peak demands are during leisure (not work) times. They move to Hatta or the east coast villages for recreation and relaxation, escaping from the city's atmosphere; thus, this movement has definitely lead to an increase in traffic, which has created some congestion on the main roads.

## **6.7 Conclusion**

An attempt has been made in this chapter to assess the impact of the transport system, especially the use of vehicles, on the population mobility of the U.A.E., and to recognise and understand the immense influence that it has had in effecting a transformation of the society from its traditional lifestyle to a modern one.

Enormous social changes have taken place in the Emirates within the past twenty years, and this needs to be attributed to the improvement in transportation. The increase in social services is reflected in Al Ain based on the high percentage of travel that has been recorded as being associated with educational activities. Similarly social services have spread throughout Dubai Emirate thanks to road construction and the concomitant increase in car ownership. The east coast is the best example of that development, having previously suffered from poor mobility and lack of social services. More recently it has gained the benefits (and the drawbacks) of a good road linking it with other parts of the Emirates. The development of roads has increased and improved the numbers of schools and students and hospitals.

The significant effects of the impact of transportation are seen in the dominant role played by private cars within the transport sector as the means used to enhance the mobility of the population in the cities and in the role played by public transport which has its shortcomings despite the recommendation of the authorities in the Emirates to improve this sector.

In Dubai Emirate, as in the other emirates, the use of motorised transport is accompanied by the major problem of urban traffic congestion, not least because of the dominant use of private cars, which creates most of the congestion in the CBDs. The 'Abra' as a traditional method of transport in Dubai, as mentioned in earlier chapters, is an important factor in reducing the congestion on both sides of the CBDs of Dubai. It could be recommended that Abra facilities should be improved so as to be more suitable for all passengers travelling between the two parts of Dubai. Facilities to upgrade the boats should include equipping them with air-conditioning and more comfortable seats.

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- (16) Interview with Salim ben Jasim, 55 years, as previous driver. He saw the development in Fujairah and its areas from the fifties to the recent times.
- (17) Interview with Dr. Abdulhamid Gunaim, Department of Geography, U.A.E. University, dated 27 March 1993. Al Ain.

# Chapter Seven

## The impact of politics on the transport system of the U.A.E.

### 7.1 Introduction

The transport system is one of the spatial aspects affected by the internal and external political circumstances in any country. This is because the nature of politics creates spatial relationships between geographical features, such as in the formation of state political boundaries. Politics, in every sense affects transport; likewise, transport can affect politics. In the context of the U.A.E., it is the interplay between the interests of the individual emirates, the interests of the Federation, and the interests of other states, notably Oman and Saudi Arabia, which all intertwine and have been responsible for much of the system that now exists on the ground - from the details of its alignment, through major inter-nodal linkage, down to the decisions not to develop in certain directions.

The impact of politics on transport systems, and vice versa, is thus a highly complex issue, and a country with a political system as complex as the U.A.E., which is a federation of still-sovereign units which has seen its internal modern transport system emerge from almost nothing in under 25 years, provides a remarkable laboratory for studying this impact.

The influence of international politics on transportation is broad, such as the placing of customs points on the borders between the countries in order to regulate the import and export of goods. Political decisions and political changes within the Gulf region directly affect the transport system, as represented either by impact of the political boundaries upon the location of roads<sup>(1)</sup> or by the impact of political changes such as international relationships between the countries. Examples of these are the estab-

lishment of regional councils, and the turbulence caused by warfare. Moreover, the political orientation of a government will in turn have implications for the transport policy. This latter point is examined in both this and the following chapter.

In reality, this topic may be more complicated in certain respects than in others because of the precise relationship between politics and the transport system. To help clarify some of these issues in the U.A.E., individual case studies have been used.

In this chapter the transport system in the U.A.E. will be evaluated from the political point of view, concentrating on two major points. First, the details of the internal and external boundaries of the U.A.E. and their impact on road location; and second, the activities of the international transport system, such as seaports and airports during the Gulf War of August 1990 to March 1991 and their regional impact as an agent of political change.

## **7.2 The political importance of the United Arab Emirates**

The U.A.E.'s regional location has given it a political importance greater than its size would warrant: this has encouraged transport developments, initially stimulated by outsiders such as the British, but more recently by the leadership within the U.A.E. which has realised the political necessity and the political potential of a modern transport network.

The strategic location of the United Arab Emirates is of vital importance to the country. This importance partly stems from its oil reserves and production (the emirates have between them 304,000 million barrels of proven reserves<sup>(2)</sup>, and oil production reached 2 million barrels a day in 1990), and partly from its strategic location on either side of the southern shore of the Strait of Hormuz. This strategic importance is due to an increase in world demand for oil, and has led to increases in

oil production and exports to industrialised countries. Another specific and significant feature was the political development in the Gulf when the U.A.E. agreed to the deployment of military forces in the Emirates, against Iraq, in 1990-91.

Political considerations have encouraged the U.A.E. government to develop a road strategy which involves linking together all the emirates in a speedy and efficient network. This is in line with the broader goals of political and social unity, and the nurturing of similar federalist aspirations. An example which illustrates this policy is the 1967 opening of the first road to link the Emirates of Fujairah and Sharjah with the aim not just of increasing trade but also of promoting unity between the west and east coasts.<sup>(3)</sup> These steps have been followed by many social projects throughout the cities, towns and villages, and these include settlement projects, hospitals, schools, mosques and works of service to society.

In the context of recent global political development, the U.A.E. continues to play an important role as an oil producer. On a regional level, the U.A.E.'s east coast has strategic significance, in particular for the GCC countries. Since the Gulf War, a new strategic dimension has been proposed: that of establishing a 'strategic storage' base for the GCC countries on the east coast of the Emirates.

Being essential to the political stability of those countries which depend on it, international trade needs to be recognised as a political feature for many countries. International trade plays a role second only to oil in the U.A.E. economy.

### **7.2.1 Oil sector and transport**

The economy of the Emirates is dominated by oil production and its related industries. This major source of revenue thereby indirectly supplies the financial basis for all projects throughout the Emirates. After the discovery of oil in this country in 1963,

there followed development a rapid expansion of the Emirates' international trade, based upon oil exports to the world. Figures 7.1A and B show the extent of that trade in the second half of the 1980s, and the extent to which diversification away from oil had been achieved. These major factors contributed to the development of a specialised sea transport system, such as oil terminals and commercial ports.

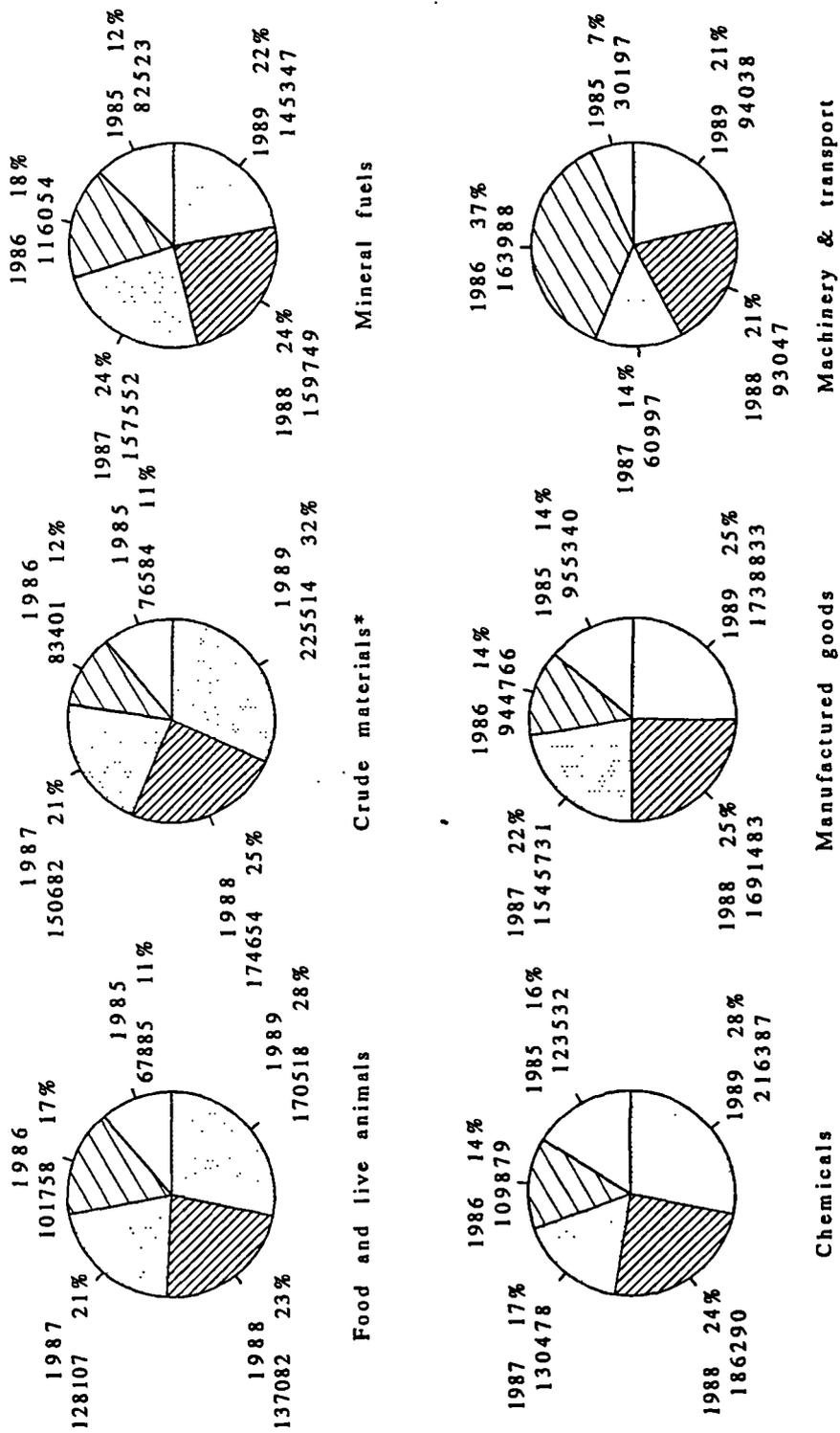
Abu Dhabi is the major emirate in the production of oil. The geostrategic importance of oil in the Emirates is related to the oil fields, crude oil production facilities, oil reservoirs, oil tankers, terminals and oil-related and other industries in the U.A.E..

Oil is transported by pipeline from the oil fields to the oil terminals where it is pumped into tankers. This movement of oil is important for the offshore and onshore fields. The need for equipment related to oil production, pipelines, tankers and the construction of terminals has led to major development of, and investment in, a complex, related transport system.

Security is needed to protect the oil fields from political threat. An example of this was when, as a result of the Gulf War between Iran and Iraq, air attacks in 1986 disrupted some offshore oil fields, to the extent of terminating oil transport activities.<sup>(4)</sup> However, the vulnerability, and therefore strategic importance, of the oil is more related to the transportation of the oil by tanker, often along politically sensitive or vulnerable routes, than to the actual location of the wells themselves.<sup>(5)</sup>

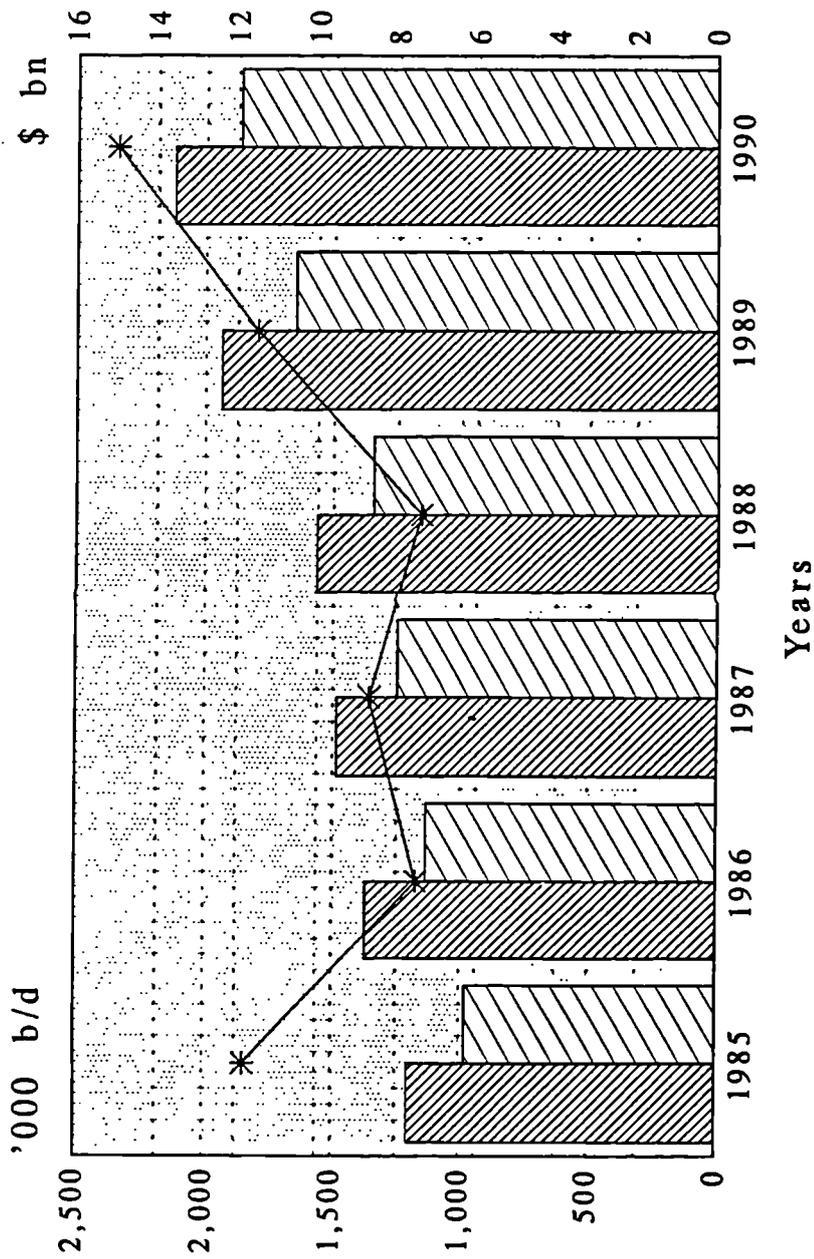
Figure 7.1(a) The foreign trade of the UAE, from 1985 to 1989. Non oil Exports by value. ('000 Dirhams).

As a main export items



Source: Ministry of Planning, Statistical Annual Abstracts, 1986 to 1990.

Figure 7.1(b) The foreign trade of the UAE, from 1985 to 1989.  
Oil exports



▨ Crude Oil production □ Oil exports \* Oil export revenues

Source: The economist Intelligence Unit, Profile 1991-92.

### 7.2.2 Strategic location and the transport system

The location of a country relative to other countries in the region, and indeed in the world, is an essential feature of its state structure, determining the political, economic and social behaviour between a state and its neighbours<sup>(6)</sup>. Regarding the political evolution of the U.A.E., the following view was expressed in 1973:

*"Internally the Emirates' road links, both with each other and with the rest of the Middle East, are being steadily improved in a bid to make the union a geographical and commercial, as well as a political, reality."*<sup>(7)</sup>

In terms of the geopolitical significance of the U.A.E.'s location and its maritime function, the internal road network of the U.A.E. is in essence a link between the two coastal strips: that on the currently-vulnerable Gulf and that on the Gulf of Oman; the former traditionally far more important than the latter. The network therefore reflects not only the relative importance of the Gulf coast and the 'Omani' coast during the formative years of the transport system, but a realisation that fast, secure links between the two could prove crucial to the economic and political development of the state.

The transport system has played a key role in the United Arab Emirates during recent times of political violence of the Gulf region. Sea and air transport systems have been the most significant elements, the development of which has gradually increased the U.A.E.'s political and economic importance. War in the Gulf created important dimensions which relate to the significance of the strategy of the U.A.E.. Following Iraq's invasion of Kuwait, in August 1990, a political coalition against Iraq was arranged by the Gulf states which agreed to authorise the use of some of the land of these countries for military purposes. This military development was mentioned in the Herald Tribune Newspaper on 21 August 1990, focusing on the location of the transport system in the U.A.E. in such cases:

*"In the United Arab Emirates, the huge port facilities at Abu Dhabi, Dubai and Jebel Ali and its three international airports could be of great value, given the scale and likely duration of the western military build up in the Gulf." (8)*

The transport system of the U.A.E. later offered a vital back-up for the liberation of Kuwait by allowing military forces to use it.

The emergence of international trade as an important activity at the U.A.E.'s ports, and especially the development of ports such as Dubai's as entrepots, has heightened both the importance of security considerations in the U.A.E.'s planning process and the U.A.E.'s vulnerability because of global involvements. Consequently, security of the Emirates' navigation and maritime transportation are essential 'geostrategic' elements of the U.A.E..

Other internal factors show the importance of political factors in the U.A.E. transport sector: the importance of population distribution and density; the population's internal and external mobility using the transport systems; and their use of the different transport modes. The increasing rapidity of internal transport flows has certainly encouraged integrative processes throughout the U.A.E., and has been recognised as a force for change. At the commencement of the Federation, there was still a basic separation between the towns and the villages. Roads have since played a major role in drawing together the population and cementing their relationship. Centres of population have developed city functions from their previous village or town functions. For instance, Al Ain was traditionally an agricultural and caravan transit point used by the Buraimi (Oman).

A factor in the strategy of the Emirates is the long coastline. The transport system has utilised natural harbours and creeks especially along the west coast. From the geopolitical point of view, the existence of a coastline along two seas is seen as crucially important for the U.A.E.: a realisation which has been heightened by recent

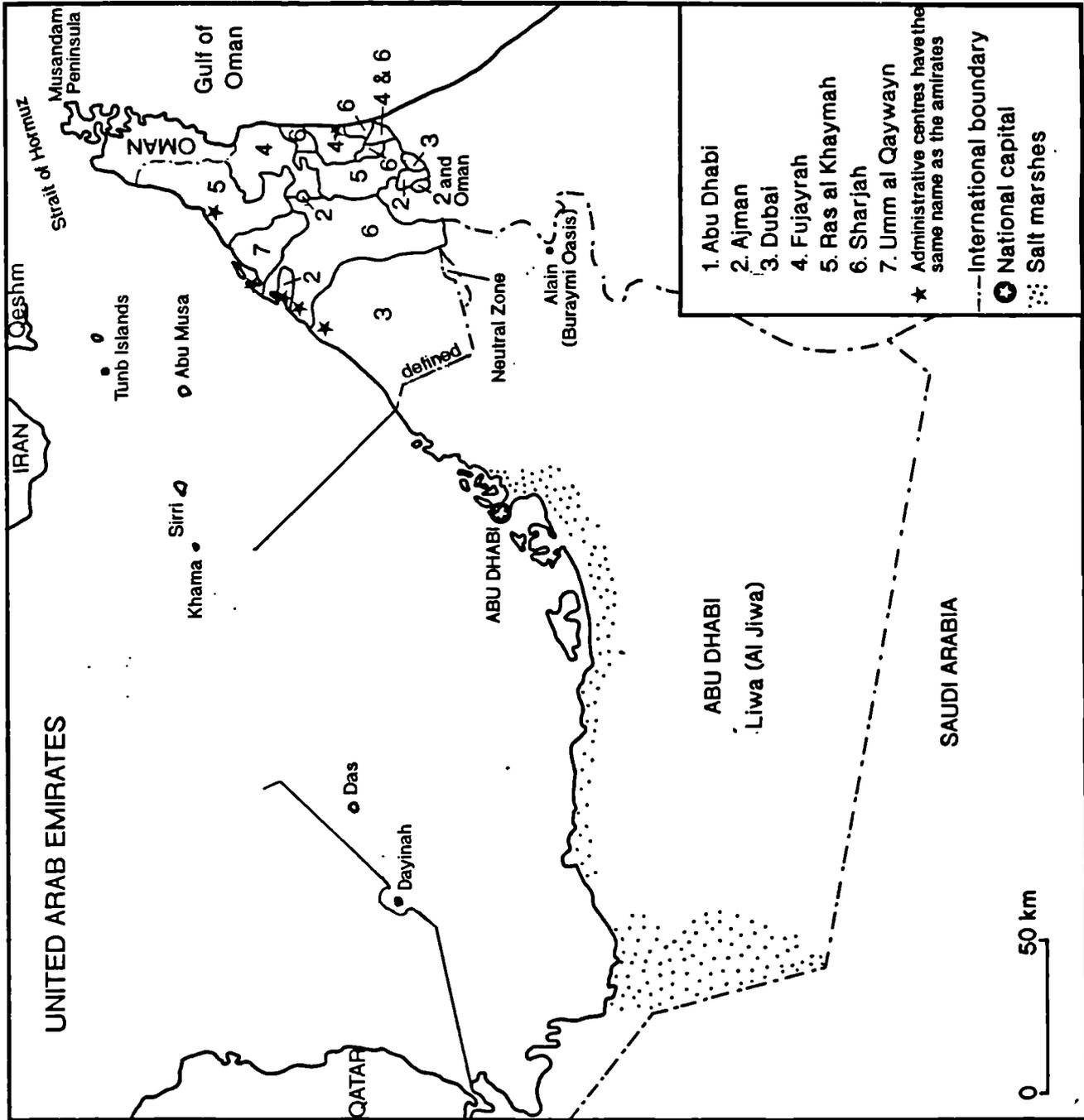
threats to 'close' the Strait of Hormuz and by embargoes on shipping movement within the Gulf. The role of this east coast as a 'strategic storage' base for the GCC states has already been mentioned in this context. Thus, the development of seaports has been expanded on both coasts.

### **7.3 The political boundaries of and within the U.A.E. and their relationship to the location of roads**

The impact of the internal political boundaries as a potential artificial barrier on the location of roads in the U.A.E. is a major issue which needs investigating. This issue was mentioned by Appleton (1967) in his book about the impact of political boundaries on the alignment of the road network. He argued that, overall, political boundaries had as much impact as physical relief on road network alignments. <sup>(10)</sup>

In the case of the U.A.E. this becomes much more complex and obscure. Chapters 2 and 3 discussed the impact of landscape features on the road network and concluded that, in the main, by making use of modern technology and a high resource input, landscape had been 'overcome'. In contrast, the role of the 'internal' boundaries of the U.A.E. is ambiguous. On the one hand, they are not what Appleton imagined when analysing boundary impact, given that his analysis was mainly concerned with international borders. On the other hand, the federal constitution of the U.A.E. confirms that whilst having established a unified Ministry of Public Works which embraces transport (roads), the individual emirates retain their sovereign rights over their agreed land areas. As maps such as Figure 7.2 indicate, these land areas have complex borders and include many exclaves and enclaves. Therefore, the potential for problems when agreeing on new road development and precise alignments is considerable: some examples of these issues are shown in the next sections.

Fig. 7.2 The internal boundaries of the UAE.



These internal boundaries are not a problem for traffic movement. There are, however, some recent examples of the obstruction caused by internal boundaries regarding improvements in road construction. In the U.A.E. these conflicts have led to changes in the alignment of particular roads, or to the abandonment of vital road proposals between towns and cities. The cancellation of road building projects is examined later in this chapter.

There were some problems related to traffic movement between Dubai and the northern emirates in 1976, as a result of a boundary dispute between Dubai and Sharjah, for which British arbitrators were eventually called in. Dubai took control of the movement of taxis between Dubai and the northern emirates.<sup>(11)</sup> This action was limited to taxis as they were at that time the cheapest and most popular form of inter-state public transport between Dubai and Sharjah.<sup>(12)</sup> There were many implications of this incident between Dubai and Sharjah. This sort of political action had the greatest effect on population mobility between the places concerned. Dubai is a place of work for many people living in Sharjah. As a result of the boundary conflict between Dubai and Sharjah, the ruler of Dubai attempted to prevent the people of Sharjah from carrying out their business in Dubai, the major commercial centre in the U.A.E.. He used control of the taxis as political pressure on Sharjah.

This boundary dispute was resolved later between the two emirates when they agreed to fix a line demarcating the boundary. Traffic flow between the two emirates is now the heaviest of the entire road network.

Before federation, there were border controls between Abu Dhabi and Dubai. Each car, private or taxi, had to stop and the occupants produce their passports. The next section will investigate the problem of border controls along two dimensions: internal and external, using for purposes of evaluation the existing road between Dubai and

Al Ain, and the proposed link road between Ras al Khaimah and Fujairah Dibba on the internal scale. On the external scale, the international boundaries of the U.A.E. will be examined.

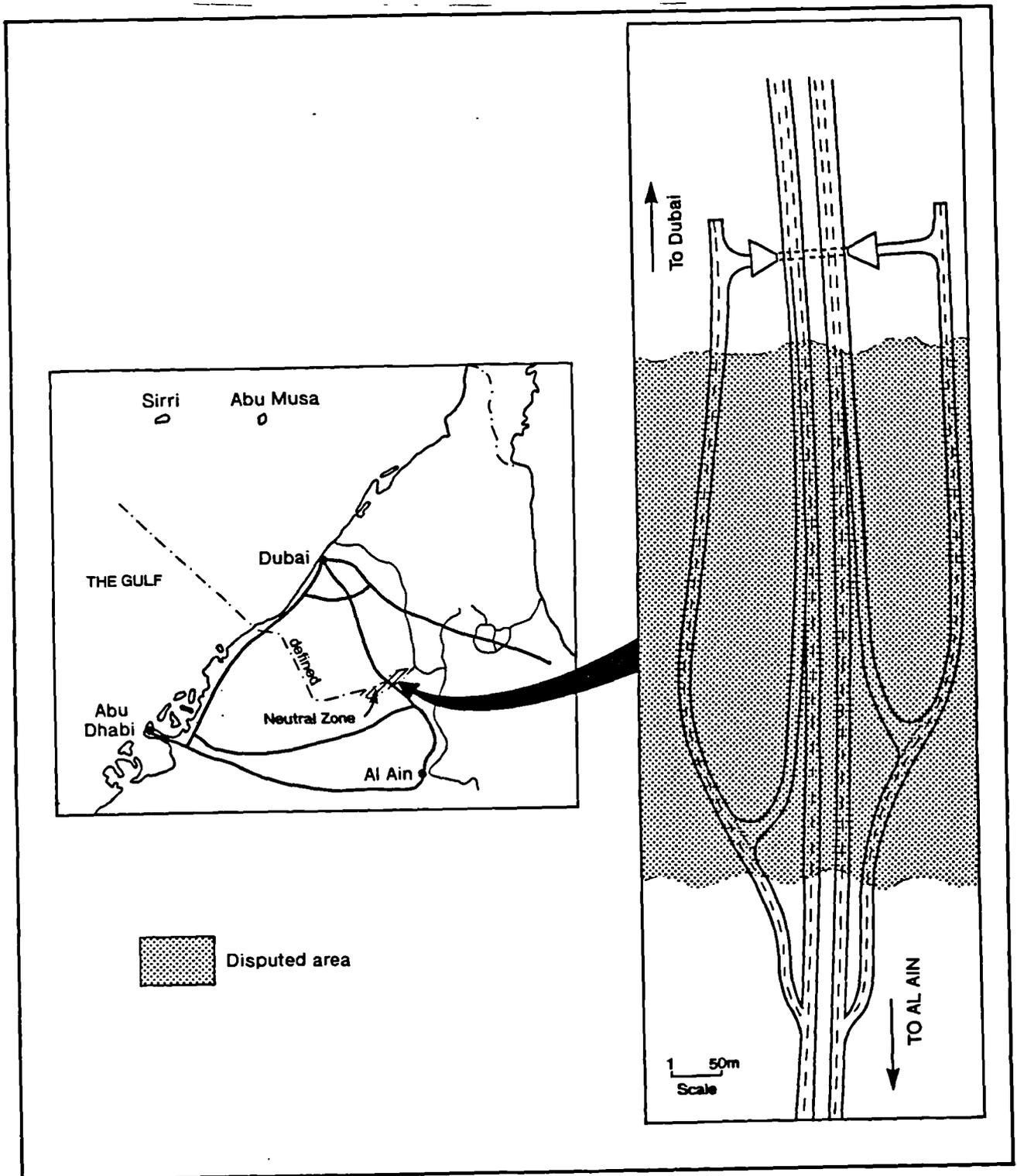
### 7.3.1 Al Ain-Dubai road

The major new road between Dubai and Al Ain (136 km) was completed at the beginning of August 1984, the first stage being 23 km from Dubai to Al Faqqa'a village, a border point between the Dubai and Abu Dhabi Emirates.<sup>(13)</sup> The road passes many small and moderate sized villages. One of the busiest roads in the U.A.E. road network, it is a main link between Dubai and the northern emirates and the Al Ain region, is the major link for most traffic, and is a crucial part of the through-route to Oman.

The political significance of this road's alignment relates to a boundary dispute within Al Faqqa'a village between the emirates of Dubai and Abu Dhabi. The dispute, in February 1969, was resolved when *Dubai and Abu Dhabi agreed to put a neutral zone* between them, defined by four wells, Tawi al 'Ashush, Tawi Baraq, Tawi Zulayman and Tawi al Faqqa'a.<sup>(14)</sup> The latter well is related to the recent village, because it had been used simply by caravans travelling between the coast [Dubai] and Al Ain and Buraimi oasis.

A three-lane dual-carriageway had been planned to pass through Al Faqqa'a village. As a result of the political dispute, however, the configuration of the road is not uniform. Although the road was surveyed by one consultant, the dispute led to the road being built by two contractors. The road from Dubai to Al Faqqa'a was built as a three-lane dual-carriageway, but from Al Faqqa'a to Al Ain as a two-lane dual-carriageway. This road configuration is shown in Figure 7.3.

Fig. 7.3 Dubai - Al Ain Road, near al Faqqa border point between the two Emirates.



The problem has a political and economic basis. Abu Dhabi regarded itself as the seaport for Al Ain. The Abu Dhabi government and merchants wanted to develop Abu Dhabi as a port, but the economic logic for this would be reduced if domination of Al Ain's trade was not guaranteed, and this depended on the Al Ain market. Dubai, on the other hand, economically and commercially the strongest of the emirates, wanted to strengthen further its distribution, and therefore trading, position amongst the emirates. The configuration of the road was changed in accordance with Abu Dhabi's desires and ambitions. From the point of view of Abu Dhabi, the case for this road was overwhelming as it would lead to a decline in the movement of goods from Dubai to Al Ain; Al Ain merchants would turn to the Abu Dhabi market for faster delivery, thus increasing trade. This type of action is clearly against federal intentions, and eventually created a lot of problems between the emirates.

The case has had several consequences. It has led to confusion in the regional development of the Emirates. Further, there is a reduction in the overall efficiency of regional and international roads, in terms of the movement of passengers and, most importantly, goods. Other examples of the political problems between Abu Dhabi and Dubai include the problems of building a road between these two emirates under the U.A.E.'s Federal government. The road which existed before federation was not asphalted, and traffic was slow. At a border station, *Seh Shuaib*, passengers' passports were checked. With the development of Abu Dhabi's infrastructure, the needs of building and construction projects Abu Dhabi were supplied insufficiently rapidly. Dubai, which focuses on commerce, jumped at the opportunity which offered itself, and Dubai's merchants sold their wares to Abu Dhabi making use of either road and sea transport. Dubai decided to reconstruct the road as far as Jabel Ali: the southern point of Dubai boundary. However, Abu Dhabi's merchants and some of the political influences represented by sheikhs, refused to improve the road because of Dubai

competition against Abu Dhabi economic sectors. Later in 1972, the Abu Dhabi merchants had been unable to realise their ambition, for the needs of federal targets were to link all major and minor places throughout the country. Even after construction, this road still suffers from maintenance problems, which might be attributable to the lingering atmosphere caused by past events.

### **7.3.2 Ras al Khaimah - Fujairah Road**

This case shows the consequences of political disputes on the internal boundaries between the emirates. There were problems of 'confidential data' in this part of the study. However, some relevant data has been obtained which makes the illustration clear.

This road was proposed in 1980 to benefit some villages located along the proposed road,<sup>(15)</sup> and to link the northern emirates with the east coast near to Dibba village. The U.A.E.'s Ministry of Public Works and Housing agreed to produce a preliminary report on the "Idhn-Tawiain-Dibba Road", agreeing that one consultant should build this road. This road was planned both to serve seven small villages in order to improve their agricultural development, and to increase access for the Ras al Khaimah area to the east coast centres.

The villages to be served by this road are Ryamah and Tawiain plus the tiny settlements at Malayen wadi, Muhtarikah, Zahir, Safwa and Ghob. It was proposed that the road would serve these places on its route from Ras Al Khaimah to Dibba, ending in that part of Dibba which is within Fujairah Emirate (see Figure 7.4).<sup>(16)</sup> These villages are disputed between Ras al Khaimah and Fujairah.

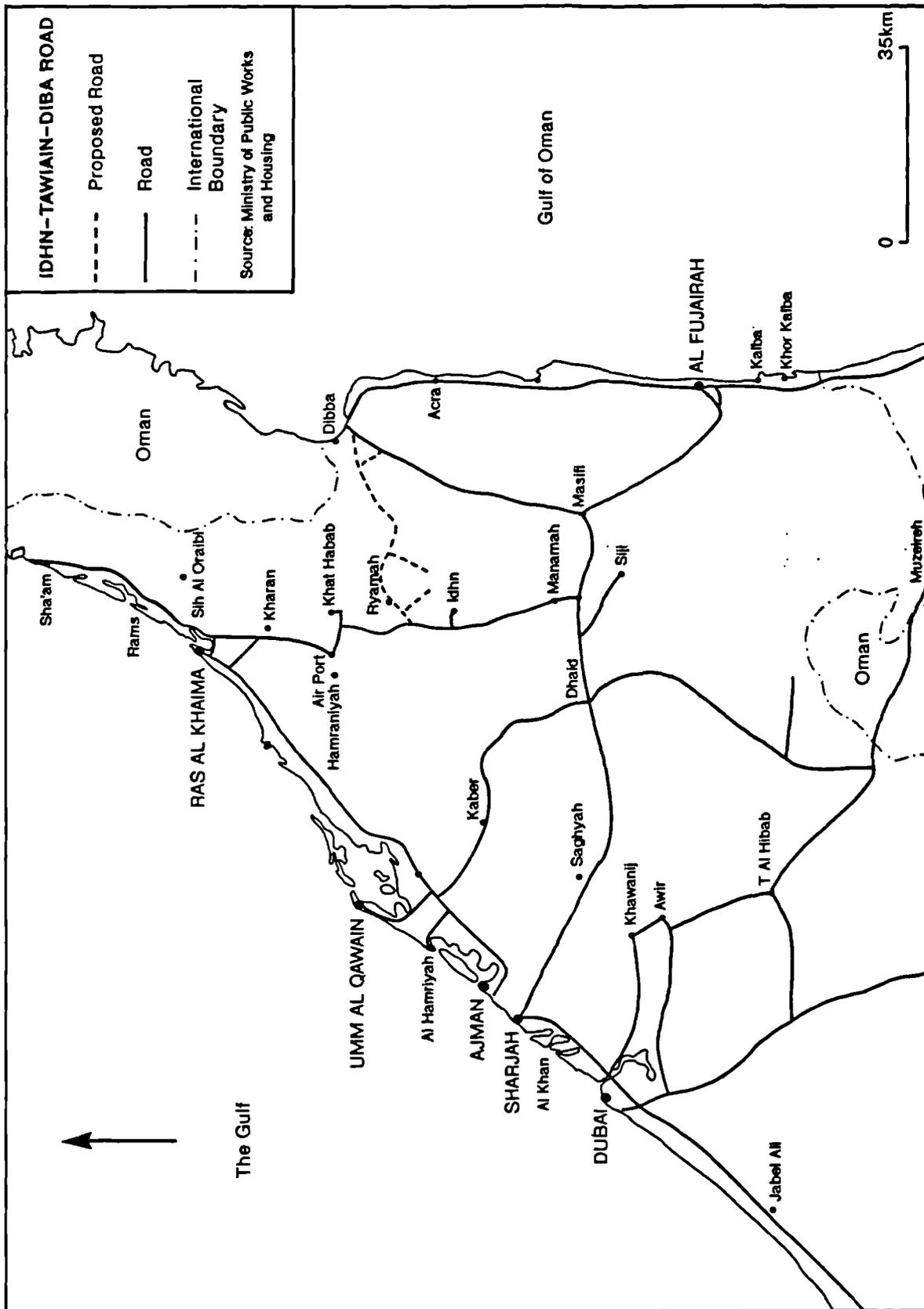


Fig. 7.4 The proposed road between Ras al Khaimah and Dibba (Fujairah).

The road project was cancelled when a conflict between Fujairah and Ras Al Khaimah about their mutual border blew up during the preliminary study for this road. Sectors on the border between Fujairah and Ras al Khaimah are not yet demarcated, and it is these which have led to problems. In terms of establishing a completed road network serving all the emirates, this road would have been valuable. The problems, however, stand in the way of regional development and national unity. These dimensions are related, in a circular fashion, to the lack of demarcation of the boundaries. For the lack of a road results in a continued failure to settle the demarcation of disputed internal political boundaries which would represent the best solution.

### **7.3.3 International boundaries and road location**

On the international scale, roads can be used as a symbol of the official unity of country.

The impact of the international boundaries on road location is more pronounced than that of the internal boundaries between the emirates. Only Saudi Arabia has formally demarcated all its boundaries with the Emirates. Neither the Sultanate of Oman nor Iran and the islands have formally demarcated all their boundaries with the Emirates.

The point here is that the fixed roads and infrastructure demand a clear agreement about ownership and responsibility. In the past, vagueness about demarcation was probably both inevitable and desirable. Therefore, building new routes across the type of space both increased demand for the use of this space and for ownership to be clarified.

In 1974, Saudi Arabia signed an agreement fixing its political boundaries with the U.A.E.. Prior to this agreement, political problems confronted the planners of the road to link Abu Dhabi with Al Sila on the route to Qatar and the rest of the Gulf.

The strategic location of western Abu Dhabi led Saudi Arabia to desire an outlet in this part of the southern Gulf. Construction of this road began in 1971 in order to develop international linkages with the Emirates. The road is the sole concern of the Abu Dhabi government. In reaction to the boundary conflict between Abu Dhabi and Saudi Arabia, in particular the last agreement in 1974, this road has changed in its formation. This road was built between the governments of Abu Dhabi and Saudi Arabia.

Figure 7.5 shows the situation before and after the agreement of 1974. The significance of this road is a return to the movement of passengers and goods through the border point (Al Sila). This benefits the Emirates, and also relates to the strategic importance of the area which links the Emirates with Qatar. However, after the 1974 agreement, the importance of that area for the Emirates was eliminated, and the road is now in the Saudi part.

### **7.3.3.1 The U.A.E. and Oman boundary in the vicinity of Al Ain**

Figure 7.6 illustrates the alignment of the road along the eastern border of the U.A.E. from Al Ain southwards. The road starts from Ain al Faidah in Al Ain region and runs to south of Al Quaa' village 100 km south of Al Ain city, which demonstrates that the alignment of road has been controlled by the boundary line.

This road was built primarily for political reasons, and serves only a small population living there. This road is obviously diverted by the formation of the boundary between Oman and the Emirates and continues to Liwa oasis in the south, but only as a track. Another example of the impact of political boundaries upon road alignment is the road from Al Ain to Al Madam as shown in Figure 7.6.

Fig. 7.5 Location of the major road between the UAE and Saudi Arabia before the agreement of 1974.

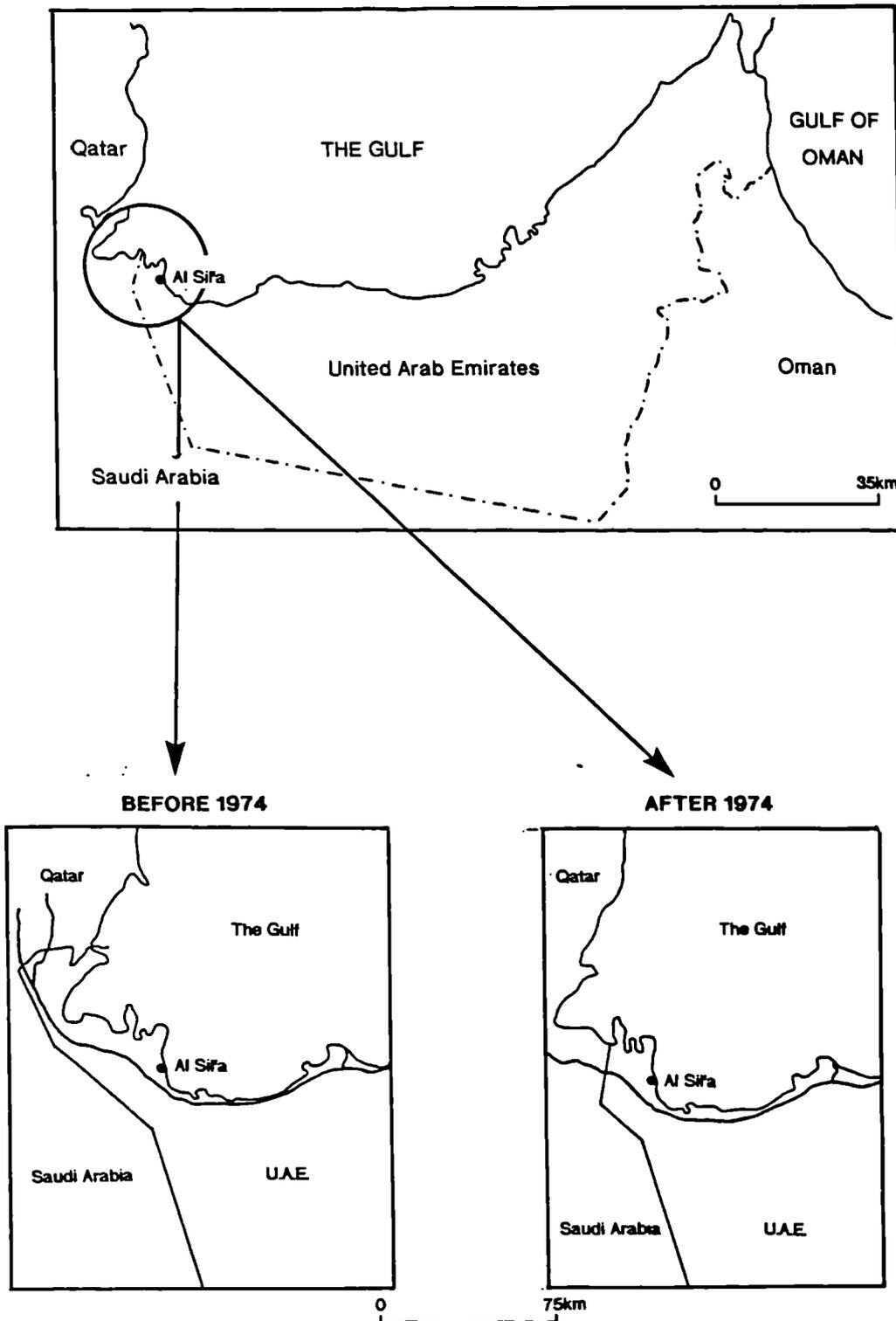
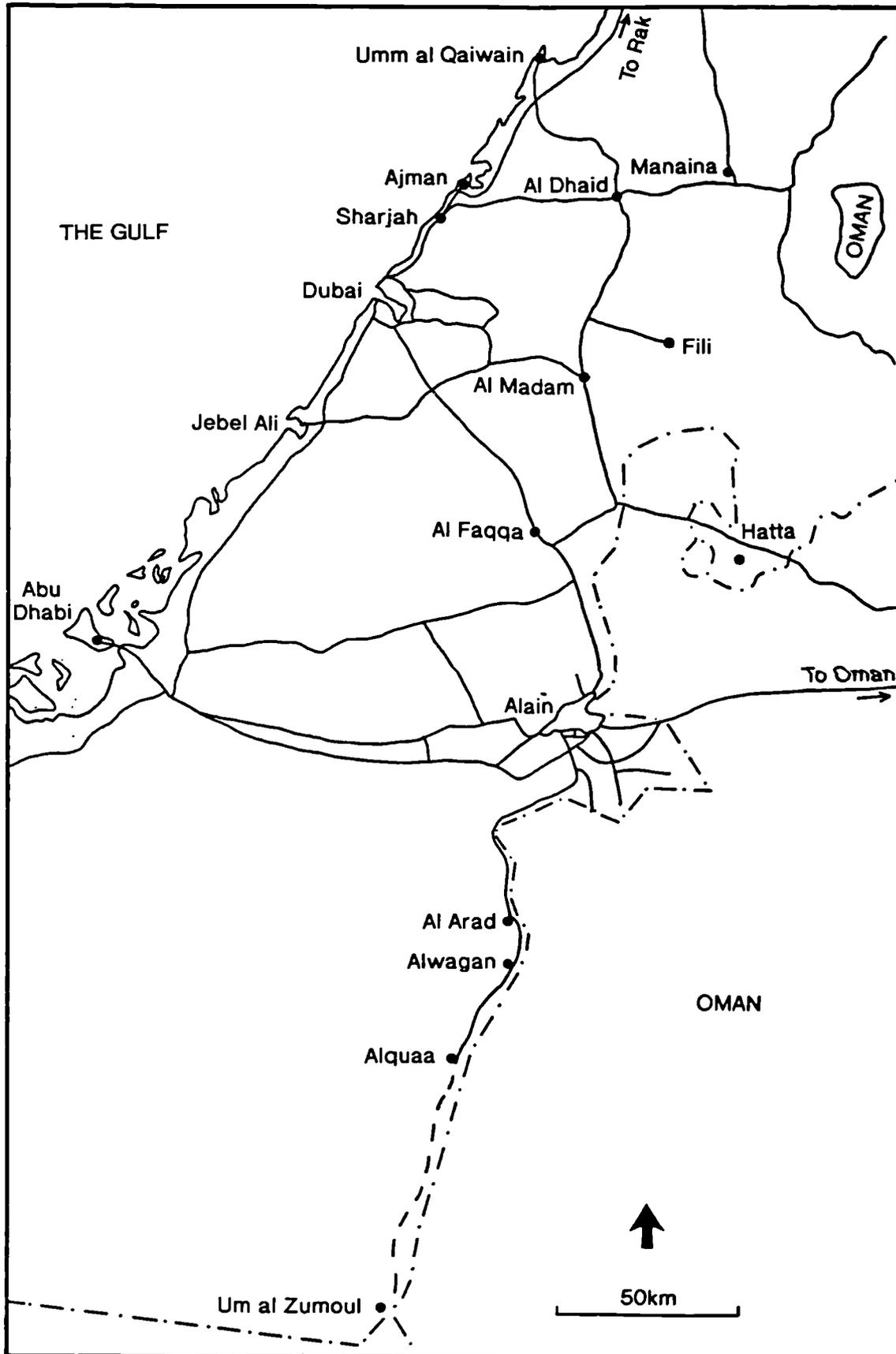


Figure 7.6 THE ALIGNMENT OF THE ROAD NETWORKS IN THE EASTERN AREAS OF THE UAE, SHOWING THE IMPACT OF THE INTERNATIONAL BORDER AREA.



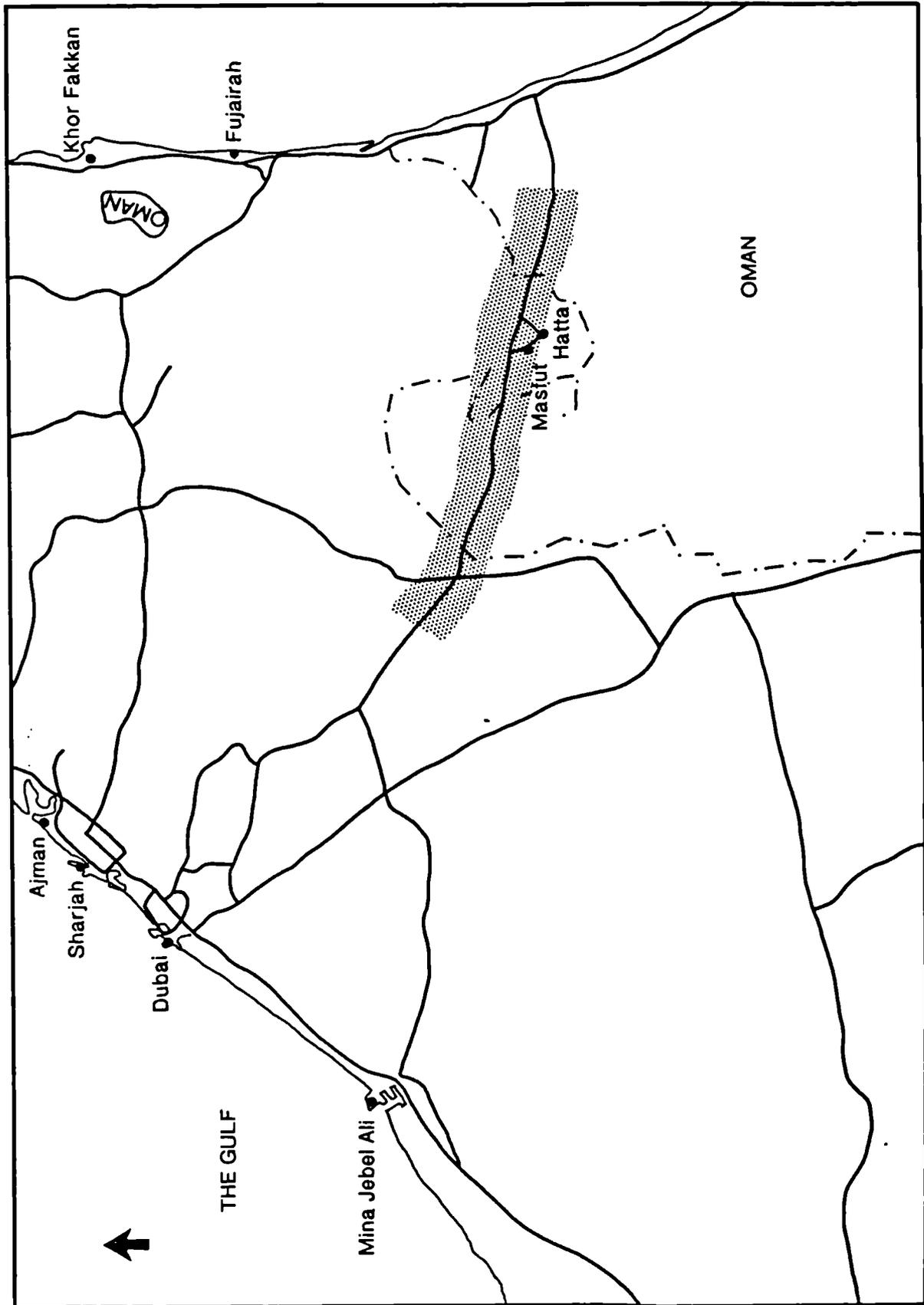
The boundary with Oman imposes this alignment on the road, because of the location of the Omani enclave, Madha, within U.A.E. territory on the east coast.<sup>(17)</sup> This place is situated roughly midway between the southern and northern borders of Oman, a distance of 35 km from the northern border and 30 km from the southern border.

### **7.3.3.2 Relating to the Dubai - Hatta Road**

Political boundaries have different degrees and styles of influence on road location. Figure 7.7 shows the Dubai-Oman road. Its political and economic importance to traffic (passenger-goods), prompted the Dubai government to give this road top priority. The road begins in Dubai Emirate nearly 90 km from the border with Oman. It penetrates Oman (Mahadhah region), passing through about 20 km of Omani territory. It re- enters Dubai at Hatta town, and back into Oman to Sohar on the Omani coast (see Chapter 8).

When the road passes beyond the Emirates border into the Mahadhah area, there is an Omani welcome sign, indicating that this is Omani land, although for just 20 km, before entering Hatta and other Emirates enclaves. The road was funded by the Dubai government, which also built a border control station (al Wajajah). The population of Hatta enjoy full communication with Dubai, not least with the Municipality, police, education and telecommunication facilities. Hatta being the major settlement in that area, and Dubai being a strong and rich emirate with plenty of employment potential, people from the nearby places such as Masfut and other small villages find employment and other services in Hatta

Figure 7.7 THE ALIGNMENT OF THE DUBAI-HATTA-OMAN ROAD, ILLUSTRATED BY ITS COURSE PASSING THROUGH DIFFERENT POLITICAL ZONES.



This road was built for many reasons. Dubai wanted to encourage commercial (passengers and goods) traffic movement between Dubai and Oman. In 1985, traffic flow was 2,700 cars per day in both directions, making it the road with one of the highest traffic densities.<sup>(18)</sup> There was also a mutual political desire to stabilise their long-standing political relationships.

Thus, the impact of boundaries on the road transport system is seen to be both related to modifying road locations and affecting traffic flow. It is concluded that internal boundaries have played a major role in the development of the modern road network. The impact of roads on international boundaries is more related to political and economic factors.

#### **7.4 The impact of the Gulf War upon the transport system in U.A.E.**

Most Gulf countries have faced many problems related to the economic, social and political conditions created by the Gulf War. One of these problems was represented in the decline of total oil production because of the danger and reality of political violence in the north of the Gulf. Internal economic activity fell to its lowest level in the recent years in the Gulf states at the time.

The transport sector was also affected by the Gulf War. The transport system, including air traffic, relating to the northern ports of the Gulf was brought to a complete halt by the hazard of the war in the Gulf. Export and import movement within the ports of the U.A.E. declined during the Gulf War. This decline was a logical reaction, because the lack of security in the Gulf encouraged sea carriers to find safer ports elsewhere to load goods.

These most recent events in the Gulf have brought a new dimension in terms of the efficiency of transport systems for all the GCC countries. New geographical zones which can facilitate transportation between the GCC markets and abroad, such as the

East Coast of the U.A.E., have had their importance enhanced. For that reason, the significance of geographical location and the availability of transport facilities in that part of the U.A.E. is now of more concern to the political authorities in the Gulf.

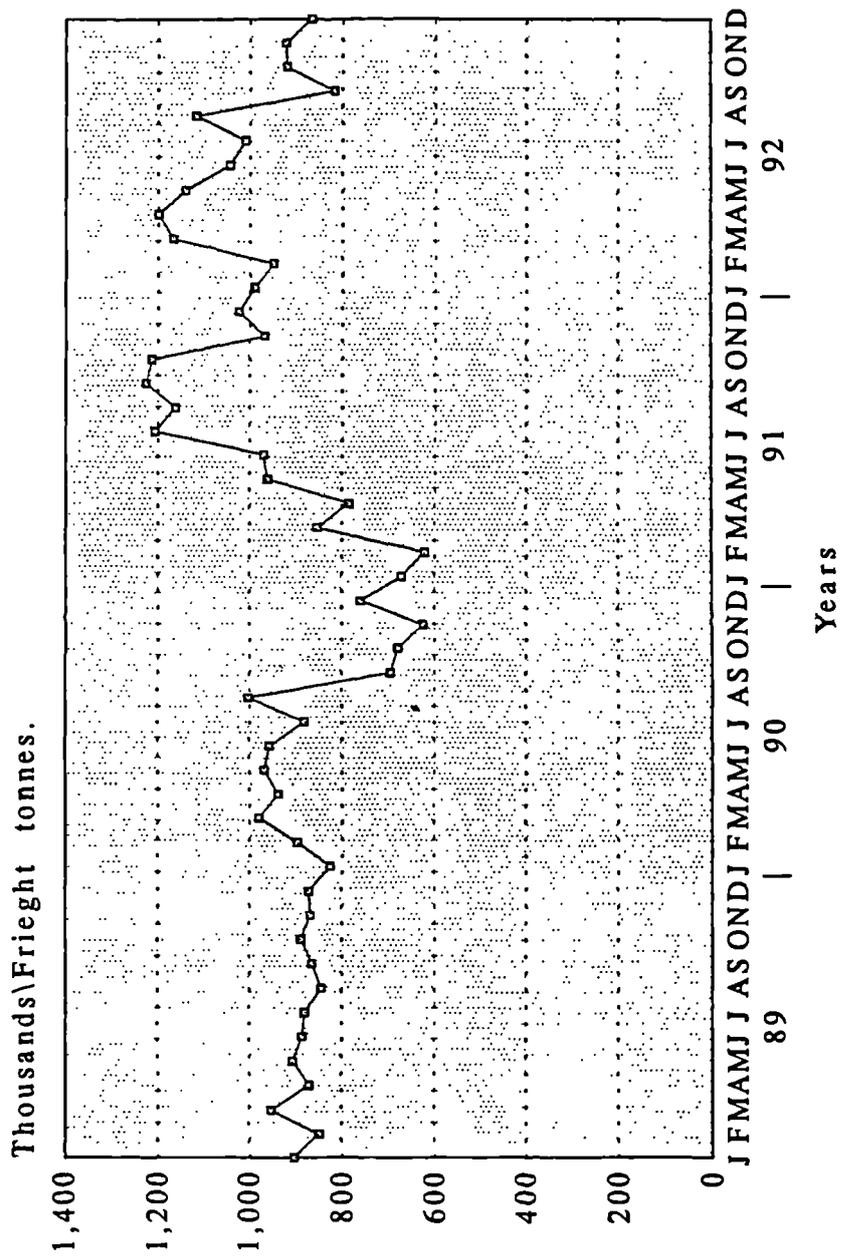
#### **7.4.1 The impact of political events upon the international sea and air transport of Dubai Emirate**

International transport links are very sensitive to political instability. This was made apparent to the U.A.E. by the events of 1990-1991.

The regional political changes since the establishment of the Gulf Co-operation Council in 1984, and those caused by the Gulf War between Iraq and Iran from 1980 to 1988, resulted in numerous specific developments in the transport systems of the Gulf states, and especially in the U.A.E. as a Lower Gulf state. These developments followed a period of greater stability in the operation of the transport system in the U.A.E.. Since 1980, there has been almost constant warfare in the Gulf. The point here is that, after one and a half decades of very rapid economic and physical growth, political instability (outside the U.A.E.) started to be a force to be reckoned with. It has been in the U.A.E.'s interests, and within her economic development goals, that the instability be both minimal and prepared for.

The Iraqi invasion of Kuwait and its immediate consequences affected U.A.E. trade activity (imports and exports) particularly from August 1990 and during the ground battle of February 1991. These effects can be seen in Figure 7.8 which notes commercial activity within Port Rashid. The decline in August 1990 is directly related to the fear of the political consequences of the invasion of Kuwait, leading to much tension in the Gulf region. This resulted in many foreign commercial companies, who had invested capital in projects in the Emirates, deciding to leave the country. Some of these companies transferred their headquarters outside the U.A.E., returning only after the liberation of Kuwait.

Figure 7.8 The impact of the Gulf War upon the Sea transport activity in the Port of Rashid. ( General Cargo ).



Source: Port of Rashid Authority, 1993.

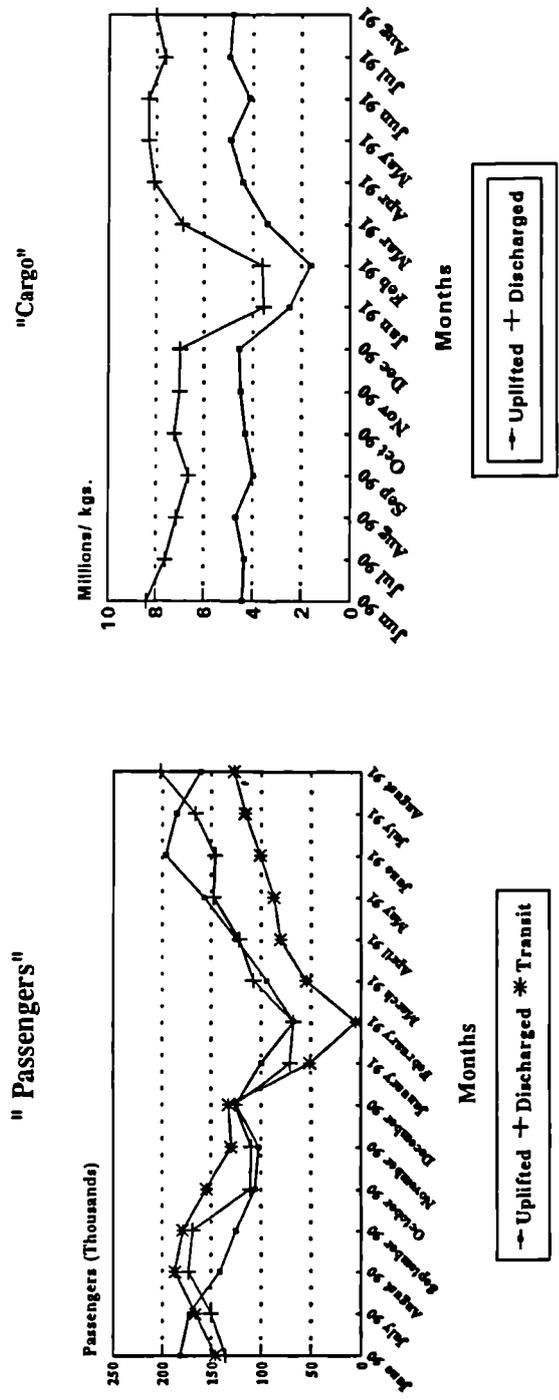
The intermodal transport system was also affected. Dubai, as a major centre in the Gulf region for the sea-air transport linkage system, suffered changes in its market and in its efficiency. Cargo movement within Dubai airport was the item most affected by the war. Official authorities in Dubai reveal that cargo movement declined from 12.7 million kg in June 1990 to 10.6 million kg in September 1990, a clear reflection of the invasion. In February 1991, there was another sharp fall to 5.2 million kg, as a result of the operation of the ground battle.

The decline in the number of passengers using Dubai airport within that period are shown in Figure 7.9. The impact of the war on passenger movement is due, of course, to people's need to travel in perceived and actual safety. Airline companies which operated in this region were required to pay higher insurance premiums for their aircraft, which led to higher air fares for passengers and cargo. Insurance costs for air cargo were increased by 25 per cent during the Gulf crisis, although after the war the premiums returned to normal.<sup>(19)</sup>

Changes in aircraft movement affected all the U.A.E. airports. Civil aircraft operating out of Dubai airport declined from 133 flights per day in June 1990<sup>(20)</sup>, to 30 aircraft per day in February 1991. In part, this decline in civilian activity was replaced by an upsurge in military activity.

During the Gulf War, Dubai airport was operated, as well as other airstrips, by the U.S. Air Force and those of other allies, which led gradually to an increase in movement from August 1990 to March 1991.

Figure 7.9 Passenger and Cargo movement during the Gulf War in Dubai International Airport from 6/90 to 3/91.



Source: Department of Civil Aviation 1991.

Much of the transport system changed in terms of the movement of oil and other goods from the U.A.E. and Gulf region. This was initially related to the political and military development in the Gulf region, particularly the invasion of Kuwait, which turned the Gulf into a high risk region. Sea transport was affected by these changes, for instance, by the increased cost of insurance, and by the laying of (uncharted) mines throughout the Gulf.

This increasing of insurance premiums for freight by the international insurance companies threatened the role of Dubai as a major centre for sea-air transport, because of its place as a transit point for goods from the Far East bound for Europe. Insurance premium cost increases led to a lot of local commercial companies reducing the quantity of imported goods, as well as their trading activities.

## **7.5 Conclusion**

The economic understanding of the transport system as a service sector for any region is more influenced by political changes than other economic sectors. These political factors are diverse in type as well as their impact, ranging from aspects such as political boundaries to military actions and reorganisation of policies and development of regions.

Political boundaries, internal and external, can act as an artificial barrier to the development of a comprehensive road network in the Emirates. Equally, they can also act as a stimulus to development as rivals attempt to outstrip each other. e.g. airports, 'parallel' road and port developments. These boundaries have affected the location of roads in the U.A.E..

The facts presented above have examined the Emirates largely as a 'political unit', and as a member of the Gulf Co-operation Council, with which it participated in the recent military events in the Gulf.

The transport network system has been affected by these circumstances in terms of trade movement through the Emirates' ports and continues to be affected by road location or road configuration along and across the internal and external political boundaries.

Internal road network development has advanced political integration among the emirates, delivering greater connectivity between places; and has been used as an important factor towards the demarcation of political boundaries. The road network has also created some political problems for integration, such as the disputes between Dubai and Abu Dhabi, and between Ras al Khaimah and Fujairah.

The efficiency of the transport system in the Emirates during the Gulf War was somewhat affected, although not directly, by the political changes in the north of the Gulf, in particular by the huge increase in insurance premiums on trade activity in the Gulf.

The strategic location of the Emirates meant that it was affected by the Gulf War. The extent to which it was affected was moderated by the remoteness of the Emirates from the northern, less stable, Gulf region.

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## Chapter Eight

# The impact of transport policies on the expansion of settlements and land use with particular reference to Dubai Emirate

### 8.1 Introduction

It has been argued in the past that the role of physical features such as climate, nature of the land surface, and maritime influence have either determined or strongly influenced patterns of settlement. Whilst this may remain true in many instances, technological developments and the resultant creation of new dimensions in human lifestyle have led to the expansion of urban areas and associated human settlements. This means that there are 'human' factors which are far more significant than purely physical factors influencing recent patterns of settlement. An example of such a non-physical element would be the development of transportation and the policies related to it, given that it has long been recognised that a transport network can have very specific consequences, both deliberate and secondary, on patterns of settlement.

Transport policy usually plays a vital role in the regional development of a country and has its obvious impact on land use and on the expansion of the settlements in the U.A.E.. In view of the importance it holds, transport policy has been the subject of numerous studies. These have looked at the role of transport policies upon changes in urban and rural areas and the impact of these policies on spatial changes in general.<sup>(1)</sup>

This chapter will examine and analyse the extent to which transport policies were used to achieve the expansion of settlements in the U.A.E., and the extent to which the road network had assisted the integration of the U.A.E. population, by a process of linking scattered settlements and making them more accessible. It will also examine

the projects that were undertaken in response to the road transport policies, and the attempts to establish a national transport policy for the Emirates as a whole.

Extensive tracts of the U.A.E. were, and remain, barren and unsettled desert. Recently, the nature of some of these areas has been completely changed. New patterns of life have emerged involving large scale farming. Areas such as Liwa oasis situated in the desert in the south of Abu Dhabi were the first to change in this way. New settlements have sprung up and are found in many parts of the Emirates both on the mainland and on the offshore islands. These changes have taken effect over the past twenty years due to the revenue accrued from oil, and the consequent increase in trade and population mobility.

In the U.A.E. the impact of these policies on the settlement patterns of individual emirates is especially apparent in Dubai and Abu Dhabi. This is, of course, largely because they are by far the largest of the seven, but it is also the case that these two have recognised and pursued the most positive policies towards transport. Of these two, Dubai stands out as the emirate in which there has been the most visible increase in the settlement areas and changes in the land use types.

Transport has had a dual effect on the patterns of settlements. Firstly, there has been the creation of new settlements as a direct consequence of new road alignments, as for instance with the linking of the Al Twar area in Deira, which was salty and lying on the road from central Dubai to Khawaneej village in the interior of the emirate, and also areas such as Al Quoz and Nad al Shiba along with other urban areas within Bur Dubai. The same process of creating settlements can be seen in such places as Tarif, Habshan, Bu Hasa and Asab, all of which settlements were based on oil fields developed after they had been linked by roads. Secondly, there are some settlements that have declined in importance as a result of the diversion of the hitherto prevailing

transportation routes. This affected the villagers of Massafi who were selling their agricultural products alongside the old route which earlier penetrated the village. The diversion of the trunk road disturbed this activity of the villagers as they had to find new locations alongside the new route for the sale of their products.

These types of consequence can be structured around several theoretical points:

- a) linking of two existing places may lead to the growth of one or both of these places. This can be seen happening between Dubai as a major centre and Sharjah: since the establishment of the major road between them, the influence of Dubai upon Sharjah has been greatest. Additionally, several places have been influenced as a result of establishment of roads between them such as Dubai and Al Ain. Al Ain, though in Abu Dhabi, now makes increasing use of the Dubai market, thus justifying the fears expressed by Abu Dhabi when this road was proposed (see Chapter 7). Another example is between Dubai as a commercial port and import gate, and the Emirate of Fujairah on the east coast which has been dependent on Dubai. After the building of a road in 1967 (Transpeninsular Road: see Chapter 2) Fujairah as a local market, and as a transit point to Oman, expanded and developed not as a rival, but in parallel with the growth of Dubai.
- b) Creation of new settlements on new roads. The impact of a new road as an artery creates many spatial changes along it. This can be seen in many places throughout the U.A.E., as described in the next section in this chapter.
- c) Decline of traditional centres, now bypassed. Many of the villages have been traditional centres based on economic activities such as agriculture. Massafi village, mentioned above, is an example.

- d) Decline of local centres which, being no longer isolated, lose out to another place. These centres decline in function as centres for commercial, agricultural, fishing and other activities as a result of a road being built between them. Ajman and Ras al Khaimah used to be more active than Dubai and Abu Dhabi being the oldest populated centres on the emirates coast. However, after the oil revenue and the expansion of the federal infrastructure in the form of new roads, the local centres of those emirates declined. The populations refocussed their activity and jobs on the stronger emirates, simply because of the new road linking them.
- e) increased importance of formerly low-value land because of suddenly improved access. That has been happening in many areas of Dubai which have been improved by good road access.

The data for the preparation of this chapter has been collected mainly from the official records of the Department of Planning of Dubai Municipality, and from the Ministry of Public Works and Housing. In addition, the Doxiadis survey (1985) of Dubai has provided useful information in accounting for the nature of settlement expansion and the resultant changes in land use. Apart from the above, other information was obtained through field investigation in the study area.

Basically, the socio-economic infrastructure of the Emirates has been developed rapidly so as to provide the necessary social and economic facilities needed for local centres and communities throughout the U.A.E.. The rapid modern roads have diminished the importance of old 'local' centres, although the extent of this varies between the emirates. The modern roads have strengthened some local centres such as Dubai and Abu Dhabi. Weaker local centres, such Ras al Khaimah and Ajman have seen their local centres diminish as a result of modern roads. These facilities include the provision of schools,

hospitals, sports clubs and other related social services, along with economic facilities needed for the establishment of commercial projects in the region.

Development is also seen in the commercial sector and in housing, in the public service networks of water, electricity, and other social services. For services to have a widespread availability and to function effectively, an efficient road system was a pre-requisite as it would link the depots situated in the main urban areas to the interior locations to be served.

## **8.2 Transport policies in the U.A.E.**

Since the establishment of the U.A.E. in December 1971, transport policies have undergone many changes both at the national and at the regional levels. When the U.A.E. was first established, a Ministry of Communication was set up, which was to regulate the transport system throughout the U.A.E.. However, this ministry was weak in regulating the entire transportation system due to a deliberate lack of co-ordination amongst the emirates. The ministry has now limited its area of activity to telecommunication services, leaving each emirate free to determine its own transport policies. This ministry has become one of several federal ministries which have declined in activity towards federal projects as a result of an increase in individuality among the emirates.

It was in 1980 that the first attempt was made to create a 'National Transport Policy' for all the Emirates.<sup>(2)</sup> This attempt did not succeed. In part this was because of a lack of understanding about the nature of movement within and between the Emirates' towns, but more especially it was because of a lack of clear agreement on the need for a common plan. Whilst the federation officially wanted a unified structure, in practice several emirates wanted to retain autonomy in this respect, thus preferring to make individual plans. Dubai was certainly in this category, with its early and

continuing refusal to hand over its air and sea ports to federal control. Even the proposal to establish a national bus transportation network to link all the emirates, presented to the authorities, was rejected and has yet to materialise.

Some of the emirates, especially the smaller ones, were not particularly in favour of many of these development as they were able to equate road development with a potential loss of separate distinctiveness. There is no single policy which regulates transport strategy within the Emirates. This has given rise to a lack of co-ordination in federal planning between the states. As a result of the problems over lack of co-ordination, some emirates such as Sharjah are suffering, despite their own good transportation system which serves only the urban areas. Services linking the rural areas are very poor as there is no internal public passenger transport system for movement between major centres of population. At the same time, the country's population is increasing rapidly, and it, or at least the U.A.E. national proportion of it, achieves mobility almost exclusively by the use of taxis and private cars.

This has been referred to by Taryam (1987):

*"Generally, the sector suffers from the shortcomings characterising other sectors, namely duality in administration and weakness in co-ordination between federal and regional bodies." (3)*

The emirates' lack of co-ordination in respect of transport policies is one of the major problems between the federal state and the individual states as it obstructs the way to a unified policy for the U.A.E.. Whilst in practice few integrated road schemes have been prevented as a consequence of these differences, the tangible nature of the issue means that transport routes are a constant reminder of the fact that the divisions of powers between the U.A.E. as a whole and its individual parts are not clear cut.

Some emirates find themselves in a situation of having to fund other emirates for such infrastructural projects as road building, housing, etc.. For example, in 1969 Abu Dhabi assisted in the construction of a road to Dhaid village.<sup>(4)</sup> Similarly, Dubai has undertaken many transport projects on behalf of other emirates which were unable to undertake projects because of meagre resources. Moreover, both for economic and political reasons, the Dubai Emirate has funded transport projects for Oman (see Chapter 7).

Table 8.1 shows such projects undertaken by Dubai since 1971; they were concentrated in Ras al Khaimah, Fujairah and especially in the other eastern parts of the Emirates.<sup>(5)</sup> The main construction period was the decade from 1974 to 1984.

**Table 8.1:**  
**The Transport Projects of Dubai Government**  
**in the other Emirates and Oman**

Project	Emirate	Value (million Dhs)	Year completed
Fujairah Fishing Harbour	Fujairah	15.2	1979
East Coast roads	East Coast	44.0	1983
Lulayyah Fishing Harbour	Sharjah	46.4	1983
Agr-Seeb Road	[Oman]	680.0	1980
Ajman Creek	Ajman	60.0	1980
Ras Al Khaimah Fishing Harbour	Ras al Khaimah	48.9	1981
Rams Creek	Ras al Khaimah	39.0	1981
Dibba Harbour	Sharjah	136.0	1981
Murbah Fishing Harbour	Fujairah	42.7	1982
Kalba Fishing Harbour	Sharjah	34.8	1980
Jazirat Al Hamra North	Ras al Khaimah	51.0	1980

Source: Derived from Halcrow Consulting Engineers, Unpublished report, 1991.

Table 8.1 shows that 45 percent of these projects went to Sharjah, followed by Ras al Khaimah. However, Fujairah has received much funding from Dubai for its infrastructure, such as Fujairah Airport. Recently, the Dubai government has been further involved with Sharjah, many projects being undertaken including urban roads in Sharjah city, and roads in Kalba.

These steps may be regarded as a skillful use by Dubai of its transport policies to strengthen its political position within the Emirates. Since 1971 the Dubai Emirate, alone of the seven emirates,<sup>(6)</sup> has not been completely incorporated into the federal state, in respect of fields such as the military, police, transport, customs, ports and airports. This indicates not only Dubai's independent stance but also the recognition that its economic future lies in its commerce. By extending this network of economic linkage and being willing to foot the bill, Dubai is not simply displaying generosity to its neighbours: it is also hoping effectively to extend the commercial hinterland of its urban core.

Other transport plans have been put forward by local municipalities of each emirate to regulate the transport movement plans for its region. For instance, Al Ain Municipality signed up with Shankland Cox (1986) London, to formulate a master plan for it. Similarly, Dubai Municipality has had many plans for its emirate: the John Harris plan (1959-1972) the essence of which will be defined in the next sections, implemented Dubai's goals in the 1960s. Doxiadis of Greece (1985), and the new transportation plan agreed with Dar Al Handasah of London (1991), are some examples of these plans.

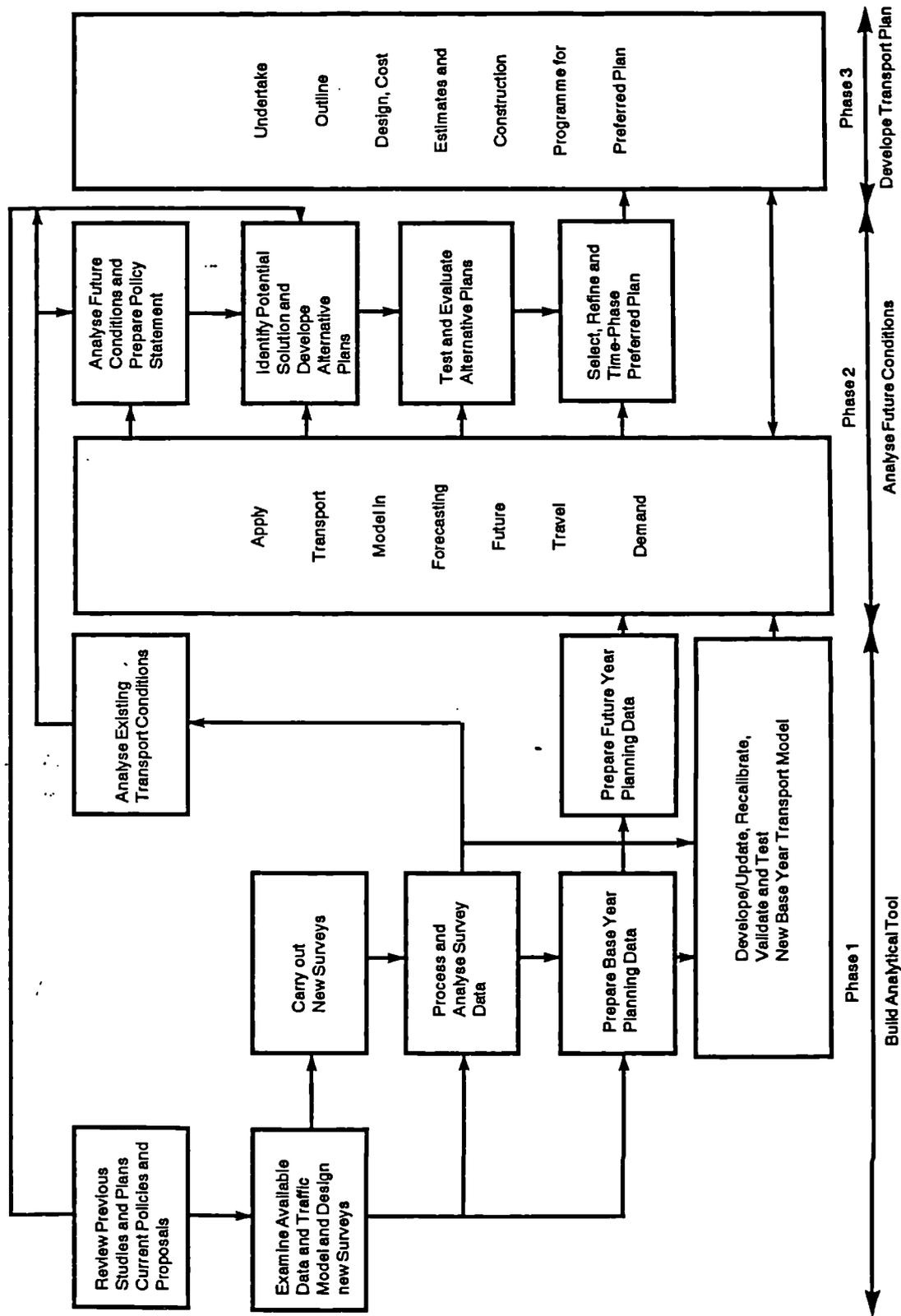
The reason for this variety of urban plans in some of the Emirates is uncertainty within the official authority as to how to create a good and sufficient development plan, coupled, in some cases, with growth far greater than was planned for or anticipated.

For instance, Dubai has shown a rapid growth of activity in commerce and trade for which it was not prepared, and that was quite apart from the huge numbers of expatriate workers and investors who have flooded into Dubai from Iran, India and other Asian and European countries. There was another reason for the multiplicity of plans: in some emirates, intervention by the respective sheikhs' in these plans often led to changes in the idea or policy. In Dubai, when Doxiadis was producing a third master plan for Dubai in 1985, they carried out a study for a comprehensive plan for Dubai to evaluate all the physical and human factors of the Emirate of Dubai. This study has not directly benefited the emirate's development, because it has never been officially used.

The Dar Al Handasah plan can be distinguished from earlier ones as the first comprehensive one for transport movement in Dubai. This plan was put forward with the view to adopting the necessary steps to form transportation models for planning and to forecast the movement of traffic within Dubai. This method of forecasting the traffic flow in Dubai Emirate is different from those adopted in the other emirates.

Figure 8.1 shows the Dubai transportation planning model devised by Dar Al Handasah, which consists of 14 stages through which it would achieve the transport plan for the Emirate. Having gone through this planning procedure a new transport plan, incorporating the basic principles of the three phases in Figure 8.1, was published in early 1992.

Figure 8.1 DUBAI TRANSPORTATION PLANNING MODEL, 1991



SOURCE: Daral Handasa, 1991

### **8.3 Transport policies and settlement in the U.A.E.**

The federal government of the U.A.E., by focusing on projects that build unity amongst the Emirates, has concentrated on improving the inland centres of population, many of which were Bedouin settlements.<sup>(7)</sup> These improvements concentrated on the most important infrastructural projects, such as road networks, housing, and the development of agriculture. In the pre-federal period, many of the Emirates communities consisted of Bedouin groups which remained spread out throughout the interior sections with a nomadic lifestyle and movement pattern related to the scarcity of resources. Other examples of this lifestyle and location include the tribe of Bani Yas, many of whom preferred to settle on Abu Dhabi island rather than remain at their inland base (Liwa), as they adopted fishing and pearl diving activities.

In the first years of the Federation, the federal Ministry of Public Works and Housing established settlements for the local people in each of the Emirates. These 'settlements', either new or an expansion of old, guaranteed, without a charge, a new permanent home of agreed size for every native family, with public service amenities also being provided.

There was a heavier proportionate concentration of these settlements in the northern emirates of Fujairah and Ras al Khaimah as their respective individual governments could not afford to build houses for them. These projects were undertaken side by side with the expansion of the road network, which penetrated into the old rural settlement areas of Dhaid, Madam and Ras al Khaimah and provided them with a reliable and improved communication system. Side by side the towns received greater attention in respect of housing projects in areas of population concentration. The construction of these roads led to social development, with the building of modern shops, social clubs, hospitals, schools and other community services needed by the population.

These are all an outcome of the relevant policy measures undertaken by the Emirates. It was warranted by the increasing population, which demanded the provision of such services and by the extremely rapid increase in material well-being which the urban areas were experiencing. Also, the established urban areas were incapable of absorbing the rapid population expansion, thereby creating a need to look for alternative areas for urban expansion. One reason why the traditional centres could not absorb more of the citizens of the emirates was that these areas were becoming the main residential areas for the huge influx of expatriate workers and their families. Government attitudes and policies towards this population arose from both tiers: federal and local. The objective was to import a work force in order to realise the infrastructure projects set out at the beginning of the Federation. There was a clear policy to encourage these expatriates in order to develop the country, because of the small size of the local population which, at that stage, was still largely unskilled in many of the technical aspects required.

Recent policy has shifted at both levels. In particular, in Dubai, the recommended policy is to achieve a balance between the national and expatriate population. There is also a move to increase the number of nationals in the labour force, if that is possible.

In order to examine in detail the impact of transport on the expansion of settlements in the U.A.E. this study will now turn to the transformation that took place in Dubai Emirate.

### **8.3.1 The impact of transport policies on the expansion of Dubai City**

The recent development of the transport system in Dubai Emirate has resulted in changes in the spatial patterns of urban and rural areas. This has in turn brought about changes in the landscape pattern. There was development in road building and in the construction of seaports and airports, significant expansion and improvement in the

Emirate was seen in road construction. This is basically an outcome of the planning policies outlined by the Emirate for infrastructure improvement.

The need for positive transport policies in Dubai Emirate was mooted as early as 1960, when the Municipal Council of Dubai decided to regulate the city's car parks and animal stables, with a view to influencing the direction of changes in road utilisation.<sup>(8)</sup> In addition, they had plans to regulate and control the rate of growth of the urban areas of all districts in Dubai. Transport policies have influenced the spatial development patterns and have assisted in effecting changes in that direction since the 1960s. These development plans were drawn up by the Municipality in conjunction with international consultants, in keeping with the objectives of Dubai Emirate.

#### **8.3.1.1 First Master Plan in 1960**

Most development plans that were drawn up have been influenced by the landscape of Dubai, which will be discussed in the next section. The first policy, before the creation of the U.A.E. which was implemented between 1959 to 1966, is named the "Dubai City Plan" or "Master Plan of 1960" and was proposed by consultant John Harris.<sup>(9)</sup>

This plan consisted of proposals for major urban development in Dubai. Its principal objective was to enlarge and promote building projects in the Deira area in Dubai Emirate. These were plans to provide the city with many services, such as residential areas (in response to population increase), and an efficient road system to enable easy movement within various parts of the city, and above all to promote commercial and industrial activities in the city.

The aforesaid plan made much headway in improving the transportation network as indicated by Gabriel (1987):

*"The large strip of land that was open to the north in the 'new city' was to be made into a four-lane highway. In addition, two roads were to be cut into the 'old city' in order to improve the traffic flow. Of particular importance was the plan to connect the suqs of Deira and Dubai by two wide roads coming in from the east.....These proposals of the first master plan were soon carried out and the framework of main traffic routes was realised by 1970." (10)*

The above summarises the early progress made in the transport sector in Dubai. However, the implementation of the plan has led to urban problems associated with traffic and shortage of parking space within the urban limits. The plan had many shortcomings from a transport viewpoint, mainly concentrating on the CBD areas along the creek, but giving scant attention to population growth and to the rise in the number of vehicles leading to increased traffic congestion in the CBD.

### **8.3.1.2 Second Master Plan in 1971**

The Second Master Plan of Dubai City was implemented from 1971 onwards. It was based on recommendations made in the previous plan, which laid greater emphasis on some important aspects of urban development such as the road network system, and the expansion of urban land use. In 1971 there was no legislation to control vehicles, and public transport was absent, which led to an increase in the use of private cars. The plan recommended an enlargement of the roads in and out of the City. Due to an increase in buildings and settlement projects within the districts of Dubai, greater attention was paid in this plan to developing the road network.

Transport policies were therefore a major feature of this plan, especially because of the strong impact it had on the development of peripheral areas of the city. These plans incorporated new transport elements, such as the construction of the Shandagah tunnel and projects to build bridges thereby enabling a smooth flow of traffic between districts of the city.

From the time of the Master Plan in 1971 until 1985, during which time the population both of citizens and expatriates in the urban area was growing at a very rapid rate, numerous developments had taken place in the urban landscape of Dubai. They included the construction of new buildings, roads and ports. Dubai, although not the main oil producer in the U.A.E., was thus a classic oil boom economy at this time: oil was both the cause of most of the initial transport network development and the source of its financing.

### **8.3.2 The expansion of settlements and the road network in Dubai**

Dubai Emirate has an official total of 45 urban and rural settlements scattered throughout the area.<sup>(11)</sup> Many of these settlements did not exist twenty years ago. All of these which are new have locations which are closely related to, and integrated with, the planned road expansion programme. The urban area in the Emirate has been enlarged and some small Bedouin villages in the interior, such as Al Awir and Hibab, have been improved. However, the major settlement in Dubai continues to be primarily located in the coastal areas.

Embodied in the transportation system are the seaports and some old routes which pass through the towns and villages so as to enhance trading activities. Table 8.2 shows the annual growth of the aerial extent of the urban area in Dubai from 1900 to 1985. In 1900 the urban area was only 20 hectares in extent, located at the mouth of the creek.<sup>(12)</sup>

Lorimer (1908) recorded the presence of only three main areas of settlement in 1900: Deira with 1,600 houses occupied by nationals and by 350 commercial establishments; Shandagah village with 250 houses which were residences for nationals; and Bur Dubai with 200 houses and 50 commercial establishments.<sup>(13)</sup>

**Table 8.2:**  
**Extent of growth of the Urban Area of Dubai from 1900 to 1985**

<b>Year</b>	<b>Urban area (hectare)</b>	<b>Annual average growth rate (%)</b>	<b>Average total increase per annum for each 'inter censal' period (hectare)</b>
1900	20	-	-
1935	80	4.04	2
1945	200	9.60	12
1955	320	4.81	12
1960	530	10.61	42
1970	1800	13.01	127
1975	4700	21.16	580
1980	8400	21.31	740
1985	11000	5.54	520

Source: Derived from *Dubai Municipality*, 1985; Doxiadis, 1985.

From 1935 onwards there began to be an increase in the activities in the Deira traditional market and in the Creek the process of rapid urbanisation was set in motion resulting in the increase in acreage to 200 hectares in the decade 1935-45. Subsequent policies outlined by the Municipal Council in 1961 aimed at physical urban expansion by providing improved social and civic amenities, building in an area which had already grown to 530 hectares. Thereafter, the rise in the acreage from 1970 when it stood at 1,800 hectares, to 11,000 hectares in 1985 is the obvious consequence of both the establishment of the Federation and the increase in revenue accrued through oil.

The population (both citizens and expatriates) of the whole of Dubai Emirate grew from 59,000 in 1968 to 310,475 in 1985. This expansion was particularly due to the

temporary immigration of an expatriate work force consequent upon the economic growth that took place in the Emirates. Of the 310,475 in 1985, some 230,000 were in this category. Also, in the early part of this century, the political problems in Iran contributed to the flow of immigrants into Dubai: many of these immigrants are now full citizens.

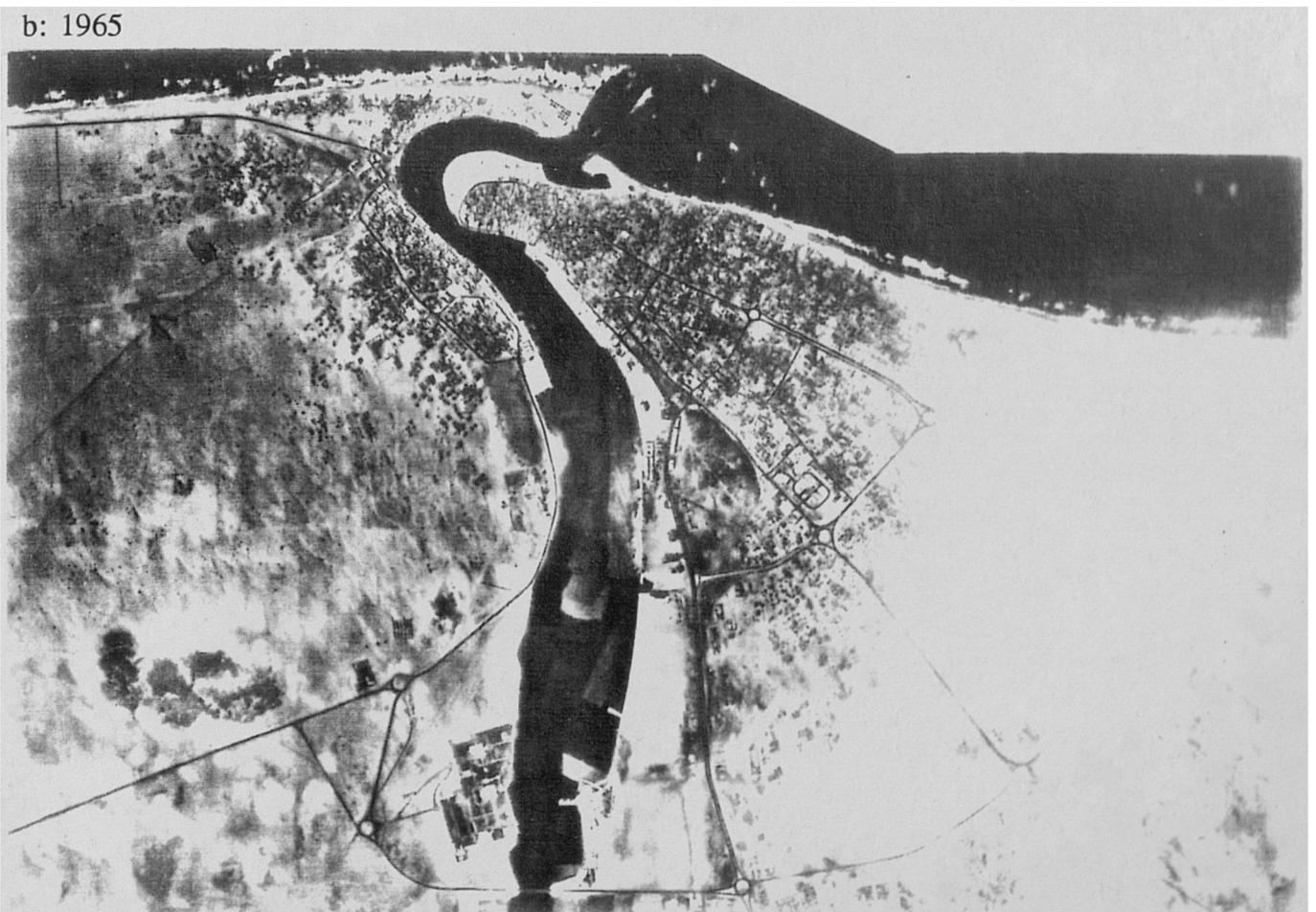
Aerial photographs reveal the urban development of Dubai from 1960 to 1981 as in the six views which comprise Figure 8.2 (A,B,C,D,E and F). They highlight the importance of roads and other transportation systems in this growth, and show the broad changes in the landscape in respect of developments in settlements both within and around the urban areas.

In 1960, the only transport factor significant to the development of urban areas in Dubai was the Creek. Settlements were then concentrated on the Deira (east) side which formed the major trade centre. There were a few key roads within the urban areas of Deira and a trunk road ran out from Deira to the rural areas in the south. Apart from these there were only some sandy tracks linking other places.

The built-up areas expanded from Deira eastwards, and from Bur Dubai westwards. This expansion of the built-up area was concentrated along the coast rather than moving into the interior. For the Dubaian, the coast symbolised his distinctive, cosmopolitan origins and interest. The sea was the main source of economic subsistence, as Dubai had traditionally depended on fishing, pearl diving and trading activities. The expansion of the road system into the less-hospitable parts of this coastal zone was integrated with the construction of new residential areas such as Al Twar, Al Qusais, Al Qouz, and Nad al Sheba. Thus, the planned and constructed road building programme has directly related to the rapid growth and integration into greater Dubai City of this formerly empty land.



a: 1960



b: 1965

Fig. 8. 2(a,b,c,d,e,f and g) Aerial photographs for the development of urban area of Dubai City, (1960 to 1981).



c: 1968



d: 1974



f: 1981

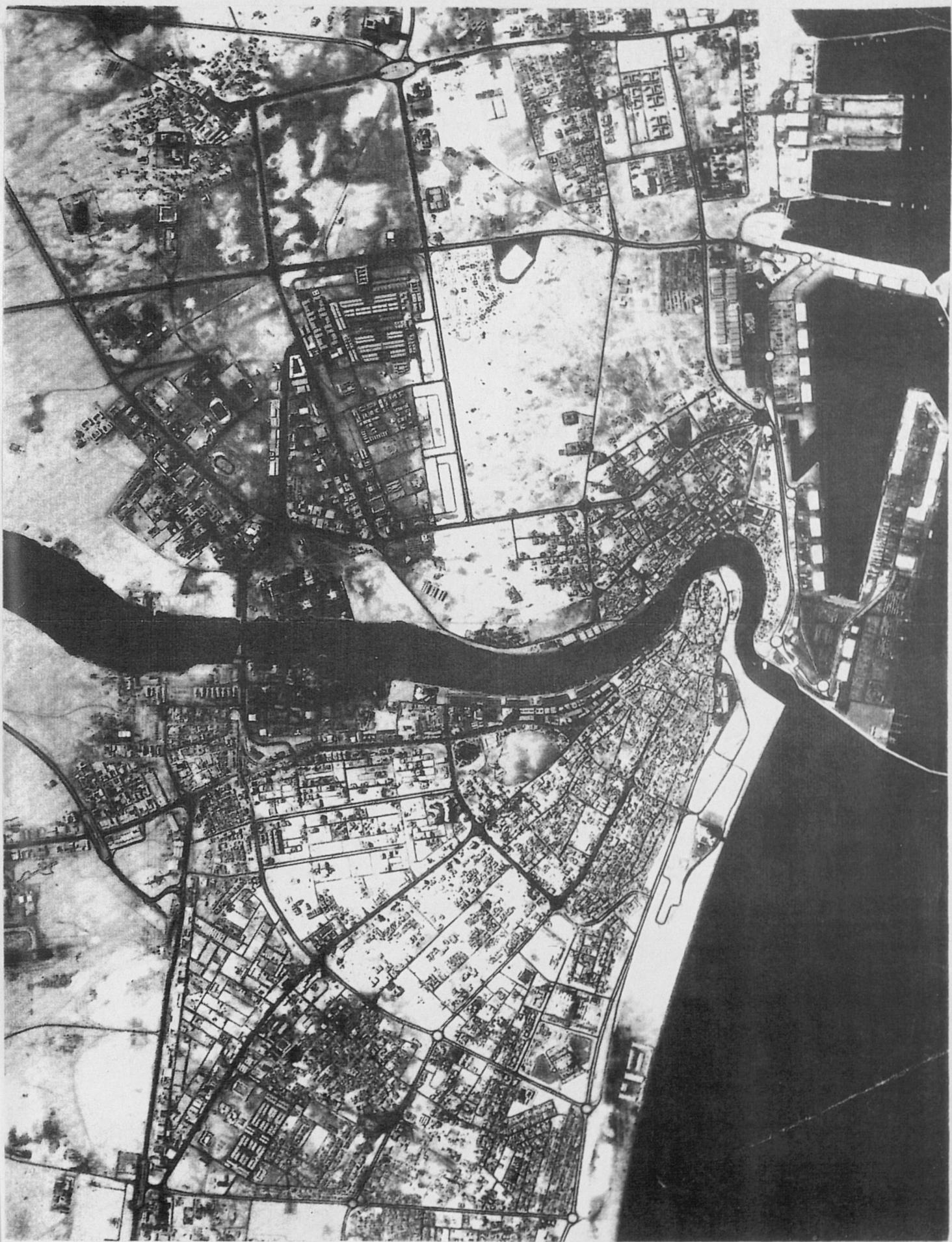
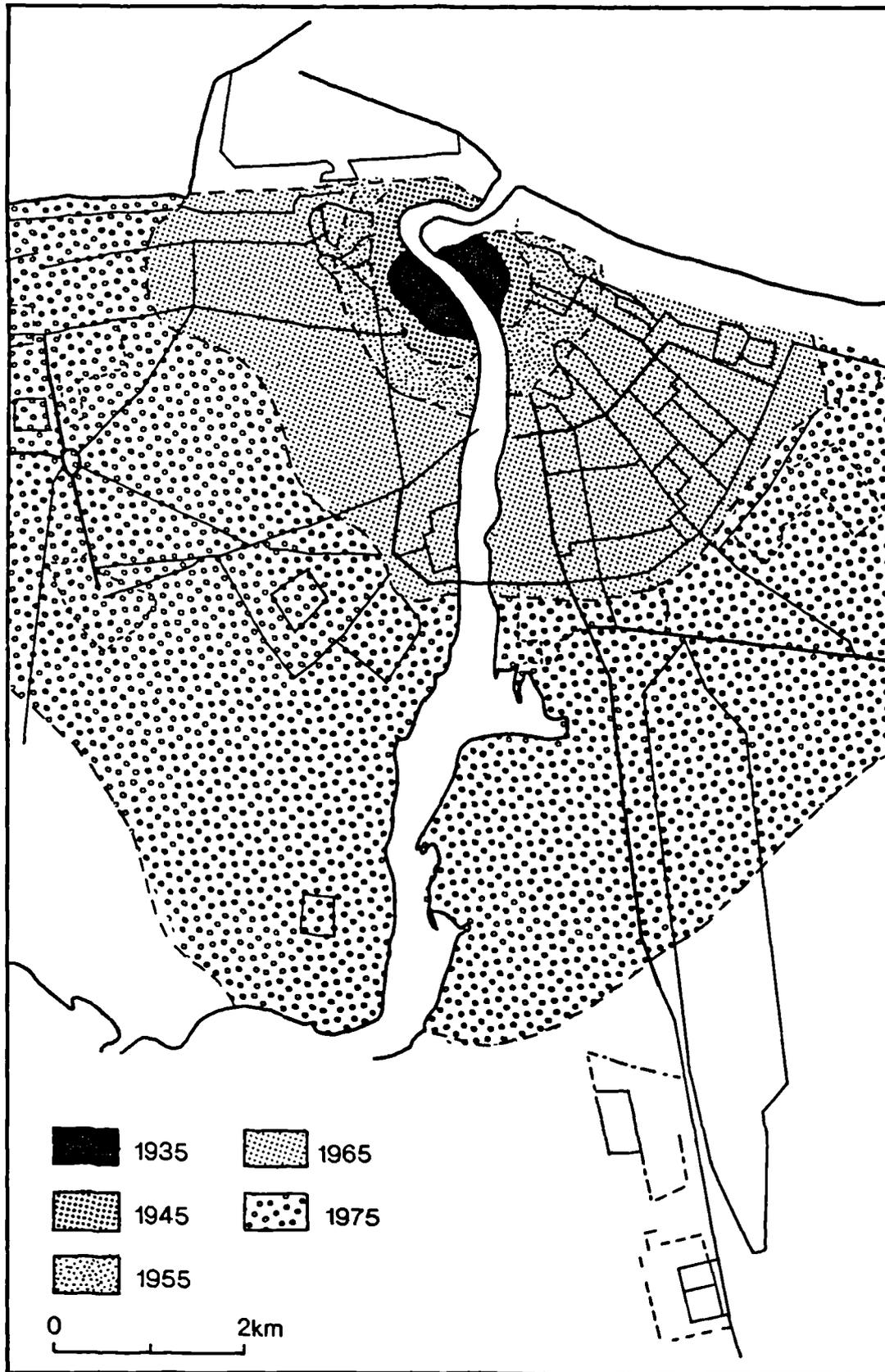


Figure 8.2 HISTORICAL EVOLUTION OF THE URBAN AREA OF DUBAI  
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SOURCE: Institute of Arabic Studies and research, 1978 p.657

From 1960 to 1965 the location of the settlement patterns changed in response to the construction of new roads. Settlements grew in size and number as a result of improving the road network of the interior. In 1965 a new 15 km road link was established between Dubai and Sharjah. This road has enhanced the movement of passengers and goods between the two Emirates and has encouraged many citizens of Sharjah to settle in Dubai to engage in business. This road was extended to link all the northern Emirates in 1968. Between 1968 and 1975 roads were constructed linking the other major settlements of Abu Dhabi and Al Ain to Dubai by modern road for the first time.

Between 1968 and 1972 Rashid Port was built to assist in the process of economic development in Dubai. Figure 8.2 (D) shows that the port has a new settlement in its hinterland, due to the construction of roads. At the same time, on the Deira side, enormous expansion toward the east can be seen, with particular growth around the main centres, which had just been constructed.

From the 1980s the growth of settlements has slowed down due to the completion of the planned major infrastructure of Dubai. Dubai nationals have tended to move to new areas away from the concentrations of expatriate workers who now comprise the main residential element of the old city. These new locations, notably Hamriyah, Nad al Sheba and Mardif, form the main Dubaian residential areas.

An increase in car ownership by the population of a city is normally reflected in an increase in traffic circulation within the city. Journeys to and from work normally occupy the most common travel pattern amongst any active community (see Chapter 6). Over the past twenty years cities in every Emirate have expanded both in terms of area and population. The economically active population has expanded because of

growth in the number of job opportunities, and this includes both nationals and expatriates.

The economically active population obviously use the transport network to travel to work. The journey to work is the most frequently made trip in Dubai. For instance, the Doxiadis survey of 1985 found that, out of the total journeys made, 30 per cent were for the purpose of work. Many of those who work in the city now live in settlements far away from the centre. It is this as a planning policy amongst the people that has contributed to the growth of outlying areas, thereby creating a larger and greater number of settlements around the city, as well as adding to rush-hour congestion.

Previously, the nationals lived in the city. Recently they have begun to move out to places far from the problems of the city to places such as Mardif, Rashidiya and to other formerly rural areas of Dubai. They have turned to new areas in which to live due to the pressure on housing caused both by the expatriate workers and by the high density of the commercial buildings. However, the use of the car for travel has reduced the problems of remoteness from the city, and has led to the cutting of travel time substantially. The consequence of moving out to live away from the city resulted in an increase in the journeys made by such people most of whom continue to move to the urban core areas to work on a daily basis.

The market place is an area of population concentration. Employees and businessmen move between their residences and the market. The movement to reach the work place mainly involves using private cars and public transport. With the passage of time, this movement has stimulated the 'urban' development of these designated new settlements on the fringe of urban areas.

The government policy to settle the Bedouin in rural areas is now proving successful. A majority of the new generation of male Bedouin are now employed in the armed forces, and stationed in a manner so as to maintain a close physical link with their homes.

#### **8.4 Transport and land use**

Urban land use can be defined as the spatial distribution of the geographical patterns in the city such as premises occupying residential, industrial, wholesale and retail trade areas.<sup>(14)</sup>

Transport and land use are inter-related, and traffic generation is determined by land use. Hence, land use and transport can be regarded as belonging to a single system. Development strategies regarding land use aimed at improving it are mainly related to objectives and goals embodied in the planning policies of the governments of countries. In this regard, the transport factors, especially those in respect of the road network system, are of prime importance.

Land use directly related to transport occupied 11.1 per cent of the total urban land areas of Dubai Emirate in 1985: with the sea and air ports occupying 8.8 per cent and the road network 2.3 per cent.

Figure 8.3 shows the pattern of urban land use as at 1985, distinguishing between 14 basic categories of land use. Of these the largest area is occupied by residential areas, and this needs to be related to the increase in the economic activity of the people.

Figure 3.4

الاراضي الحالية 1985  
EXISTING LAND USE, 1985



- Residential
- Residential - Commercial
- Central Business District Uses
- Commerce and Business
- Public Administration
- Institutional
- Sports
- Open Air Recreation
- Warehousing, Industrial
- Utilities
- Transportation Centres
- Cemeteries
- Conservation Areas
- Palm Trees
- Agriculture, Fishing
- Major Arterials
- Minor Arterials - Collectors
- High Tension Lines
- Temporary Residential
- Temporary Commercial
- Temporary Industrial
- Temporary Utilities

Sources:  
 - Land Use and Holdings Survey 1985  
 - State Planning Department  
 - Public Department  
 - Survey Department

Fig. 8. 3 The pattern of urban land use of Dubai City in 1985.

**Table 8.3:**  
**Dubai City: the general divisions of land-use in 1985**

Land Use	Area (ha)	%
Residential Use	3,154	14.1
Central Business Areas (CBD)	388	1.7
Commercial & Commerce	242	1.1
Administration Use	106	0.5
Institutional	343	1.5
Recreation Areas	425	1.9
Warehousing, Industrial	548	2.45
Industrial Use	1,044	4.7
Utilities	295	1.32
Road Network	516	2.3
Transport Sectors	1,968	8.8
Cemeteries	115	0.5
Cultivation Areas	68	0.3
Other Areas*	13,188	58.9
<b>TOTAL</b>	<b>22,400</b>	<b>100.00</b>
* Land convenient for construction		

Source: Adapted from Dubai Municipality, Doxiadis, 1985.

In 1985 residential areas occupied 14.1 per cent of the total urban area of Dubai City.

The relationship between transportation facilities and changes of land use is well illustrated by the role played by the seaports, such as Rashid Port, which was established in 1976. The area located behind Rashid Port, for instance, was brought under limited use and was occupied by warehouses, and other commercial and

industrial buildings. However, by 1980 these areas had increased in size, and were being used more as storage areas. There were new buildings for shipping agents and recreation facilities because of its proximity to the port. In addition, other areas such as Mankhool and Hudibah have been established for residential purposes. The impact of the activities of the port is reflected in the density of journeys generated to and from the port by the movement of trucks laden with goods. The land use pattern around the ports is determined by the desire of commercial establishments to locate storage areas as close to the port as possible so as to minimise on transportation costs.

Similarly, the development of Dubai Airport has led to commercial and industrial establishments planned to be located close to it. Accordingly the areas close to the airport are demarcated as commercial and industrial areas. In 1970 there were neither warehouses nor industrial activities included in the land use of that area. However, subsequent to the increased economic activity and with manufacturing projects coming up there has been a resultant increase in the movement of goods.

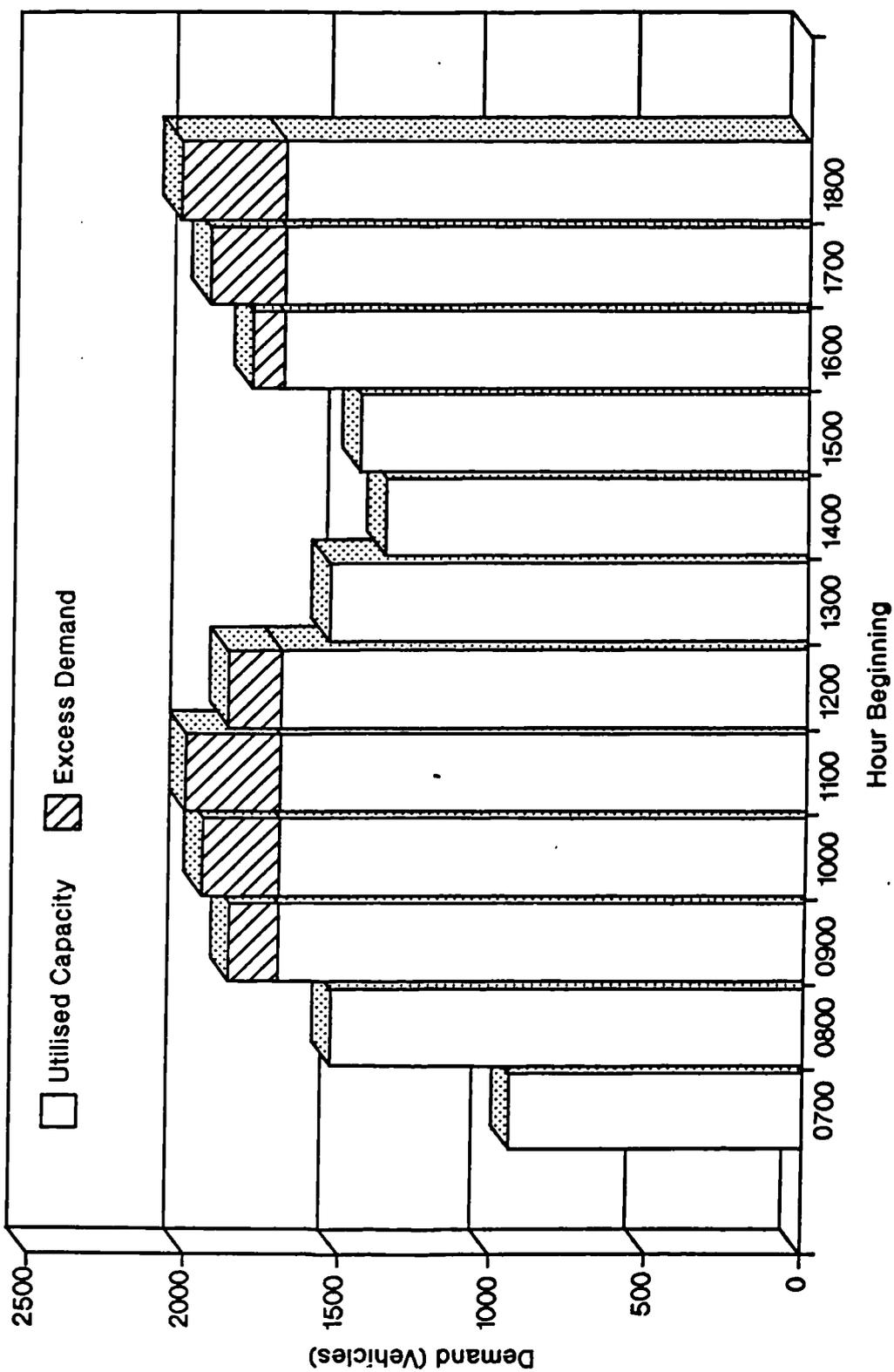
The presence of the Dubai CBD and the movement of goods and passengers has strongly influenced the pattern of urban land use. These movements create a need for more parking space, and areas for commercial, wholesale and retail business use. This is well illustrated in the development of the Al Ras area, which has undergone enormous change. Growth in economic activity in the Al Ras area has created pressure on space for vehicle parking. Figure 8.4 shows the parking demand on Bani Yas road in the Al Ras areas. The demand in excess of supply for parking space was for about 200 to 400 cars during the peak hours from 09:00 to 12:00, and from 16:00 to 18:00. This is due to the need for parking space demanded by the employees engaged in commercial activities and by those working in financial organisation such as in the bank complex. In late 1991, in response to these parking problems, a new car park was opened in Deira CBD. However, this car park will not be able to meet

the rising demand for parking as there is great pressure created by the economic activities located in the area. Creek Port is close by, and the transit ships and dhows anchor there. This is recognised as the rapid response to the development of commercial activities in the area. Land use in the area is also coming under increasing residential pressure. This has led the government to plan more residential areas in interior areas. Moreover, the government has encouraged people, especially the national population, to hold land for each family and take out a loan to build on that land.

#### **8.4.1 Traffic movement and land use**

Traffic flows, their volume and frequency, can be regarded as useful indices of the land use pattern's effectiveness as an integrated system. In urban Dubai, journeys are made to different land use locations such as to residential, commercial centres, and to schools and areas under other uses. Table 8.4 shows the distribution of such journeys made with details of the origin and destination of these journeys to and from the land use categories.

Figure 8.4 BENI YAS ROAD CAR PARKS PARKING DEMAND ANALYSIS



SOURCE: DOXIADIS, 1985

**Table 8.4:**  
**Distribution of car trips to different land use locations,**  
**Emirate of Dubai 1985**

Land use	Origin %	Destination %
Residential	30.55	29.87
Commerce and Business	30.04	35.46
Government Offices	9.92	8.48
Industry and construction	4.07	4.12
School/Mosque/Hospital	1.96	2.36
Transport centres	21.73	17.15
Recreational areas	0.75	1.71
Other uses	0.98	0.85
Total	100.0	100.0

Source: Dubai Municipality, Doxiadis, 1986.

Therefore, journeys undertaken can be analysed in terms of the origin and destination by type of land use. The highest proportion of journeys are associated with and determined by commercial and business activities, especially those found in the CBD, and this was predicted to rise in the future. Arising from the above movement of people and traffic are urban problems associated with traffic congestion and the concomitant lack of space for parking. Table 8.4 reveals that rather more than 1 in 3 car journeys had a business/commercial destination. This is strongly related to the importance of Dubai as a commercial and financial centre. The importance of transport-related land use is further illustrated by the significant movement in both the origin and destination of trips made to and from transport centres. This could be accounted for by the fact that Dubai is a major regional transport centre, and offers

another dimension for the movement of goods and passengers by using its road, sea and air transportation facilities.

In addition to internal movement within the city, Table 8.5 shows, again for 1985, a breakdown of types of origins and destination for those trips which crossed the city boundary.

It shows that passenger trips had the highest percentage, thereby demonstrating the importance of residential land use in the pattern of origin and destination of trips made. Nevertheless, commercial land use is well represented in this area, and it indicates the activities of commercial firms in places which are far from the centre. Trips generated by commercial and residential land use determine the impact of transport on the land, and could change the landscape to a different land use pattern.

**Table 8.5:**  
**Distribution of trips to different land use location, origins of which are external to the official city area, in Dubai City in 1985**

Land use	Origin %	Destination %
Residential	49.22	49.03
Commerce and Business	22.61	22.63
Governments offices	6.93	7.00
Industry and construction	7.03	7.01
School/Mosque/Hospital	6.35	6.44
Transport centres	1.81	1.81
Recreation areas	4.79	4.80
Other uses	1.26	1.28
Total	100.0	100.0

Source: Dubai Municipality, Doxiadis, 1986.

A point related to the trips generated from transport centres is that there is not much dependence on the public bus system beyond the limits of the urban area of Dubai. This suggests an increasing dependence on private cars, thereby contributing to a decline in the quality of the bus services. These bus services are, as already mentioned, almost exclusively used by the expatriate population of Dubai.

## **8.5 Conclusion**

Recent transportation policies outlined in the United Arab Emirates do not have federal status. Road construction was developed under the federal government for all the settlements of the northern emirates. This has had a positive impact on them, linking them all into one network. However, this network must be continuously maintained in order to develop greater integration among the people of the U.A.E.. This should be supervised by the federal government so as to keep the integration programme on track.

On the other hand transport policy needs to be orientated to suit all emirates. Such a policy could be based on the initial proposal of a National Transport Plan put forward by the United Nations.

In Dubai Emirate the development of a transport system and its impact upon the settlement patterns have influenced both urban and rural expansion. The rapid expansion of cities and other settlements in Abu Dhabi and Dubai has had its impact on all land use sectors.

Since the establishment of the U.A.E., the expansion of the federal road network in general, and that of the Dubai network in particular, has helped the population to gain greater mobility, and to move to other settlements where they can live in greater comfort than in the crowded cities. These improvements of the road network include expanding into new areas, and linking all areas by good roads, bridges and tunnels.

Another aspect of the impact is felt in the improvement of access provided for smaller settlements located in the interior. They tend to become larger settlements, with the passage of time resulting in an increase in the ability to provide modern facilities to the population therein, such as Dhaid and Al Ain.

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## Chapter Nine

### Conclusions

The voluntary unification of seven emirates into one federal state was a unique modern political event, though a few states, such as Malaysia, offer some parallels. Political developments in the Emirates were associated with intensive infrastructural developments, of which the transport sector is an example. These major infrastructural changes affected the landscape of the Emirates. Oil production and its revenue have changed many locational aspects in the U.A.E. over a very short space of time. This has had positive and negative consequences for the whole development of the U.A.E.(see Chapter 4).

This study has been concerned with transport in the U.A.E.. Transport has had a profound effect on the nature of geographical patterns such as economic activity, social activity and other related aspects in every emirate of the U.A.E.. In this thesis, special consideration has been given to the relationship between the development of transport and economic development in Dubai Emirate, Dubai being the emirate which has most deliberately seized the opportunities for expansion which efficient transport methods are theoretically supposed to facilitate (see Chapters 4 & 5).

Many issues have been examined relating to the impact of transport on spatial evolution, particularly those having social and economic aspects. These aspects, making up the process of political integration of the seven emirates, have been assisted by the road network. Socially, a different type of mobility has been created in every emirate, each of which is now dependent on the economic structure of the whole area.

Population increase in the Emirates, both of citizens and of aliens (see Chapter 6), combined with economic and business development, has brought about an increase in demand for better modes of transport in the Emirates. Policies for transport development in the U.A.E. need to reflect economic development activities, which in turn brings us back to the increase in population.

Five main components of the consequences of development have been examined separately in this thesis: the declining but still significant impact of physical factors; economic, social and political objectives and effects; and the settlement pattern of spatial development. The results of this examination are summarised below.

The role of transport in helping to mould the region's identity has been important since the establishment of the earliest settlements on the Emirates' coasts: camels and pack animals overland; small boats and dhows on the sea. As people travelled to and settled in the interior, there was increasing purpose in communication between coast and the interior. Caravan routes linking coastal towns and centres in the interior were established mainly by economic and political evolution, allowing the dominance of some centres to emerge such as Dhaid and Al Ain (see Chapter 2). The alignment of the routes was influenced by the topography and terrain through which they travelled, whilst the overall lack of frequently-used land routes, until modern times, greatly contributed both to the distinctive survival and to the relative isolation of this corner of Arabia.

The modern road network of the U.A.E. was established on the basis of the earlier caravan routes. From its inception, the U.A.E., insofar as it functions as a whole, has sought to create the maximum linkages between all its areas in order to establish maximum federal integration. This policy has succeeded, internally linking all the towns and almost all the villages by a permanent paved road network. An interna-

tional road network has also been established in response to economic and political necessity, the links to both Oman and Saudi Arabia being seen as part of the inevitable 'opening up' process with all the consequent advantages and a few less desirable possible consequences.

The development of air transport in the U.A.E., with a history dating back to the British Empire and the Imperial route to India, has been even more dramatic. Since this first step towards the era of air transport in the Emirates, the system has developed greatly. The U.A.E. airports cope with the movement of large numbers of passengers and goods, having established a number of airports throughout the principal emirates. That number is in itself a contentious development issue and illustrates the tensions which inevitably exist between the goals of the Federation and the ambitions of each emirate. On the other hand, this important issue might be advantageous to all parts of the State by making positive improvements towards coordination between emirates: by establishing a unified policy regarding the use and coordination of the airports of the U.A.E., this policy will win greater benefits for both the Federation and for each emirate.

Chronologically, the transport policies in the U.A.E. may be divided into four stages of development:

- a) The pre-oil stage: the age of the caravan routes and a primitive economy; this era was before the 1960s.
- b) The oil development era and establishment of the Trucial States Development Office (TSDO); this period, from 1965 to 1971, witnessed the development of the major cities such as Abu Dhabi, Dubai and Sharjah and saw the laying down of the key components of the modern *road* system.

- c) The Federal era began on 2 December 1971, marking the start of the period of official policy integration.
- d) The years since 1980, by which time some 95 per cent of the current road network had been created: an era of consolidation and improvement of the network.

In the context of the *nature* of these policies, the crucial distinctions to make are between the potentially differing objectives of (a) federal and individual emirate goals, and (b) internal U.A.E. and international goals.

Physical features continue to exert some influence. This is true of detail at the local level - route alignment, etc.. It is also true at the international level, where factors such as navigation through the politically sensitive Straits of Hormuz have become a factor comparable with, for instance, the nineteenth century caravan operator's fear of a particular Wadi, with all its implications of 'natural' and human hazard.

Some major roads have faced problems due to the process of integration of the U.A.E., such as the road from Dhaid to Shuaib village, the importance of which lies in links between the north and the south. Such problems might eventually be taken up by the local and federal authorities. One of these problems is road maintenance, which is suffering from the shortcomings of, and confusion within, federal policies. Road maintenance, as illustrated in chapter 3, has not been federalised nor even regulated under one federal policy. Each emirate pursues its own policy, looking after its own roads, with the exception of rich emirates providing a grant to maintain some urban roads in the northern emirates. The major problem is the lack of coordination between the emirates, of which road maintenance is a representative issue. For instance, Abu Dhabi and Dubai alone have strong road maintenance departments looking after their own roads. Other emirates have no such facilities, resulting in many

problems for the northern emirates where the quality of road surfaces is significantly poorer than in places such as Dubai (see Chapter 3).

The principal linkages between the transport system in Dubai Emirate and economic development have been examined. This showed that there is a close and longstanding relationship between the development of the economy and the strength of the international transport system involving Dubai.

The main transport nodes in Dubai, such as Rashid, Jebel Ali, Creek Ports, and the airport, have improved the movement of cargo through this system and have established new facilities to cope with increasing cargo movement. The inter-accessibility between the transport components has created a new system termed the Sea-Air transport system which is now a highly significant system for Dubai and the U.A.E.: in terms of value, the U.A.E.'s facilities in this respect have a global importance second only to Seattle in U.S.A. (see Chapter 4). This development has led indirectly to the improvement in the operation of ports in the system such as the Port of Rashid and the airport of Dubai, and most recently to the establishment of Dubai Cargo Village.

Competition between U.A.E. cities for the sea-air transport system is mainly between the emirates of Dubai and Sharjah, the main focal points. Fujairah Emirate has made some slight progress in this system. These developments have led to an increase in the activity of this system within all the seaports and airports of the U.A.E.. The future of Dubai Emirate's services looks secure because of its recent impressive record of financial and technical investment in the infrastructure supporting this transportation system. This does not mean, however, that Dubai need do nothing to provide a more suitable policy for the sea-air transport in order to improve further this sector (see Chapter 4). Similarly, what is not clear is the capacity for the growth, in the U.A.E.

as a whole, of this sector. Is this growth to be part of the U.A.E.'s concerted effort to maintain its lead in this global activity, or is it a competitive, 'dog eat dog', situation, which sets one emirate against another? Indeed, could healthy competition between the emirates be, of itself, one of the causes of overall improvement in the facilities offered for this sector?

An evaluation of the transport system and its relationship with commercial activity in Dubai Emirate has provided a very important perspective on its significance as a major node of transportation especially between the Far East and the West, and as a major commercial centre. Fieldwork study outlined the importance of the internationality of Dubai's transport system, through the commercial firms based in Dubai. Chapter 5 showed that transport activity through Dubai Emirate focuses on the importance of Dubai as a re- distribution centre to other regional countries. Consequently, the movement of passengers and of goods is constantly increasing the importance of Dubai as a transport centre in the Gulf.

Some commercial firms focused their attention on the importance of Dubai as a market, because of its significance as a regional trade centre in which they would like to find the essential place to sell their products. However, the transport system is still a high priority for their commercial activity. The location decisions of commercial firms are much concerned with the transport sector, represented by the seaports, the road network, and air transport arrangements, which have all had a profound impact on commercial activities. The nationality of the firms using the transport system in Dubai was found to be less of a factor than the type of commercial activity in which the business was engaged, and their relationship with their customers.

The fieldwork results showed significant points concerning the relationship between transport and economic and commercial activity in Dubai. The impact of transport

on the development of the commercial sector in Dubai is clearly visible. Another aspect raised in this study was the use made by commercial firms in Dubai of other emirates' transport sectors, and in particular, the east coast seaports. This use has given a new strategic significance to that area of the Emirates, and a unique relationship between Dubai Emirate and the east coast.

In Chapter 6 an attempt was made to assess the impact of the transport system, especially the utilisation of vehicles, on population mobility between places in the U.A.E.. It is necessary to recognise and understand the immense influence that it has had in effecting a transformation of the society from its traditional setting to that of a modern one. Over the twenty years 1971-1991 immense changes in social life took place in the Emirates. This can be attributed in considerable measure to the development in transportation.

Analysis of data in this chapter showed that there has been an increase in social and welfare services. For instance, the rise in education in Al Ain is reflected in the high percentage of travel recorded associated with educational activities. Al Ain is a university city. Social services have similarly spread to Dubai due to road construction and the concomitant increase in car ownership.

The impact of transport can be seen in the dominant role played by the private car within the transport sector. This dominant role has considerably enhanced the mobility of the urban population, as has the role played by public transport albeit to a lesser extent and with shortcomings. The shortcomings of public transport are illustrated by the absence of a federal bus network between the cities of the emirates. This is linked to the great difference between the mobility of the U.A.E. national and the foreign national: the latter use public transport to a much greater extent. The

explosion of vehicles onto the roads has its problems, however, such as congestion in the cities, pollution and accidents (see Chapter 6).

The impact of the transport system on politics differs from the impact of politics on the transport system. Economically, the transport system is not, in a conventional sense, a productive sector. It is, however, seen as the key enabling part of the service sector in this economic development, but as such is probably more vulnerable to the influence of political change in any region than are other economic sectors. The political factors by which it is mainly affected are political boundaries, military actions and the reorganisation of policies and the development of regions. Political boundaries, internal and external, affect the location of roads in the U.A.E.. Co-ordination between emirates is not always to be relied on, such as in the cases of the Ras al Khaimah - Fujairah road, and Al Ain - Dubai road.

Chapter 7 viewed the Emirates largely as a single 'political unit': as a member of the Gulf Co-operation Council, which participated in the recent military events in the Gulf; looking at trade movement through U.A.E. ports; and at the effect on road location along external political boundaries. The efficiency of the transport system in the Emirates during the Gulf War was slightly affected, but not directly, by the political changes in the north of the Gulf. It was the huge increase in insurance premiums that affected trade activity in the Gulf. It could be said that, as a result of the Gulf War, new factors emerged due to the Emirates' strategic location. These factors depend on the remoteness of the Emirates from the less stable northern Gulf region .

Chapter 8 dealt with recent transportation policies in the United Arab Emirates in general, and in Dubai Emirate in particular. As an example of the positive use of transport routes as a means of achieving fuller inter-emirate integration, the early

direction of the Federal government's planning and income onto the roads linking the northern emirates to Dubai and therefore the rest of the U.A.E. was quoted, and shown to have been successful.

In Dubai Emirate, the development of the transport system and its impact on the settlement patterns has greatly influenced urban and rural expansion. The rapid expansion of the city and other settlements in Dubai has had its impact on all the land use sectors.

Since the establishment of the U.A.E. in 1971, the fast expansion of the federal road network under the Ministry of Public Works and Housing in general, and that of the Dubai network in particular, has helped the population to move to other settlements where they can live in greater comfort than in the crowded cities.

It was an intention of this work to identify and study known potential problems. Transport problems in the U.A.E. are summarised in the following points:

1. A lack of co-ordination between the emirates in terms of the transport policies has become a major feature under the federation of these states. To foster integration between the emirates, there needs to be greater concern for a national transport policy regulating movement, and to consolidate this potential sector (see Chapters 2 & 8).
2. As a result of the earlier difficulties, problems are still experienced with the maintenance of some major roads. This problem is recognised as a major obstacle facing integration between emirates. The richer emirates have to be willing to help the poorer ones if there is to be an improvement in political and social integration (see Chapter 3).

3. The road network has played a vital role in facilitating the movement of goods and passengers from place to place. Movement of heavy loads of commercial goods in commercial trucks, which move goods from the ports, industrial places, and commercial centres has damaged some roads. Some emirates, such as Dubai and Abu Dhabi, have implemented a policy to control these problems on the roads, whereas others have not given this problem much attention, despite the studies which have been carried out by the Ministry of Public Works and Housing usually because of their individual financial problems. This lack of uniformity points to the need for a federal policy on controlling the movement of commercial loads on the road network.
4. Continued progress in commercial activity in Dubai Emirate has led to many improvements in its transport system. It has led to the expansion of transport facilities in all three transport systems: road, sea and air. The recent development in the sea transport sector in the seaports has been to increase, and respond to the increase in economic activity. It is appropriate to mention here some points relating to commercial expansion in the CBD area of Dubai. First, the fieldwork studied revealed that the concentration of commercial firms in the CBD is a very important factor in the location decision of firms. However, this has an effect on car parks, which have insufficient space, and on traffic congestion on some major roads in the area. These are problems to which the official authorities must give more attention.
5. The vastly increased use by the population of private cars, especially in their journey to work in some major cities, has precipitated a number of environmental problems, including congestion in the cities, accidents, and in the increasing of pollution caused by car exhaust fumes. Therefore, there needs to be a policy to improve the other transport services, such as public transport buses, and to

encourage people to use such, especially within the cities, in order to reduce the problems associated with the use of private cars and taxis. The case of Dubai was examined, and the same needs to happen in other cities of the Emirates (see Chapter 6).

6. This study has uncovered the need for not only the formal collection and collation of data relating to transport, but also a willingness to put this information to use when plans are implemented.

Transport is an important subject for the Emirates. An authority for transport studies would co-ordinate all studies, and the information and data from this could be made available to researchers.

### **Further studies**

This study has not dealt with all problems of the transport in the U.A.E., but was a first step in this important subject. This study was concerned with the impact of transport policy on spatial changes in the Emirates, with special concentration on Dubai Emirate.

As mentioned at the beginning of this report, the transport field receives little in depth attention from researchers in the Emirates. However, further research must be carried out in relation to many things: transport problems of different kinds continue to grow both in the cities and in rural areas; the development of the infrastructure of each emirate needs to pay greater attention to integration; long-term relationships in terms of this vital sector between the southern emirates of Abu Dhabi and Dubai and the five northern emirates need to be examined.

The urban transport systems of the Emirates differ from each other, particularly in terms of problems and policy. These problems need to be studied because this field

is always expanding, and the major cities of the Emirates seek to solve these problems by means of scientific research. The role of planning in transportation must be given more attention by the federal authorities, in order to provide the comprehensive solution of a 'federal transport policy'. In this context, there is a real need for an in-depth study of transportation planning involving the cities of Dubai and Sharjah which, because of the rapid urban and commercial integration between them, has created a single conurbation despite the political boundary which divides them, resulting in heavy traffic flows and congestion, road accidents, and environmental problems. These problems are despite recent studies about this issue. Similar issues, albeit on a smaller scale, concern the other cities of the Emirates.

Recent issues relating to transport include the impact of vehicles on the environmental aspects of the cities. This requires evaluation. Road accidents seem to be increasing steadily, but to find out the problems, studies from different viewpoints must be undertaken including a geographical view.

Regarding Dubai Emirate, there are many viewpoints to be evaluated in terms of the transport system. Dubai is a busy commercial city where the commercial core is located on both sides of the Creek. That Creek is, in itself, the cause of much of Dubai's congestion as internal city movers try to get around it, and as it is possible the more imaginative use of the Creek as a transport artery could help resolve this problem. The expansion of commercial projects undertaken by local and international business in the commercial and shopping areas need to be studied in order to evaluate the transport problems currently faced by these projects, and to avoid the problems associated with the city centre CBD.

There are also vital issues relating to Dubai as a transit point of global importance. Transport studies may point to more convenient solutions to Dubai's problem of

attempting to cope with ever increasing trade activity. The intermodal transport system is recognised as a sector very useful to Dubai and other emirates, and is in need of further study. There is also a need to explore the implementation of suitable policies to contribute to the greater economic diversification of each of the emirates. The strategic importance of the East Coast of the Emirates must be the focus of more attention and greater study in terms of development of its transport networks represented by the sea ports, airport and road network, the purpose of which would be to strengthen integration between the Emirates.

This study has shed light on all these problems and prospects. What is especially clear is the dual role of these two aspects of transport in the development of the U.A.E. in general and Dubai in particular. On the one hand we have seen how the various U.A.E. members have used the internal road system, not always in a concerted or integrated way, to further the occasionally conflicting aims of federal and single emirate integration and development. On the other hand, Dubai's ability to build on its long tradition as a trading entrepot has been shown to be well founded, in Dubai's leadership grasping the geopolitical potential of the Gulf's location for international transport flows and exploiting it successfully. This has been, inevitably, for the benefit of Dubai, and it has been a tacit assumption that whatever benefits Dubai will also benefit the rest of the U.A.E..

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# Appendix

**University of the U.A.E.  
Faculty of Arts  
Department of Geography**

**Questionnaire examining the relationship between the transport  
system and commercial activity in Dubai Emirate**

**Analysis study in Geography  
for obtaining a Ph.D. Degree**

**Researcher:  
Jamal Al Mehairi**

# Questionnaire

**University of the U.A.E.  
Faculty of Arts  
Department of Geography**

**Circle the appropriate answer for each question:**

*1. Type of commercial activity:*

1. Wholesale.
2. Retail.
3. both

*2. Ownership of Establishment:*

1. Public ownership.
2. Private ownership.
3. Joint (Government and Private).

*3. Nationality of the company:*

1. Emirates (U.A.E.)
2. AGCC.
3. Arab non AGCC.
4. Iranian.
5. Indian.
6. Other Asian.
7. European/American.
8. Other (please specify) .....

4. Which factors have influenced the location of your company?

Please rank the following eight factors by putting a number beside the factor, 8 being the most important and 1 the least important.

Factor	Rank
1. Proximity to main road connection	
2. Proximity to market	
3. Proximity to port	
4. Proximity to industrial areas	
5. Proximity to residential areas	
6. Availability of labour	
7. Proximity to raw material	
8. Relating to the land's rent	

5. What is the share of the following items as percentage of the total expenses of your company?

Please circle one number

Items	Percentage (see Key below)				
1. Rent	1	2	3	4	5
2. Transport	1	2	3	4	5
3. Labour	1	2	3	4	5
4. Utilities (water etc.)	1	2	3	4	5
5. Others .....	1	2	3	4	5
<b>Key:</b>					
1. Less than 10%					
2. 11 to 25%					
3. 26 to 50%					
4. 51 to 75%					
5. More than 76%					

6. Which modes of transport are mostly used by the company?

<b>A: Exports of goods by your company</b>	
Mode of transport	Reasons
1. Sea Transport	1. Cheap 2. Fast 3. Safe 4. Other .....
2. Road Transport	1. Cheap 2. Fast 3. Safe 4. Other .....
3. Air Transport	1. Cheap 2. Fast 3. Safe 4. Other .....
<b>B: Import of goods by your company</b>	
Mode of transport	Reasons
1. Sea Transport	1. Cheap 2. Fast 3. Safe 4. Other .....
2. Road Transport	1. Cheap 2. Fast 3. Safe 4. Other .....
3. Air Transport	1. Cheap 2. Fast 3. Safe 4. Other .....

7. How much of your annual production is distributed in each of the following areas:

<b>A: Dubai Emirates</b>							
<b>Area</b>	<b>Percentage (see Key below)</b>						
1. In CBD (Bur Dubai)	1	2	3	4	5	6	7
2. In CBD (Deira)	1	2	3	4	5	6	7
3. Rest of Deira	1	2	3	4	5	6	7
4. Rest of Dubai	1	2	3	4	5	6	7
5. Al Qusis and Al Remool	1	2	3	4	5	6	7
6. Al Rashidiah	1	2	3	4	5	6	7
7. Jumeirah and Umm Suqiam	1	2	3	4	5	6	7
8. Jebel Ali Area	1	2	3	4	5	6	7
9. Al Awir and Al Khawaneej	1	2	3	4	5	6	7
10. Dubai rural area	1	2	3	4	5	6	7
<b>B: of rest of the U.A.E.</b>							
<b>Areas</b>	<b>Percentage, (see Key below)</b>						
1. Abu Dhabi	1	2	3	4	5	6	7
2. Sharjah	1	2	3	4	5	6	7
3. Ajman	1	2	3	4	5	6	7
4. Ras al Khaimah	1	2	3	4	5	6	7
5. Umm al Qaiwain	1	2	3	4	5	6	7
6. Fujairah	1	2	3	4	5	6	7
7. Al Ain	1	2	3	4	5	6	7
8. Khor Fakkan	1	2	3	4	5	6	7
<b>Key:</b>							
1.	Less than 5%						
2.	6 to 20%						
3.	21 to 35%						
4.	36 to 50%						
5.	51 to 65%						
6.	66 to 80%						
7.	More than 81%						

C: abroad							
Areas	Percentage, (see Key below)						
1. Oman	1	2	3	4	5	6	7
2. Qatar	1	2	3	4	5	6	7
3. Saudi Arabia	1	2	3	4	5	6	7
4. Bahrain	1	2	3	4	5	6	7
5. Kuwait	1	2	3	4	5	6	7
6. Iran	1	2	3	4	5	6	7
7. Pakistan	1	2	3	4	5	6	7
8. India	1	2	3	4	5	6	7
9. Other	1	2	3	4	5	6	7
<b>Key:</b>							
1. Less than 5%							
2. 6 to 20%							
3. 21 to 35%							
4. 36 to 50%							
5. 51 to 65%							
6. 66 to 80%							
7. More than 81%							

7. *Commodities distributed by:*

(You can tick more than one answer)

1. Company cars.
2. General transport companies.
3. Customers cars.

8. *Have recent developments of the ports been helpful for your company activity?*

1. Yes
2. No.
3. Not sure.

If 'yes', in what respects:

1. ....
2. ....
3. ....
4. ....
5. ....

9. Which of the following non-Dubai transport facilities in the Emirates do you use?

Transport facilities	Reasons
1. Abu Dhabi seaport	..... ..... ..... .....
2. Abu Dhabi airport	..... ..... ..... .....
3. Sharjah airport	..... ..... ..... .....
4. Sharjah seaport	..... ..... ..... .....
5. Khor Fakkan seaport	..... ..... ..... .....
6. Fujairah seaport	..... ..... ..... .....
7. Fujairah airport	..... ..... ..... .....

