

TOWARDS A SUSTAINABLE URBAN FUTURE IN OMAN: PROBLEM & PROCESS ANALYSIS (MUSCAT AS A CASE STUDY)

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Submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in Architecture

DECLARATION

I declare that this thesis was composed by myself and that the work contained therein is my own, except where explicitly stated otherwise in the text.

I declare that this submission has not been submitted for any other academic award.

Khalfan Said Mubarak Al Shueili

ABSTRACT

Like its neighbouring countries, Oman has witnessed an extraordinary social and economic development over the past few decades. This was mainly one-sided socio-economic development dependent on the oil sector and the government has continuously strived to draw a balance between exploitation of its natural resources, and the development program which indicates an early courtesy towards sustainability and environmental protection. The pressure towards massive investment in development and economic progress was nevertheless higher and determined to a large extent its success in maintaining this equilibrium. As such, one has to address this important issue within the framework of urban sustainability. The essence of this thesis contribution to knowledge lies around the dissection of the decision making process around urban planning and development in Oman during the past forty years (through problem and process analysis) and how it may be directed towards a more sustainable urban future.

The aims of this research are: to develop a comprehensive understanding of the history of urban development in Oman since 1970, and to provide insights into the decision making processes which have occurred during this period; to develop an understanding of contemporary decision making processes in urban planning, including an understanding of decision makers and citizens attitudes towards urban sustainability; to identify problems and successes in these areas; and to develop an improved strategy for urban planning that will provide an effective and equitable sustainable urban future.

The study has progressed in a sequence of phases: identifying the main dimensions of urban sustainability that are relevant for this study; mapping out the history of urban development planning, including its main objectives, policies, urban development milestones and challenges; carrying out the research using a triangulated methodology approach that consists of: historical analysis of milestones and projects within the development of town planning in Oman over the past forty years, semi-structured interviews of decision makers, and the assessment of behaviour and attitudes of the general public towards sustainability through the use of focus groups and

questionnaires. This has revolved around a few case studies of existing districts from Muscat, the capital of Oman.

The framework for this study consisted of 16 urban sustainability dimensions (USDs), which can be looked at as the agenda for any serious review of urban sustainability specific to Oman. The *problem analysis* phase produced a list of problems, challenges, constraints and drivers that can be utilized in addressing the progress of urban development and how it may be enhanced in the future. It was evident that throughout the early years of development, and up to 1995, Oman has undertaken serious strategy development across various disciplines within urban development. As a result of the *process analysis* phase, there is an apparent gap between strategy development and implementation, and this research identified 14 strategy shortcomings and 24 implementation shortcomings. As an outcome of this analysis, the research identifies a comprehensive list of recommendations against each urban sustainability dimension and this should aid any consultant that aims to develop future urban planning strategies, and the professionals entrusted with implementation of such strategies.

It is not surprising that focus should be cast on land use, urban planning and urban transport. The plot distribution system in Oman has driven our cities to the shape they are in today, and has affected other elements of the city in this route, such as transport corridors, urban design and urban quality. The lack of a meaningful urban development management at a city scale contributes to this dilemma, but there are solutions to overcome this that should be looked at.

This research could be carried forward by translating these urban sustainability dimensions into indicators which will be able to measure progress and success against the government actions and other initiatives addressing sustainability. In addition, the *product analysis* phase that would involve case studies within Muscat as a city could be undertaken to identify the association of the outcome with the strategies developed and their implementation. In addition, the results within this research could be tested against the current progress and development of Oman National Spatial Strategy, under development since 2008. The qualitative analysis in this research would be enhanced by conducting quantitative analysis into the decision making process and to measure the gap behind strategy and implementation.

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**To my mother and father for their sincere prayers and
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**To my best friend, my wife (Huda) for her continuous love and
support;**

**To our future, our heart, our lovely children: Osama, Reenad,
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**To my country, Oman, for which I will never be able to pay
anything back;**

Please accept my love and humble dedication

TABLE OF CONTENT

DECLARATION	2
ABSTRACT.....	3
ACKNOWLEDGEMENTS.....	5
DEDICATION.....	6
LIST OF FIGURES	17
LIST OF TABLES	21
ABBREVIATIONS	29
1. CHAPTER 1: INTRODUCTION.....	30
1.1. OVERVIEW.....	30
1.2. BACKGROUND AND RESEARCH PROBLEM	31
1.3. THESIS STATEMENT.....	32
1.4. RESEARCH AIMS AND OBJECTIVES.....	32
1.4.1. Research Aim 1: History of urban development in Oman.....	33
1.4.2. Research Aim 2: Urban Sustainability Dimensions (USDs)	33
1.4.3. Research Aim 3: Contemporary approaches in urban development in Oman.....	33
1.4.4. Research Aim 4: The GAP between strategy and implementation.....	34
1.4.5. Research Aim 5: Improved approach towards urban sustainability	34
1.5. CONTRIBUTION TO KNOWLEDGE.....	35
1.6. DISSERTATION STRUCTURE.....	35
2. CHAPTER 2: OMANI CONTEXT AND BACKGROUND.....	38
2.1. OVERVIEW.....	38
2.1.1. PHYSICAL CONTEXT	38
2.1.2. HISTORICAL CONTEXT	40

2.1.3.	SOCIAL CONTEXT	42
2.1.4.	ECONOMIC CONTEXT.....	46
2.2.	BUILT ENVIRONMENT AND URBAN DEVELOPMENT BEFORE 1970	48
2.3.	BUILT ENVIRONMENT AND URBAN DEVELOPMENT AFTER 1970	52
2.4.	THE FOCUS ON SUSTAINABLE DEVELOPMENT.....	55
2.5.	WHY STUDY URBAN SUSTAINABILITY IN OMAN?	55
2.6.	WHY MUSCAT AS A CASE STUDY?	56
2.7.	PROBLEMS AND GAP ANALYSIS	59
2.8.	CHAPTER SUMMARY	60
3.	CHAPTER 3: URBAN SUSTAINABILITY IN THE GLOBAL CONTEXT	61
3.1.	OVERVIEW.....	61
3.2.	SUSTAINABILITY	61
3.3.	URBANISM.....	65
3.3.1.	THE ROLE OF THE CITY	65
3.3.2.	URBAN PLANNING	67
3.3.3.	URBANISM – TRENDS.....	68
3.4.	URBAN SUSTAINABILITY	71
3.4.1.	URBAN SUSTAINABILITY - DEFINITION.....	71
3.4.2.	URBAN SUSTAINABILITY – CHALLENGES	72
3.4.3.	BARRIERS TO URBAN SUSTAINABILITY	73
3.5.	URBAN SUSTAINABILITY ASSESSMENT	74
3.5.1.	URBAN SUSTAINABILITY INDICATORS	75
3.5.2.	URBAN SUSTAINABILITY DIMENSIONS	77
3.6.	LESSONS.....	79
3.6.1.	LESSONS FROM HISTORY.....	79
3.6.2.	LESSONS FROM EUROPEAN CITIES	79
3.6.3.	CASE STUDIES FROM THE MIDDLE EAST	80

3.7.	STRATEGIES AND IMPLEMENTATION	82
3.8.	INTERPRETATION AND CRITICAL REFLECITON	84
3.9.	GAP IN KNOWLEDGE	85
3.10.	CHAPTER SUMMARY	87
4.	CHAPTER 4: THE RESEARCH METHODOLOGY	88
4.1.	OVERVIEW.....	88
4.2.	RESEARCH STRATEGY	88
4.3.	RESEARCH DESIGN	89
4.3.1.	Qualitative research	90
4.3.2.	Quantitative research	91
4.3.3.	Mixed methods.....	92
4.4.	REVIEW OF THESIS STATEMENT.....	94
4.5.	RESEARCH AIMS, OBJECTIVES AND QUESTIONS.....	94
4.6.	RESEARCH METHOD 1: ANALYSIS OF OMAN URBAN DEVELOPMENT HISTORY (QUALITATIVE).....	95
4.6.1.	Preparation of the instrument.....	95
4.6.2.	Resources and data collection.....	96
4.7.	THE RESEARCH FRAMEWORK/AGENDA: URBAN SUSTAINABILITY DIMENSIONS (USD)	97
4.8.	RESEARCH METHOD 2 & 3: SEMI-STRUCTURED INTERVIEWS & FOCUS GROUPS (QUALITATIVE)	99
4.8.1.	Purpose.....	99
4.8.2.	Targeted Participants and their selection	100
4.8.3.	Preparation of the instruments	104
4.8.4.	Results Analysis.....	105
4.9.	RESEARCH METHOD 4 & 5: QUICK SURVEYS AND PUBLIC QUESTIONNAIRES (QUANTITATIVE).....	106

4.9.1.	Purpose.....	106
4.9.2.	Preparation of the instruments	106
4.10.	RESEARCH TRIANGULATION	107
4.11.	RESEARCH LIMITATIONS.....	110
4.12.	CHAPTER SUMMARY	111
5.	CHAPTER 5: HISTORY OF URBAN DEVELOPMENT AND SUSTAINABILITY IN OMAN	113
5.1.	OVERVIEW.....	113
5.1.1.	THE MAIN OBJECTIVE OF THE POLICY FOR TOWN PLANNING	113
5.1.2.	OMAN URBAN DEVELOPMENT AIMS AND OBJECTIVES.....	114
5.1.3.	OMAN URBAN PLANNING KEY CONCERNS	116
5.1.4.	PLOT DISTRIBUTION AND HOUSING POLICIES	116
5.1.5.	REFLECTION ON POLICY AND OBJECTIVES OF TOWN PLANNING	119
5.2.	URBAN PLANNING GOVERNANCE IN OMAN	120
5.2.1.	Overview.....	120
5.2.2.	Supreme Committee for Town Planning (SCTP)	121
5.2.3.	Ministry of Housing.....	122
5.2.4.	Muscat Municipality	123
5.2.5.	Other Organizations	124
5.2.6.	Summary and reflection.....	125
5.3.	THE HIERARCHY OF URBAN PLANNING	128
5.3.1.	Overview.....	128
5.3.2.	Level 1: National Spatial Strategy	129
5.3.3.	Level 2: Regional Planning (Scale: 1:100,000)	132
5.3.4.	Level 3: Town Structural Plans (Scale: 1:10,000)	132
5.3.5.	Level 4: Local Plans (Detailed plans) (Scale: 1:2,000)	132
5.4.	METHODOLOGY FOR IMPLEMENTATION OF URBAN PLANS	133
5.4.1.	Methodology for implementation of macro-level urban plans	133
5.4.2.	Methodology for implementation of micro-level urban plans	134

5.5.	KEY URBAN PLANNING STRATEGIES	135
5.5.1.	Overview	135
5.5.2.	The Greater Muttrah Development Plan (1967-1972) by John R. Harris and Partners 136	
5.5.3.	Muscat City Planning (1972 to 1973) by Makiya Associates Consultants.....	136
5.5.4.	The Greater Muttrah Development Plan 1972 by VIAK.....	138
5.5.5.	Capital Area Structure Plan (CASP 1982) by Llewellyn-Davies Weeks	139
5.5.6.	Proposals for the future development within the Capital Area (6 new projects):.	141
5.5.7.	Muscat Regional Plan (1989 to 1990) by Weidleplan & Muamir	142
5.5.8.	Muscat Area Structure Plan (1989-1991) by Weidleplan & Muamir.....	144
5.5.9.	Oman National Spatial Strategy (ONSS) (2008 to present)	144
5.5.10.	Summary and reflection.....	146
5.6.	OTHER STRATEGIES INFLUENCING URBAN DEVELOPMENT	148
5.6.1.	TRANSPORT STRATEGIES	148
5.6.2.	ENVIRONMENT STRATEGIES	150
5.6.3.	ENERGY STRATEGIES	151
5.6.4.	INTERPRETATION.....	152
5.7.	Summary	152
6.	CHAPTER 6: THE FRAMEWORK – URBAN SUSTAINABILITY DIMENSIONS (USDs)	154
6.1.	Overview	154
6.2.	WHY DIMENSIONS, NOT INDICATORS?	154
6.3.	STAGE 1: USDs IN GENERAL LITERATURE.....	155
6.4.	STAGE 2: USDs IN OMAN TOWN PLANNING KEY CONCERNS.....	156
6.5.	STAGE 3: USDs IN OMAN TOWN PLANNING AIMS AND OBJECTIVES	157
6.6.	STAGE 4: USD MATRIX ANALYSIS AND SELECTION OF USD.....	158
6.6.1.	USD 1: Urban Planning	159
6.6.2.	USD 2: Urban Services.....	163
6.6.3.	USD 3: Urban Economy	165

6.6.4.	USD 4: Urban Environment.....	169
6.6.5.	USD 5: Urban Society	171
6.6.6.	USD 6: Urban Mobility	174
6.6.7.	USD 7: Urban Management.....	175
6.6.8.	USD 8: Urban Quality	178
6.6.9.	USD 9: Urban Resources	179
6.7.	STAGE 5: USD DEFINITION	181
6.8.	INTERPRETATION AND CRITICAL REFLECITON	183
6.9.	SUMMARY	185
7.	CHAPTER 7: PROBLEM ANALYSIS PHASE – RESULTS AND INTERPRETATION	186
7.1.	OVERVIEW.....	186
7.2.	RESEARCH METHODOLOGY	186
7.2.1.	RESEARCH METHOD 2 & 3: SEMI-STRUCTURED INTERVIEWS & FOCUS GROUPS (QUALITATIVE)	186
7.2.2.	RESEARCH METHOD 4 & 5: QUICK SURVEYS AND PUBLIC QUESTIONNAIRES (QUANTITATIVE).....	190
7.2.3.	ANALYSIS REPORTING FORMAT.....	192
7.2.4.	EXAMPLE 1 – TRIANGULATION FOR SETTLEMENT PATTERN USD	193
7.2.5.	EXAMPLE 2 – TRIANGULATION FOR LAND USE	196
7.3.	USD 1.1: SETTLEMENT PATTERN.....	198
7.3.1.	Settlement Pattern Problems	198
7.3.2.	Settlement Pattern Challenges	201
7.3.3.	Settlement Pattern Drivers	202
7.3.4.	Settlement Pattern Barriers (Constraints)	204
7.4.	USD 1.2: URBAN DESIGN	205
7.4.1.	Urban Design Problems	205
7.4.2.	Urban Design Challenges	205
7.4.3.	Urban Design Drivers	206
7.4.4.	Urban Design Barriers (Constraints)	206

7.5.	USD 1.3: LAND USE	207
7.5.1.	Land Use Problems	207
7.5.2.	Land Use Challenges	212
7.5.3.	Land Use Drivers	212
7.5.4.	Land Use Barriers (Constraints)	213
7.6.	USD 2.1: HOUSING.....	214
7.6.1.	Housing Problems.....	214
7.6.2.	Housing Challenges	214
7.6.3.	Housing Drivers	215
7.6.4.	Housing Barriers (Constraints)	216
7.7.	USD 4.1: ENVIRONMENTAL PROTECTION	216
7.7.1.	Environmental Protection Problems	216
7.7.2.	Environmental Protection Challenges.....	217
7.7.3.	Environmental Protection Drivers	218
7.7.4.	Environmental Protection Barriers (Constraints).....	218
7.8.	USD 4.2: CLIMATE CHANGE	218
7.8.1.	Climate Change Problems.....	218
7.8.2.	Climate Change Challenges.....	219
7.8.3.	Climate Change Drivers.....	220
7.8.4.	Climate Change Barriers (Constraints).....	220
7.9.	USD 5.1: PUBLIC PARTICIPATION	220
7.9.1.	Public Participation Problems.....	220
7.9.2.	Public Participation challenges.....	221
7.9.3.	Public Participation Drivers.....	222
7.9.4.	Public Participation barriers (constraints).....	222
7.10.	USD 6.1: URBAN TRANSPORT.....	222
7.10.1.	Urban Transport Problems.....	222
7.10.2.	Urban Transport Challenges	223
7.10.3.	Urban Transport Drivers	223
7.10.4.	Urban Transport Barriers (Constraints)	225

7.11.	USD 7.1: URBAN DEVELOPMENT MANAGEMENT.....	226
7.11.1.	Urban Development Management Problems	226
7.11.2.	Urban Development Management Challenges	226
7.11.3.	Urban Development Management Drivers	227
7.11.4.	Urban Development Management Barriers (Constraints)	227
7.12.	USD 8.1: URBAN QUALITY	227
7.12.1.	Urban Quality Problems	227
7.12.2.	Urban Quality Challenges.....	228
7.12.3.	Urban Quality Drivers.....	228
7.12.4.	Urban Quality Barriers (Constraints).....	229
7.13.	INTERPRETATION AND CRITICAL REFLECTION.....	229
7.13.1.	Summary of problem analysis phase	230
7.13.2.	Trends of problems over periods of development	231
7.13.3.	Critical reflection	236
7.14.	CHAPTER SUMMARY	237
8.	CHAPTER 8: PROCESS ANALYSIS PHASE- THE GAP BETWEEN STRATEGY AND IMPLEMENTATION.....	239
8.1.	OVERVIEW.....	239
8.2.	ANALYSIS OF THE IMPLEMENTATION OF KEY STRATEGIES	239
8.2.1.	KEY TOWN STRATEGY ALTERNATIVE FOR NATIONAL LEVEL	239
8.2.2.	MUSCAT REGIONAL PLAN (1989)	242
8.2.3.	ENVIRONMENTAL STRATEGIES.....	243
8.3.	CONTEMPORARY PLANNING APPROACHES	245
8.4.	STRATEGY SHORTCOMINGS	251
8.5.	IMPLEMENTATION SHORTCOMINGS.....	255
8.6.	INTERPRETATION AND CRITICAL REFLECTION.....	263
8.6.1.	WHERE WAS THE GAP IN PREVIOUS KEY STRATEGIES IMPLEMENTATION?	263

8.6.2.	THE PUBLIC PERCEPTION OF THE GAP	264
8.6.3.	REFLECTION ON OMAN NATIONAL SPATIAL STRATEGY (ONSS)	265
8.6.4.	HOW DECISIONS AND ACTIONS IN THE HISTORY LED TO PARTICULAR OUTCOMES FOR DEVELOPMENT?	268
8.7.	CHAPTER SUMMARY	270
9.	Chapter 9: Improved approach towards Urban Sustainability	272
9.1.	OVERVIEW	272
9.2.	SUSTAINABILITY DEFINITION FOR OMAN	272
9.3.	RECOMMENDATIONS RESULTS FOR PROBLEM ANALYSIS PHASE	275
9.3.1.	USD 1.1: SETTLEMENT PATTERN	275
9.3.2.	USD 1.2: URBAN DESIGN	277
9.3.3.	USD 1.3: LAND USE	281
9.3.4.	USD 2.1: HOUSING	282
9.3.5.	USD 4.1: ENVIRONMENTAL PROTECTION	284
9.3.6.	USD 4.2: CLIMATE CHANGE	286
9.3.7.	USD 5.1: PUBLIC PARTICIPATION	289
9.3.8.	USD 6.1: URBAN TRANSPORT	291
9.3.9.	USD 7.1: URBAN DEVELOPMENT MANAGEMENT	295
9.3.10.	USD 8.1: URBAN QUALITY	298
9.4.	INTERPRETATION AND SUMMARY OF RECOMMENDATIONS	300
9.4.1.	Summary of results – by research method	300
9.4.2.	Opportunities – result comparison by Category of participants	301
9.4.3.	Recommendations – result comparison by Category of participants	302
9.4.4.	Final Recommendations	302
9.5.	BRIDGING THE GAP BETWEEN STRATEGY AND IMPLEMENTATION	303
9.6.	THE PLOT DISTRIBUTION AS A PROMINENT FACTOR	310
9.7.	CHAPTER SUMMARY	314
10.	Chapter 10: CONCLUSION	315
10.1.	OVERVIEW	315

10.2.	CONTRIBUTION TO KNOWLEDGE	315
10.2.1.	Research Aim 1: History of urban development in Oman.....	316
10.2.2.	Research Aim 2: Urban Sustainability Framework (USDs).....	318
10.2.3.	Research Aim 3: Contemporary approaches in urban development in Oman.....	320
10.2.4.	Research Aim 4: The GAP between strategy and implementation.....	321
10.2.5.	Research Aim 5: Improved approach towards urban sustainability	325
10.3.	CHALLENGES	327
10.4.	FUTURE WORK	329
10.5.	FINAL THOUGHTS	331
	LIST OF REFERENCES.....	334
	APPENDIX A: MUSCAT CITY PLAN	345
	APPENDIX B: TIMELINE FOR HISTORY OF URBAN DEVELOPMENT IN OMAN.....	348
	APPENDIX C: INDEX FOR POLICIES OF URBAN DEVELOPMENT IN OMAN	368
	APPENDIX D: USD ANALYSIS IN LITERATURE	379
	APPENDIX E: LIST OF QUESTIONS FOR INTERVIEWS	383
	APPENDIX F: LIST OF QUESTIONS FOR QUICK SURVEY	387
	APPENDIX G: LIST OF QUESTIONS FOR PUBLIC QUESTIONNAIRE.....	389
	APPENDIX H: LIST OF QUESTIONS FOR FOCUS GROUPS	395
	APPENDIX I: INTERVIEW CONSENT FORM	398
	APPENDIX J: ETHICS APPROVAL FORM.....	399
	APPENDIX K: INTERVIEW PARTICIPANTS PROFILES.....	402
	APPENDIX L: INTERVIEW QUESTIONS VS. PARTICIPANTS MATRIX.....	405
	APPENDIX M: MUSCAT REGIONAL PLAN (3 ALTERNATIVES).....	409
	APPENDIX N: MUSCAT STRUCTURAL PLAN (3 ALTERNATIVES).....	413
	APPENDIX P: HM SPEECH ON 23/7/1970 AND 27/7/1970	417

LIST OF FIGURES

Figure 2.1 Map of Oman (Source: The Supreme Committee for Town Planning)	39
Figure 2.2 Population (Mid-year estimate), Area (km ²) & population density by Governorates (2010 to 2012) (Statistics & Information, 2013)	43
Figure 2.3 Total Population in the Sultanate by Nationality (Statistics & Information, 2013)	44
Figure 2.4 Localities by size of population 2010 (Statistics & Information, 2013)	45
Figure 2.5 Population Pyramid 2012 (Statistics & Information, 2013).....	45
Figure 2.6 Examples of forts and castles in Oman (Omanet, 2014).....	49
Figure 2.7 Muscat gates (left: new; right: old)	50
Figure 2.8 The oasis village of Bilad Sayt (fanak, 2014)	51
Figure 2.9 Harat al-Aqr (BAHLA, UNESCO World Heritage Site) (source: (Bandyopadhyay, 2005) change reference	51
Figure 2.10 Aerial photo of Muttrah city and Sultan Qaboos Port.....	53
Figure 2.11 Aerial photo of Ruwi – the first new city in Muscat	54
Figure 3.1 Estimated and projected size of the world's urban and rural populations, 1950–2030. (United Nations, 2003).....	69
Figure 3.2 A sample of Metrics, Models and Tools ((Walton, et al, 2005).....	76
Figure 4.1: integrating data in mixed methods research(O’Cathain et al., 2010).....	89
Figure 4.2: Research Methodology Framework	90
Figure 4.3 Qualitative analysis as a circular process (Qualitative data analysis by Ian Dey 1993)	91
Figure 4.4 Snapshot of the Reading Index.....	96
Figure 4.5 Snapshot from the contacts database.....	100
Figure 4.6 Interviewees profile and experience.....	103
Figure 4.7 Snapshot from the Questions database	104
Figure 5.1 SCTP history timeline	121
Figure 5.2 Ministry of Housing history timeline	122
Figure 5.3 Muscat Municipality history timeline	123
Figure 5.4 Examples of Muscat Municipality public gardens projects	124

Figure 5.5 Timeline of development of organizations concerned with Urban Development in Oman (1970-2010).....	126
Figure 5.6 Amalgamation period trends in organizational development.....	128
Figure 5.7 Key Town Centres in Oman as part of Oman National Spatial Strategy (by SCTP)	131
Figure 5.8 Timeline of the history of urban planning (regional and structural plans) in Muscat	135
Figure 5.9 New ceremonial route in Muscat old city – a concept proposed by Makiya in 1973	138
Figure 5.10 Illustration of Master Plan Report Proposals (Oborn, 1982).....	139
Figure 5.11 Drawing extracted from Capital Area Structure Plan 1982 (Weeks, 1983).....	141
Figure 5.12 Proposal for 6 new developments within the Capital Area (Milton-Keynes and Corporation, 1985).....	142
Figure 5.13 Major urban planning strategies in Muscat	146
Figure 5.14 Timeline of the history of transport in Muscat.....	149
Figure 5.15 Proposed major road links 1990 (Muscat Area Structure Plan phase 2).....	149
Figure 5.16 Timeline of the history of Environmental Organizations in Oman.....	150
Figure 5.17 Timeline of the history of Environmental Protection in Oman.....	150
Figure 5.18 Past forty years (1970 to 2010) will help predict future urban development path for the next forty years (2010 to 2050).....	152
Figure 6.1 References for Oman Urban Planning key concerns.....	157
Figure 6.2 References for Oman Urban Planning aims and objectives	158
Figure 7.1 Snapshots from NVivo showing sources and nodes.....	189
Figure 7.2 Snapshots from NVivo showing an example of coding for settlement pattern USD	190
Figure 7.3 Extract from Nvivo coding results relating to settlement pattern USD.....	195
Figure 7.4 Exported files from Nvivo coding results relating to land use USD.....	198
Figure 7.5 Aerial photo of Qurm showing the dominant villa typology	200
Figure 7.6 Aerial photo showing part of Ministries complex in Al Khuwair.....	201
Figure 7.7 Aerial photo from Al Ghubra showing extent of change in height restrictions	208
Figure 7.8 Aerial photo from Ghala Industrial Area.....	210
Figure 7.9 Aerial photo from Al Ghubra showing development in flood zone.....	211
Figure 7.10 Aerial photo from Bousher social housing area	215

Figure 7.11 Aerial photo of the coastal road in Qurm	217
Figure 7.12 Images from tropical cyclone Gunu	219
Figure 7.13 Analysis of transport problems identified through public questionnaires.....	223
Figure 8.1 SCTP Urban Planning Manual title cover (SCTP, 1996).....	247
Figure 8.2 Aerial photo from Ghubra showing extent of increase in building height.....	248
Figure 8.3 artist impression for Sultan Qaboos Tourist port project	250
Figure 8.4 The Wave, Muscat Master Plan (Wave Muscat, 2014).....	251
Figure 8.5 Al Madina A'Zarqa (Blue City) Master Plan (Blue City, 2014)	251
Figure 8.6 Qurm Commercial Centre (right side of the highway) was unplanned.....	259
Figure 9.1 Aerial photo about Muscat Expressway junction at Qurm.....	294
Figure 9.2 Royal Opera House - Muscat	299

LIST OF TABLES

Table 2.1 Population in Muscat governorate by district – comparison between estimated and actual over the last forty years	42
Table 4.1 Matrix from the reading index comparing period and rating.....	97
Table 4.2 List of selected USDs and sub-USDs	98
Table 4.3 Research Triangulation and how they are reported within the chapters.....	108
Table 5.1 Number of Plots Distributed in Muscat by Type of Use (Housing, 2011)	118
Table 5.2 Number of Plots Distributed by Type of Use throughout the Sultanate.....	118
Table 5.3 Major building permits in Muscat according to the type of permit (Municipality, 2008)	118
Table 5.4 Organizations responsible for Urban Development in Oman (SCTP, 1991)	121
Table 5.5 Organizations’ responsibilities according to planning tiers (SCTP, 1991)	121
Table 5.6 List of other organizations that participated in Urban Development in Oman.....	125
Table 5.7 Comparison of various resources identifying the hierarchy of urban planning in Oman	129
Table 5.8 Designation of centres as part of the Key Town Strategy for Oman National Spatial Strategy	130
Table 5.9 Key towns in Oman and their functions	130
Table 5.10 Alternative strategies for Muscat Regional Plan (1989 to 1990) (Weidleplan and Muamir, 1989a).....	143
Table 5.11 Alternative strategies for Muscat Structural Plan (Weidleplan and Muamir, 1990a)	144
Table 6.1 Comparison of USDs based on general literature review.....	156
Table 6.2 Comparison of USDs based on Oman Urban Planning key concerns.....	157
Table 6.3 Comparison of USDs based on Oman urban planning aims and objectives	158
Table 6.4 Summary of matrix analysis of USDs across the 3 stages.....	159
Table 6.5 Detailed analysis of Urban Planning USD	160

Table 6.6 Detailed analysis of Urban Services USD	163
Table 6.7 Detailed analysis of Urban Economy USD	166
Table 6.8 Detailed analysis of Urban Environment USD.....	169
Table 6.9 Detailed analysis of Urban Society USD.....	171
Table 6.10 Detailed analysis of Urban Mobility USD.....	174
Table 6.11 Detailed analysis of Urban Management USD.....	176
Table 6.12 Detailed analysis of Urban Quality USD.....	178
Table 6.13 Detailed analysis of Urban Resources USD	180
Table 6.14 Summary of selected USDs and sub-USDs definitions.....	182
Table 7.1 Analysis of Participants in semi-structured interviews.....	187
Table 7.2 Matrix showing USDs vs. responses from interviews and focus groups.....	189
Table 7.3 Statistical details of public questionnaire participants' gender	191
Table 7.4 Statistical details of public questionnaire participants' age * gender crosstabulation	191
Table 7.5 Statistical details of public questionnaire participants' employment status	191
Table 7.6 Statistical details of public questionnaire participants' qualification	191
Table 7.7 Statistical details of public questionnaire participants' total household monthly income	192
Table 7.8 List of interview questions that relate to settlement pattern USD	193
Table 7.9 Matrix showing list of questions vs. interview participants who provided answers ..	193
Table 7.10 List of public questionnaire questions that relate to settlement pattern USD.....	194
Table 7.11 List of interview questions that relate to land use USD	196
Table 7.12 Matrix showing list of questions vs. interview participants who provided answers	197
Table 7.13 List of public questionnaire questions that relate to land use USD	197
Table 7.14 Summary of settlement pattern problems obtained from interviews and focus groups	198
Table 7.15 Statistical results from questionnaires of total household monthly income * dwelling type Crosstabulation.....	200
Table 7.16 Statistical results from questionnaires of nationality * dwelling type Crosstabulation	200

Table 7.17 Summary of settlement pattern challenges obtained from interviews and focus groups	201
Table 7.18 Statistical results from questionnaires of distance between dwelling and workplace frequency.....	202
Table 7.19 Summary of settlement pattern drivers obtained from interviews and focus groups	202
Table 7.20 Statistical results from various methods of Muscat growth frequency.....	203
Table 7.21 Statistical results from questionnaires showing original residency in Muscat frequency.....	204
Table 7.22 Factors influencing urban expansion (Al-Awadhi, 2007)	204
Table 7.23 Summary of urban design problems obtained from interviews and focus groups....	205
Table 7.24 Summary of urban design challenges obtained from interviews and focus groups..	205
Table 7.25 Summary of urban design barriers obtained from interviews and focus groups	206
Table 7.26 Summary of land use problems obtained from interviews and focus groups.....	207
Table 7.27 Statistical crosstabulation from questionnaires between how the current plot was obtained and when the dwelling unit was built.....	209
Table 7.28 Statistical crosstabulation from questionnaires between how the current plot was obtained and when the plot was obtained	209
Table 7.29 Statistical frequency of approximate area of the residential plot from questionnaires	209
Table 7.30 Summary of land use challenges obtained from interviews and focus groups.....	212
Table 7.31 Summary of land use drivers obtained from interviews and focus groups.....	213
Table 7.32 Summary of land use barriers obtained from interviews and focus groups.....	213
Table 7.33 Summary of housing problems obtained from interviews and focus groups	214
Table 7.34 Summary of housing challenges obtained from interviews and focus groups	214
Table 7.35 Summary of environmental protection problems obtained from interviews and focus groups.....	216
Table 7.36 Summary of climate change problems obtained from interviews and focus groups	218
Table 7.37 Statistical frequency of the participants' satisfaction with the current level of public participation in urban planning process - from questionnaires	221

Table 7.38 Summary of urban transport problems obtained from interviews and focus groups	222
Table 7.39 Summary of urban transport challenges obtained from interviews and focus groups	223
Table 7.40 Summary of urban transport drivers obtained from interviews and focus groups...	224
Table 7.41 Statistical cross tabulation showing number of individuals living in dwelling vs. number of cars owned - from questionnaires.....	224
Table 7.42 Statistical cross tabulation showing category of dwelling vs. number of cars owned - from questionnaires.....	224
Table 7.43 Statistical crosstabulation showing mode of transport to reach the workplace vs. the distance of the workplace from the dwelling - from questionnaires.....	225
Table 7.44 Statistical frequency of the main reasons why the participants are not using public transport - from questionnaires	225
Table 7.45 Summary of urban transport challenges obtained from interviews and focus groups	225
Table 7.46 Summary of urban development management problems obtained from interviews and focus groups.....	226
Table 7.47 Summary of urban development management challenges obtained from interviews and focus groups	226
Table 7.48 Summary of urban quality problems obtained from interviews and focus groups...	227
Table 7.49 Statistical frequency of participant's view of the adequacy of public parks and gardens in Muscat - from questionnaires	228
Table 7.50 Summary of problem analysis components for selected USDs.....	230
Table 7.51 Trend analysis for problems associated with land use USD.....	232
Table 7.52 Trend analysis for problems associated with settlement pattern USD	234
Table 7.53 Trend analysis for problems associated with urban transport USD.....	236
Table 7.54 Summary for Trend analysis for problems associated with land use, settlement pattern and urban transport USDs.....	236
Table 8.1 Participants selection of alternatives implemented from Muscat Regional Plan.....	242

Table 8.2. Population estimates of the Muscat Area identified by various consultants (Al-Rawas, 1996)	253
Table 8.3 Summary of key strategies and their implementation issues – through literature review and interviews	264
Table 8.4 Feedback obtained from participants about their knowledge of ONSS – through interviews and focus groups.....	266
Table 9.1 Settlement Pattern Opportunities – obtained from interviews and focus groups	276
Table 9.2 Settlement Pattern Recommendations – obtained from interviews and focus groups	276
Table 9.3 Statistical frequency of the participants’ satisfaction with current density (only questionnaire results)	277
Table 9.4 Statistical frequency of the participants’ satisfaction with current density (only quick survey and focus groups results).....	278
Table 9.5 Statistical frequency of the participants’ willingness to live in higher density neighborhood (only questionnaire results).....	278
Table 9.6 Statistical frequency of the participants’ view of the importance of population density towards sustainability (only quick survey and focus group results).....	278
Table 9.7 Urban Design Opportunities – obtained from interviews and focus groups.....	279
Table 9.8 Urban Design Recommendations – obtained from interviews and focus groups.....	280
Table 9.9 Land Use Opportunities – obtained from interviews and focus groups	281
Table 9.10 Land Use Recommendations – obtained from interviews and focus groups.....	282
Table 9.11 Statistical frequency of the participants’ view of the importance of house size towards sustainability (only quick survey and focus group results).....	282
Table 9.12 Statistical frequency of the participants’ willingness to live in smaller house (only questionnaire results)	283
Table 9.13 Housing Opportunities – obtained from interviews and focus groups	283
Table 9.14 Housing Recommendations – obtained from interviews and focus groups.....	284
Table 9.15 Statistical frequency of participant’s satisfaction of current level of air pollution in Muscat – through Questionnaires, quick survey and focus groups	285

Table 9.16 Environmental Protection Opportunities – obtained from interviews and focus groups	285
Table 9.17 Environmental Protection Recommendations – obtained from interviews and focus groups.....	286
Table 9.18 Statistical frequency of participant’s view of sustainability – obtained from Questionnaires, quick survey and focus groups.....	287
Table 9.19 Statistical frequency of participant’s view of sustainability – obtained from Questionnaires, quick survey and focus groups.....	287
Table 9.20 Statistical frequency of participant’s view of sustainability - obtained from Questionnaires.....	287
Table 9.21 Statistical frequency of participant’s view of sustainability – obtained from Questionnaires and focus groups	287
Table 9.22 Climate Change Opportunities– obtained from interviews and focus groups	288
Table 9.23 Climate Change Recommendations – obtained from interviews and focus groups .	288
Table 9.24 Statistical frequency of participant’s satisfaction of current level of public participation– obtained from Questionnaires, quick survey and focus groups.....	289
Table 9.25 Public Participation Opportunities – obtained from interviews and focus groups ...	289
Table 9.26 Public Participation Recommendations – obtained from interviews and focus groups	290
Table 9.27 Statistical frequency of the main reasons why the participants are not using public transport – obtained from questionnaires.....	291
Table 9.28 Statistical frequency of the participants’ view of the importance of public transport towards sustainability (only quick survey and focus group results).....	291
Table 9.29 Statistical frequency of the participants’ willingness to use public transport (only questionnaire results)	292
Table 9.30 Urban Transport Opportunities – obtained from interviews and focus groups	292
Table 9.31 Urban Transport Recommendations – obtained from interviews and focus groups.	293
Table 9.32 Urban Development Management Opportunities – obtained from interviews and focus groups.....	295

Table 9.33 Urban Development Management Recommendations – obtained from interviews and focus groups	296
Table 9.34 Urban Quality Opportunities – obtained from interviews and focus groups	298
Table 9.35 Urban Quality Recommendations – obtained from interviews and focus groups	299
Table 9.36 Results comparison of recommendations by various research methods.....	301
Table 9.37 Results comparison of opportunities identified by various categories of participants	302
Table 9.38 Results comparison of Recommendations identified by various categories of participants.....	302
Table 9.39 Summary of key recommendations towards urban sustainability	303
Table 9.40 Comparison of the gap between strategy and implementation between various participants.....	304
Table 9.41 Urban sustainability priorities – obtained from questionnaires, interviews and focus groups.....	308
Table 9.42 Statistical frequency of participant’s satisfaction with current land distribution system – obtained from questionnaires, quick survey and focus groups.....	311
Table 9.43 Statistical crosstabulation between category of how the plot was obtained and the satisfaction with the current land distribution system (only public questionnaire data).....	311
Table 9.44 Statistical frequency of the participants’ willingness to live in smaller plots (only questionnaire results)	312
Table 9.45 Statistical frequency of the participants’ view of the importance of plot size towards sustainability (only quick survey and focus group results).....	312
Table 9.46 Total Number of Plots Distributed in Muscat (Source: Ministry of Housing Annual Report 2011)	313
Table 9.47 Major building permits in Muscat according to directorates (Muscat Municipality Annual Report 2005, 2003, 2006).....	313
Table 10.1 Summary for Trend analysis for problems associated with land use, settlement pattern and urban transport USDs.....	318
Table 10.2. Urban Sustainability Dimensions for Oman.....	319

Table 10.3 Summary of problem analysis components for selected USDs - – obtained from questionnaires, interviews and focus groups	321
Table 10.4 Comparison between participant’s perception of the gap between strategy and implementation	322
Table 10.5 Summary of key recommendations towards urban sustainability	327
Table 10.6 Statistical results for participant’s thoughts about Muscat as a place for living – obtained from various research methods as indicated	332

ABBREVIATIONS

bpd = (oil) barrels per day

CATS = Capital Area Transport Study

CASP = Capital Area Structural Plan

MCT = Muscat

MM = Muscat Municipality

MOH = Ministry of Housing

MOD = Ministry of Defence

ONSS = Oman National Spatial Strategy

OPEC = Organization of Petroleum Exporting Countries

OAPEC = Organization of Arab Petroleum Exporting Countries

PDO = Petroleum Development of Oman

SCTP = Supreme Committee of Town Planning

SCP = Supreme Council of Planning

US = Urban Sustainability

USD = Urban Sustainability Dimensions

CHAPTER 1: INTRODUCTION

1.1. OVERVIEW

Like its neighbouring countries, Oman has witnessed an extraordinary social and economic development over the past few decades, and this was mainly attributed to the wealth obtained from its natural resources, mainly oil and gas. The country has continuously strived to draw a balance between exploitation of its natural resources, and the development program which indicates an early courtesy towards sustainability and environmental protection. The pressure towards massive investment in development and economic progress was nevertheless higher and determined to a large extent its success in maintaining this equilibrium. In its future endeavour towards sustainable development, Oman should learn from other countries that crossed a similar path of development and must ensure that the protection of its social and environmental aspects does not vanish at the expense of economic growth.

In the quest for sustainability across the globe and within Oman as a country, the louder voice calls for the public to improve upon their consumption and living styles, to respect the environment and to prepare for the consequences associated with climate change. They are also asked to reduce their energy and water consumption and to limit their use of plastic bags. In terms of transport, they are criticised for private ownership of vehicles and their lavish use of car transport which is not sustainable and ends up polluting the environment. All of these have been proven as audible measures for addressing sustainability and have produced significant results when properly implemented in certain societies. However, I have two approaches that are different to this which I propose will support the quest for future urban sustainability in Oman.

First, I believe that if there is any route to sustainable development in Oman, and maybe elsewhere, that it should start with the government. In Oman, that has always been driven by strategy development which has been productive in terms of actually developing strategies throughout the last forty years of urban development. This, unfortunately, has not been matched with adequate implementation and that has been evident throughout this research. Although

Muscat as a city is liked by both its residents and its visitors, it could have achieved much more in terms of urban sustainability and it deserves that. The government has spent genuine resources in developing such strategies, but apparently the implementation phase is challenging, and difficult. It doesn't have to be like that if we follow some basic recommendations as illustrated within this research.

Second, to address the issue within its context and not to come to conclusion towards it based on a wider general view. That's how I have tackled urban sustainability in Oman. Throughout this research, the debate was framed around key urban sustainability dimensions (USDs), which have been carried all the way throughout the research and up to the recommendations.

1.2. BACKGROUND AND RESEARCH PROBLEM

The fact that the way forward for sustainable urban development in Oman is currently being considered through Oman National Spatial Strategy (ONSS), floated as a consultancy tender in 2008 by Supreme Committee for Town Planning (SCTP, 2008b) highlights the significance of strategy development. Moreover, the recent announcement of the government initiative (Observer, 2014), through its recently established *Supreme Committee of Planning*, to develop the economic vision for Oman 2040 as a follow on from its predecessor Oman 2020 (Economy, 1996), shows the magnitude of confidence on necessity for strategy development. What happens after strategy development is what actually matters the most. The knowledge available in this regards is not sufficient to enable the researcher or the decision maker in establishing best practices and lessons, as well as gaining knowledge about challenges and barriers during the strategy development or the implementation process. So where does one start to tackle this significant issue, especially if it is aimed at the urban scale?

After intriguing the available literature surrounding urban development in Oman, the following gaps are clear:

1. History of town planning in Oman is not sufficiently documented.

2. The governance, accountabilities, responsibilities and policies in Oman's town planning are somewhat vague, and not adequately understood especially for initiating serious steps towards implementation of sustainability in Oman.
3. Is sustainability on the agenda of town planning? What sort of sustainability are we after?
4. Society's assessment, behaviour and attitude towards town planning and sustainability.

Furthermore, the gaps in general literature and knowledge in urban sustainability have been identified as follows:

1. The gap of *definition*
2. The gap of *methodology*
3. The gap of *scope* – which urban sustainability *dimensions*?
4. The gap in *decision making*
5. The gap between *strategy and implementation*
6. The gap of *measurement*

1.3. THESIS STATEMENT

The research framework is employed to prove the following thesis statement:

Urban sustainability in Oman for the next forty years may better be driven by comprehending the history of its urban development over the past forty years, with emphasis on ascertaining the decision making process with lessons from urban development strategies coupled with implementation consequences. This can only be possible by dissecting the relevant urban sustainability dimensions (USD) suitable for this context.

1.4. RESEARCH AIMS AND OBJECTIVES

The following are the 5 research aims with their respective objectives and research questions.

1.4.1. Research Aim 1: History of urban development in Oman

Aim 1: To develop a comprehensive understanding of the history of urban development in Oman between 1970 and 2010, and to provide insights into strategic initiatives towards sustainability that have been proposed throughout this period.

Objective 1: Explore and analyse the history of urban development in Oman since 1970, and identify key milestones, trends and policies.

- ➔ Question 1: What are the key milestones (strategies, projects, policies) in urban development of Oman?
- ➔ Question 2: Who are the key players throughout the history of urban development of Oman (organizations, individuals)?
- ➔ Question 3: How has Urban Development strategy and implementation since 1970 led to current problems and issues?

1.4.2. Research Aim 2: Urban Sustainability Dimensions (USDs)

Aim 2: To develop a framework for urban sustainability in Oman

Objective 2: Identify the agenda for urban sustainability in Oman by developing and selecting applicable urban sustainable dimensions (USD).

- ➔ Question 4: What are the key urban sustainability dimensions that are relevant to the context and history of Oman?

1.4.3. Research Aim 3: Contemporary approaches in urban development in Oman

Aim 3: To develop an understanding of contemporary approaches in urban development, including an understanding of decision makers and citizen's visions and attitudes towards urban sustainability.

Objective 3: Determine the main factors and barriers that control the sustainable growth of the city, Muscat, which is used as a case study.

- ➔ Question 5: What are the main problems and challenges associated with urban development in Muscat?
- ➔ Question 6: What are the main factors and barriers that control the sustainable growth of Muscat?
- ➔ Question 7: What are the contemporary sustainable strategies and the attitudes and agendas of stakeholders?

1.4.4. Research Aim 4: The GAP between strategy and implementation

Aim 4: To investigate the gap between key strategies and their implementation in the urban development discourse.

Objective 4: Comparison of key strategies and their actual implementation

- ➔ Question 8: How have strategies been implemented in Muscat existing town developments?
- ➔ Question 9: What are the problems and successes in the implementation of these strategies?

1.4.5. Research Aim 5: Improved approach towards urban sustainability

Aim 5: To develop an improved approach towards strategy development and implementation that will lead towards a sustainable urban future in Oman.

Objective 5: Identify trends and recommendations that will aid urban sustainability in Oman.

- ➔ Question 10: How can urban planning processes be improved to provide a sustainable urban future?
- ➔ Question 11: What are the lessons that can be used for better implementation of the upcoming urban development strategies (such as Oman National Spatial Strategy)?

1.5. CONTRIBUTION TO KNOWLEDGE

The essence of this thesis contribution to knowledge lies around the dissection of the decision making process around urban planning and development in Oman during the past forty years (through problem and process analysis) and how it may be directed towards a sustainable urban future.

In addition, the most important contributions made to knowledge in this research are highlighted below:

1. Development of a comprehensive review of the history of urban development in Oman between 1970 and 2010, highlighting the most important strategies, projects, policies and players. This was captured in two indexes shown in appendix b and c.
2. Development of a framework of urban sustainability spanning 16 USDs that could be used as an agenda for setting up future sustainability strategies and their implementation.
3. Identification of contemporary decision making approaches and processes including citizen's attitudes and thoughts towards urban sustainability.
4. Conducting a problem analysis review of current situation in Muscat, and comparing this against the documented problems and challenges over the past forty years.
5. Investigation of the gap between strategy development and implementation and identifying 14 strategy issues and 24 implementation issues.
6. Development of appropriate recommendations that will aid in an improved approach towards urban sustainability in the future.

1.6. DISSERTATION STRUCTURE

Chapter 2 (*Omani context and background*) is intended to introduce Oman within a few contextual dimensions including its historical and current urban development status. This is followed by a brief recall of the literature on Oman's urban development and architecture before 1970 and after 1970.

Chapter 3 (*Urban Sustainability in the global context*) starts with broad definitions, historical review and trend analysis surrounding sustainability, urbanism and urban sustainability. Urban sustainability will be further studied in terms of the methods of measuring its performance, either in indicators or dimensions. In addition, the chapter contains a review of the lessons from history, European cities and from various case studies from the Middle East. This is followed by literature on strategies and their implementation. The chapter ends with a common gaps in knowledge and how that related to the context under review, Oman.

Chapter 4 (*The research methodology*) identifies the aims, objectives and research questions along with the research methods that will be employed to carry out this research. It provides insight into the methodology of this research and its research framework. The research is developed through a combination of research methodologies (qualitative and quantitative) and used different analysis tools.

Chapter 5 (*History of urban development and sustainability in Oman*) responds to research aim 1. It highlights various aspects of urban developments since 1970 such as: governance system, the hierarchy of urban planning, methodology for implementation of urban plans, key urban planning strategies, other strategies and finally trends.

Chapter 6 (*The framework: Urban Sustainability Dimensions- USDs*) is intended to identify a framework for the research, by defining a set of USDs that will be used as an agenda towards urban sustainability in Oman.

Chapter 7 (*Problem analysis phase – results and interpretation*) reports the results and their interpretation for the data that were obtained from various research methods designed to reflect the content of this problem analysis phase for the particular USDs that were selected in Chapter 6. Most of the sections are divided into sub-sections which illustrate the following elements of this analysis: *problems, challenges, drivers and barriers (constraints)*.

Chapter 8 (*Process analysis phase – the gap between strategy and implementation*) provides feedback on the implementation of key strategies, and describes some contemporary thoughts

about the discourse of urban development. Its main objective is the evaluation of the strategy and implementation shortcomings.

Chapter 9 (*Improved approach towards urban sustainability*) may be looked at as the recommendations chapter. Its structure is similar to Chapter 7 where sections are dedicated for the selected USDs. Each of these sections will tabulate the potentials and recommendations as obtained from the research interviews supplemented by the researcher's own interpretation.

Chapter 10 (*Conclusion*) summarize this thesis by addressing the initial research aims and objectives, and how they were answered throughout this research. Furthermore, it lists out the various deliverables that contribute to knowledge, the challenges encountered throughout this research project, and how the research may be taken forward in the future. It ends up with a final reflection and thoughts on this research project.

CHAPTER 2: OMANI CONTEXT AND BACKGROUND

2.1. OVERVIEW

This chapter is intended to introduce Oman as a country within a few contextual dimensions including its physical, historical, economic, and social context. It will be followed by a brief recall of the literature on Oman's urban development and architecture before and after 1970. A review of sustainability initiatives in Oman is given in section 2.4. The reasons for choosing this particular subject for research is outlined in section 2.5, followed by the reasons for choosing Muscat as a case study in section 2.6 and a summary of notable problems and gaps in section 2.7.

2.1.1. PHYSICAL CONTEXT

Oman is bordered on the northwest by the United Arab Emirates (U.A.E), on the west by Kingdom of Saudi Arabia and on the southwest by the Republic of Yemen. Oman has a total area of around 309,000 sq. km. Approximately 82% of the total area is sandy desert; mountains occupy 15% and coastal areas represent only 3% of the total area. Total arable land is around 2.2 million hectares, or 7% of total area with 173,000 acres under cultivation, making the per capita cultivated land about 0.07 acres. The coastline stretches for over 3,165 km along the Arabian/Persian Sea, the Gulf of Oman, and the Indian Ocean. It has one of the world's hottest and most arid regions which pose many challenges to human settlements, including shortage of water and desertification (UNEP/ROWA, 1993). Along the coast, the climate tends to be more humid, while it is extremely hot and dry in the interior deserts. The southern Region of Dhofar attracts the summer monsoon that arrives from the Indian Ocean which is called *alkhareef* by the locals.

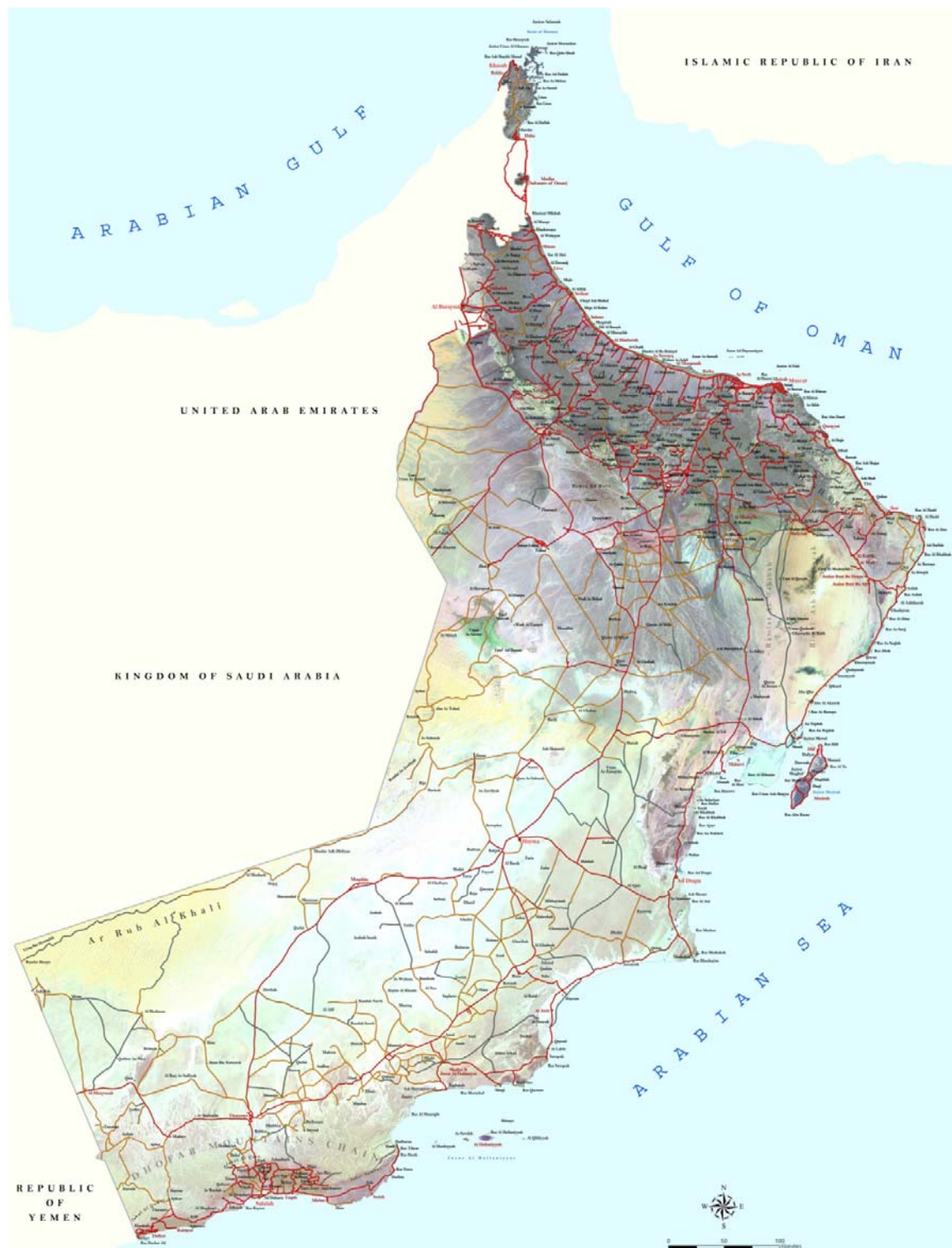


Figure 2.1 Map of Oman (Source: The Supreme Committee for Town Planning)

2.1.2.HISTORICAL CONTEXT

This section will look at the events in history that shaped the country to its present form. Here, the discussion is designed to acquire some knowledge of the recent history of Oman with special emphasis on the rule of Sultan Qaboos, the current ruler.

Before 1970

Oman embraced Islam in the seventh century, during the lifetime of the Prophet Mohammed. Oman has remained independent for most of its history, apart from the invasion by Persia and Portugal. In 1508, Portugal invaded the coastal parts of Oman and remained there for over a century when they were expelled in 1650. Some of their traces are still evident in Muscat with a few defence forts that were built on top of coastal mountains. During the chase against Portugal, The Sultan of Oman extended his rule to Zanzibar and the eastern coast of Africa. At that time, Oman was the strongest empire in the Arabian Peninsula. In 1833, during the rule of Sultan Said bin Sultan, the first Omani ship visited the United States of America and a treaty was signed. The empire also had a strong hold on the Indian Ocean with some degree of control on the ports of Makran and Bandar Abbas in what is known today as Pakistan and Iran. Much of this power started to disintegrate after the death of Sultan Said. The country was divided between his descendants and later, in 1960, Zanzibar became independent of Oman.

Under the rule of Sultan Said bin Taimur (the father of the present day ruler, Sultan Qaboos), up to 1970, Oman was devastated with conflicts, disease, poverty and illiteracy. Sultan Said inherited a state that was shattered by civil wars and economic burdens that captivated any development efforts. The country lacked any sort of income and there was no economy as such, apart from insignificant trade and the export of fish and agricultural products (dates and lemons). Many Omanis migrated to nearby states for search of employment as the life for them in Oman was unbearable. The country was divided into two regions: Muscat and the coastline were ruled by the Sultan, and the interior was ruled by an elected Imam, a religious leader. The sultan overthrew the Imam after the conflict in the 1960s which escalated around the period when oil was discovered in the interior desert of Oman. This is how the official version under the current government describes that period in history:

Oman was an isolated state having no relations with other Arab or Islamic countries and this isolation pervaded all aspects of Omanis' lives. Curfews were imposed: anyone found outside the city walls after the retort of the cannons would be shot unless he carried a lantern. Radios were banned as they were considered the work of the devil. Healthcare was virtually non-existent: in 1970, there was only one missionary hospital in Muttrah and a handful of admission units in Muscat. Only three schools existed throughout the whole State - having been built at an average rate of one every 19 years (Information, 2010).

Renaissance of 1970 and beyond

On July 23rd, 1970, Sultan Qaboos bin Said replaced his father and assumed his rule on the country. He called upon those who fled the country to return and promised all a new era of development and prosperity (see Appendix P). He immediately targeted education, health, infrastructure development, investment on the natural oil and gas resources, and opened Oman to the modern world.

(Peterson, 2004) illustrates some interesting characteristics of the achievements of Sultan Qaboos and emphasizes certain events in the politics of the country under his rule. These are mentioned below for the objective of giving a glimpse of the nature of foreign policy in Oman.

- i. Oman is a seeming anomaly in the Arab world. It rarely features in Western media and civil strife has been virtually unknown for several decades. It is neither a member of OPEC nor OAPEC, and its oil income is modest.
- ii. It retains close political and economic ties to Britain even though it has drawn close to the United States in security matters and was relatively quick in the 1980s to embrace diplomatic relations with China and the Soviet Union despite the protests of London and Washington. Its foreign policy is remarkably even-handed and flexible.
- iii. Correct relations at a minimum were maintained with Egypt after the Egyptian-Israeli treaty in 1979, with Iran through and after the Iranian revolution, with Iraq through the Kuwait war and the sanctions regime, and even with Israel before and during the Palestinian intifadas.

2.1.3.SOCIAL CONTEXT

The total population of Oman as of end of August 2013 is 3,897,000 (Statistics & Information, 2013). Oman has a young population. 43% of Omani nationals, and 35% of all Omani residents (including non-nationals), are below the age of 15 years. This young population is a challenge as well as a potential for the future development of Oman, and the government is busy with identifying key initiatives to ensure that it creates the best for this young population. Approximately 43.9% are expatriates (Statistics & Information, 2013).

Table 2.1 below provides a comparison between various statistical forecasts and actual counts for the population in Muscat throughout the last forty years.

Type	1974	1977	1984	1990 MCT regional Plan Phase 1	1990 MCT Structural Plan Phase 2	2010 Forecast MCT Structural Plan Phase 2	2010 Actual
Gr. Muttrah	41,000	57,500	118,456	138,70	113,100	305,100	177,340
Baushar	12,000	18,500	57,392	71,250	108,100	198,600	192,235
Seeb	7,000	9,000	67,608	82,500	160,700	176,100	302,992
Al Hajar	3,000*	4,000*	12,544	15,000	35,500	50,500	58,400
Quriyat					N/A	N/A	44,911
Total	63,000	89,000	256,000	307,500	417,400	730,300	775,878

Table 2.1 Population in Muscat governorate by district – comparison between estimated and actual over the last forty years

Source: Structure Plan 1977 (Llewelyn-Davies, 1977), Sample Survey 1984, Muscat Regional Plan Phase 1 Survey Report 1989 (Weidleplan and Muamir, 1989b), Muscat Area structural plan phase 2 (Weidleplan and Muamir, 1990a), (Statistics & Information, 2013)

Figure 2.2 provides a comparison over 2010 to 2012 for the total population in Oman against the population density and the area for each governorate. Figure 2.3 provides the statistical details for the total population in the Sultanate by nationality from 1985 to 2012. Figure 2.4 shows the map of Oman against the localities by size of population in 2010. Figure 2.5 shows the Population Pyramid in 2012 for Omanis and for the total population.

Governorates	السكان Population			الكثافة السكانية (كم ²) Population Density (Km ²)			المساحة (كم ²) Area (Km ²)	المحافظات
	(2)2012	(2)2011	(1)2010	2012	2011	2010		
Muscat	1,093,360	1,003,742	775,878	280.3	257.4	198.9	3,900	مسقط
Dhofar	346,046	315,324	249,729	3.5	3.2	2.5	99,300	ظفار
Musandam	34,148	31,025	31,425	19.0	17.2	17.5	1,800	مسندم
Al Buraymi	89,564	78,535	72,917	—	—	—	—	البريمي
Ad - Dakhliya	368,027	342,017	326,651	11.5	10.7	10.2	31,900	الداخلية
Al - Batinah North	598,206	523,661	483,582	25.8	23.6	38.7	12,500	شمال الباطنة
Al - Batinah South	323,124	294,720	289,008					جنوب الباطنة
Ash - Sharqiya South	243,534	219,899	188,032	6.7	6.0	4.5	36,400	جنوب الشرقية
Ash - Sharqiya North	220,661	195,757	162,482					شمال الشرقية
Adh - Dhahirah ⁽³⁾	170,584	157,006	151,664	3.9	0.0	0.0	44,000	الظاهرة ⁽³⁾
Al Wusta	36,391	30,624	42,111	0.5	0.4	0.5	79,700	الوسطى
Not Stated	99,356	102,988	—	—	—	—	—	غير مبين
Total	3623001	3295298	2773479	11.705981	10.647166	8.9611599	309500	المجموع

1- Actual Results of General Census of Population , Housing and Establishment from (12 - 21) December 2010 1- البيانات الفعلية للتعداد العام للسكان والمساكن والمنشآت للفترة من (12 - 21) ديسمبر 2010

2-Registered the Directorate General of Civil Status (Mid Year)

2- المسجلين في الإدارة العامة للأحوال المدنية (منتصف العام)

3- Includes Al Buraymi Governorate

3- تشمل محافظة البريمي

Figure 2.2 Population (Mid-year estimate), Area (km2) & population density by Governorates (2010 to 2012) (Statistics & Information, 2013)

Total	Expatriate	Omani	Year
	(000)		
1,416	314	1,102	1985
1,438	295	1,143	1986
1,424	239	1,185	1987
1,501	275	1,226	1988
1,559	285	1,274	1989
1,625	304	1,321	1990
1,757	388	1,369	1991
1,882	465	1,417	1992
2,000	535	1,465	1993⁽¹⁾
2,050	538	1,512	1994
2,131	574	1,557	1995
2,214	612	1,602	1996
2,255	613	1,642	1997
2,287	602	1,685	1998
2,325	596	1,729	1999
2,402	624	1,778	2000
2,478	652	1,826	2001
2,538	668	1,870	2002
2,341	559	1,782	2003⁽¹⁾
2,416	613	1,803	2004
2,509	666	1,843	2005
2,577	693	1,884	2006
2,743	820	1,923	2007
2,867	900	1,967	2008
3,174	1,156	2,018	2009
2,773	816	1,957	2010⁽¹⁾
3,295	1,282	2,013	2011⁽²⁾
3,623	1,530	2,093	2012⁽³⁾

(1) Actual results of general census of population, housing and establishment

(2) Registered the Directorate General of Civil Status (mid-year)

Figure 2.3 Total Population in the Sultanate by Nationality (Statistics & Information, 2013)

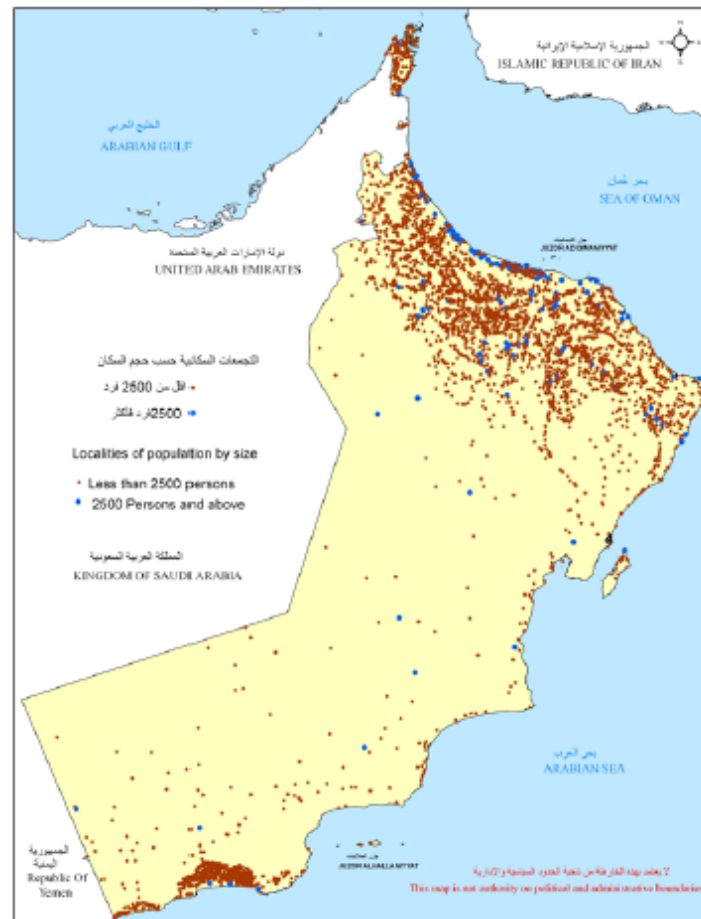


Figure 2.4 Localities by size of population 2010 (Statistics & Information, 2013)

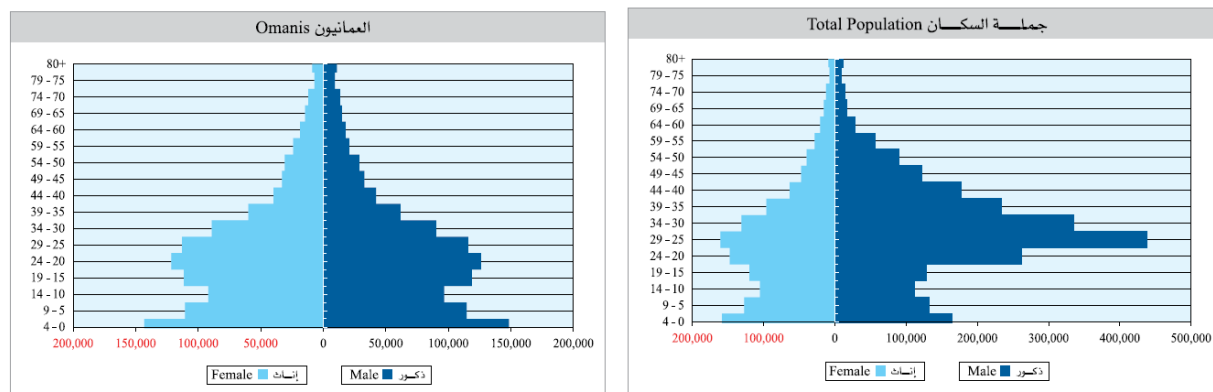


Figure 2.5 Population Pyramid 2012 (Statistics & Information, 2013)

Like elsewhere in the globe, urbanization in Oman has been increasing at a fast rate. It now stands at approximately 80% and is expected to reach about 86% by 2030. This compares with approximately 11.4% in 1970 and around 76% in 2000. The main drivers for urbanization in

Oman is the continuous migration of rural households to urban areas caused mainly by the drastic difference in development factors between the two areas, and this is evident in many areas such as household income, provision of infrastructure and access to social amenities.

The future development in Oman, outlined in the Human Development Report of 2003 recommends (UNDP, 2003):

- Advancement of human resources
- Acceleration of economic growth rates
- Diversification of economic activities
- Market expansion
- Maintenance of natural resources
- Protection of the environment
- Encourage tripartite sources of government and
- Expand the framework of participation

2.1.4.ECONOMIC CONTEXT

Before the 1970s, there was no real economic development or activity in Oman, as the country had no real income, and the people survived by subsistence trade, fishing, farming and grazing. The glorious days of the empire had long gone and the state of government was unsettled as the current sultan's father was faced with many challenges including insurgencies and civil wars that ripped the country apart. By 1970, Oman was an isolated, undeveloped country, with a population approaching one million, and had only three primary schools, one hospital, and just a few kilometres of paved roads.

The early 1970s were crucial in the history of the international oil industry, not just because of the oil embargo of 1973, but also because many Gulf countries, and those in OPEC, affirmed themselves by nationalizing their oil industries. Although Oman was not part of OPEC, it moved along these lines by taking its shares in the already established oil company, Petroleum Development of Oman (PDO). By 1974, the government owned 60% of PDO shares.

The first years of Sultan Qaboos reign were challenging as the people were ambitious to gain the fruits of the development and the wealth that oil has brought with it, as was clearly visible in the neighbouring Gulf States, but the country was once again thrown into the battlefield against insurgencies, this time in Dhofar. Eventually, this war was ended in 1976, but it had claimed plenty of lives and precious petrol money that prevented the country's development from striding ahead as initially planned. Soon after the war, the government focused on exploration of the country's natural resources.

The government embarked upon major development schemes including education, healthcare, defence, infrastructure, industry and natural resources. It created five-year financial plans to align resources towards priorities of development. The stable environment and the strategic location of the country were assets that the government banked on to attract foreign investment and the adoption of free market enabled profitable trade with other countries.

Oil production peaked in the early 1990s, but started to decrease in recent years as production from the complicated geologies of Oman's oil wells became challenging and has now reached between 850,000 and 950,000 bpd (Statistics & Information, 2013). The natural gas industry has also been developed and major refineries have been built to provide gas for residential as well as commercial and industrial sectors.

The challenges that are facing the economic and social development in Oman today are many, and they have been compounded even further by the recent global financial crisis, although Oman itself has not suffered the same consequences as other gulf states (Bertelsmann Stiftung, 2012). Oman vision 2020 (Economy, 1996) envisioned this scenario, and understood the limits to growth since 1996, and has drafted carefully planned scenarios and policies to diversify Oman's economy towards much more sustainable directions.

In addition, the implementation of rigorous plans to take advantage of natural resources resulted in the expansion of the industrial factories and estates. One example of such projects is the investment into the port city of Sohar which is close to the UAE border and has a strategic location on the eastern side of the Strait of Hormoz. More than \$14 billion has been invested by

the government alone in the financing of Sohar refinery, aluminium smelter, a fertilizer plant, steel rolling mill and the polypropylene plant. Simultaneously, Oman is developing another port city called Ad Duqm which is strategically located off the Indian Ocean and is closer to the oil and gas fields. These projects, and many others, are the attempt to deliver the ambition of economic diversification amidst uncertainty in the future of fossil fuels.

(Bertelsmann Stiftung, 2012) provides a good overview of the economic situation of Oman:

The financial crisis has less impact in Oman than in its Gulf Cooperation Council (GCC) neighbours, given the still limited integration of the country's economy into the global one. High oil prices have continued to feed growth (3–4% in 2009 – 2010) and the government reported a substantial budget surplus in 2010 which has been used to lower public debt and accumulate reserves. Job creation for Omani citizens (the "Omanization process") remains a significant challenge. Unofficial sources estimate unemployment at 15%. A bilateral free trade agreement with the United States went into effect in January 2009. At the same time, Oman confirmed its decision to opt out of the future GCC monetary union. Oman's eighth five-year plan (2011 – 2015) presented in November 2010 concentrates on economic diversification, the creation of jobs for Omanis, the encouragement of foreign investment and an expansion of the private sector's role as the key components of the move toward a post-oil economy. Oman's dwindling oil reserves make this a necessity. It also aims to achieve real GDP growth of 3% annually and keep inflation under control following a sharp rise during the pre-crisis oil-boom period.

2.2. BUILT ENVIRONMENT AND URBAN DEVELOPMENT BEFORE 1970

Due to this physical setting, the challenge of service delivery is not only in dealing with a problem of a large geographical dispersion of the population, as it is the case in many developing countries, but also rather by other constraints like fiscal planning and budget allocations, development of local economies and achieving optimum utilization of the widespread and diverse natural resources, and the environmental management arrangements to ensure sustainable development. (SCTP, 2008a)

The constraint to growth was always very limited water supply. The traditional pattern of settlement therefore, was characterized by a comparatively large number of small communities, each one self-supporting and tied to the management of its water supply. (Oborn, 1982, p. 23)

The most outstanding evidence of Oman's architectural heritage is obviously its forts and citadels as they demonstrate the traditional skills of construction. They constitute a well-established fortified architecture that is highly sophisticated and is well established in almost all parts of Oman. Their design merges with an intricate town and village planning structure that is very sensitive to scale and climate as can be visualized from the narrow streets and low height buildings across many well preserved villages built in mud or stone structures. Figure 2.6 below shows four landmark forts and castles in Oman.



Nakhal Fort



Mirani Fort – Muscat



Jabrin Castle



Bahla fort

Figure 2.6 Examples of forts and castles in Oman (Omanet, 2014)

Overall, Oman's architecture has established itself as a unique and original style of architecture but also, at the same time, interactive and sympathetic with the regional traditional technologies and developments. To this essence, Damluji has explained that:

The development of vernacular architecture in the Sultanate is closely related to the evolution of some of the earliest urban settlements in Arabia. A wide range of influences, from the Pre-Islamic, Islamic, Persian, Portuguese, Moghul and South-East Asian to the Hadrami style of neighbouring Yemen and finally the buildings of East Africa, is also discernible in many of the regional variations. (Damluji, 1998)

Unfortunately, scores of skills and craftsmanship has disintegrated as modernism, paid for by petrol wealth, swept across the country to replace the vernacular mud structure with masonry and steel structures.

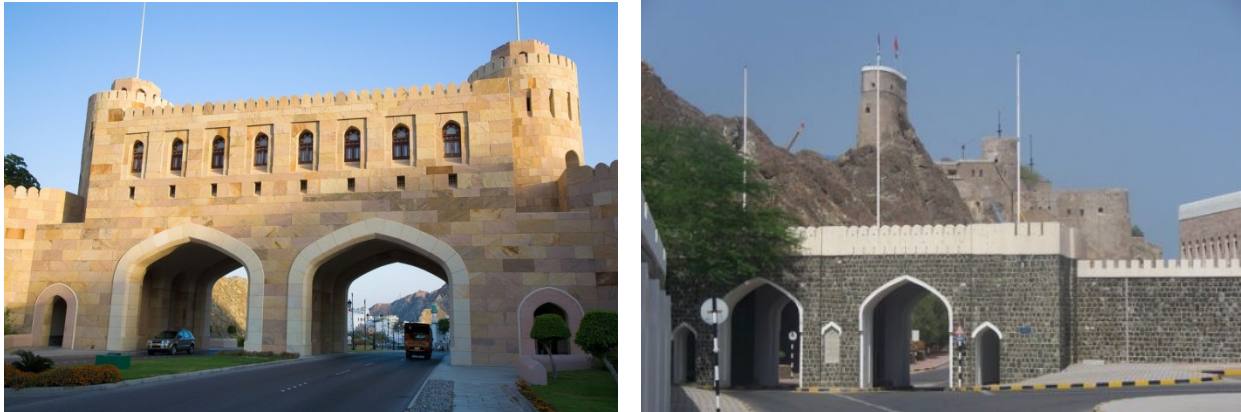


Figure 2.7 Muscat gates (left: new; right: old)

The nature of town planning in many of Oman's towns, including Muscat, reflected similar elements to those of other Islamic and Arabic towns, especially those in the Arabian Peninsula and North Africa. Many cities are surrounded by walls and are usually entered through town gates (as shown in figure 2.7 above). The materials used are local and reflect the cultural and economic lifestyle of the inhabitants that are usually restricted to trade, fishing, agriculture or grazing. The settlements are usually dense and sometimes contain within them the gardens of palm trees that are irrigated by *aflaj*, which is the dominant water distribution system. The houses are low in scale and usually rise only up to two or three levels. This is visible in figure 2.8 which shows the oasis village of Bilad Sayt in the Interior Governorate in Oman.



Figure 2.8 The oasis village of Bilad Sayt (fanak, 2014)

Apart from major town centers, oases were the ultimate response of adaptation to the harsh environment, not just in Oman but also in the Arabian Peninsula. In the era of oil, and with the impact of development and technological advances, these oases have “ceased to play their former role as the chief source of making a living” (Ibrahim et al., 2000). Figure 2.9 shows Harat al-Aqr oasis in Bahla, in the interior governorate of Oman, which has been identified as a UNESCO World Heritage Site. It is an example where traditional building materials, methods and planning practices are implemented within an environment surrounded by palm trees, the oasis, which meets the needs as well as the abilities of its residents. (Oborn, 1982) identifies three factors that determine the layout of traditional settlements in Oman: “ease of defence, topographical constraints, and climate”.



Figure 2.9 Harat al-Aqr (BAHLA, UNESCO World Heritage Site) (source: (Bandyopadhyay, 2005) change reference

In terms of the research and documentation of the Omani vernacular architecture or its oasis settlements, (Bandyopadhyay, 2005) articulates his dissatisfaction in this regards:

The much-needed field research on traditional built environment has lagged behind and has remained very much a weaker sibling of archaeology in this respect. Damluji's work, *Architecture of Oman* (Damluji 1998), potentially a perfect vehicle to plug such a shortcoming, unfortunately, has all the indications of why rigorous research into the traditional built environment has remained so few and far between.. however, when it comes to the study of traditional built environments and its architecture, we are confronted with a relative paucity of fieldwork and, regrettably, some poor commercially motivated coffee table material parading as academic work. Fieldwork conducted on settlements has at times remained unpublished for various reasons. With rare exceptions, the academic work, dominated by archeologists, has remained restricted to high-style (e.g. Costa, 1979; (1985b) or military architecture (e.g. d'Errico, 1983).

2.3. BUILT ENVIRONMENT AND URBAN DEVELOPMENT

AFTER 1970

To understand the modern history of town planning, we need to go back to the early 1970s when His Majesty Sultan Qaboos embarked on the journey to modernize Oman. After unifying the country and declaring Muscat as his chosen capital, the Sultan immediately recognized the importance of developing the infrastructure and expanding the urban cities. Obviously, Muscat, being the capital, was to achieve the most attention in the early days. Muscat as a city or region has undergone various changes in its official name, and has continued to expand throughout the last forty years of development. It could be identified as a region in terms of its urbanization and, in the local context, it constitutes a few wilayats or states: Muscat, Muttrah, Bousher, Seeb and Al Amerat.

Figure 2.10 below shows one of the earliest infrastructure projects of that nature in Muscat, Sultan Qaboos Port.



Figure 2.10 Aerial photo of Muttrah city and Sultan Qaboos Port

In the early 1970s, a group of students from the *Architectural Association* conducted a study of Oman's indigenous building and its potential contribution to building and planning in the future (Cain et al., 1975). It was actually proposed by the famous Egyptian Architect, Prof. Hassan Fathy, as part of his consultancy for rural development of Oman. Fortunately, this study documented and recorded a large array of practices and a skilled use of materials that could provide viable, durable and comfortable solutions to building needs. Among many recommendations, they have suggested the following towards the future urban development of Oman:

- Locating housing sites close to the major sources of employment, or services by a cheap, reliable public transport system to work areas
- Security of tenure so that the owner has confidence to invest on his plot
- Basic water supply, waste disposal services
- Provision of building tools and cheap building materials
- Technical training, advice and assistance in building

There are unfortunately few literature resources that can illustrate the course of urban development in Oman during the early 1970s. Chapter 5 will try to bridge this gap by identifying major projects and milestones in Oman's urban development history. However, to compare the style of urban planning and development after 1970 with that present before 1970, we can reflect on the emergence of the first new town in Oman, Ruwi. Figure 2.11 below shows a recent aerial photo of Ruwi.



Figure 2.11 Aerial photo of Ruwi – the first new city in Muscat

(Townsend, 1977) writes regarding the decision of constructing a new town called Ruwi,

... one which resulted in a new town being built as an extension of Mutrah in the dusty and landlocked Ruwi valley, an airless site, surrounded by mountains, never visited by cooling sea breezes, and where there was very limited room for future expansion.... Oman is now (in 1977) saddled with an untidy and badly located new town development, a development which will dictate the shape of the whole capital area for probably many generations.

(Oborn, 1982) summarizes the status of Ruwi in 1982:

.. few of the problems which Ruwi faces today (1982) are as the inevitable result of urbanization itself, but rather that they are due, in part at least, to the greatest enemies of every developing country, namely expediency, the inappropriate and unsympathetic application of Western principles of design and the failure to implement legislation to control development. (Oborn, 1982, p.122)

2.4. THE FOCUS ON SUSTAINABLE DEVELOPMENT

Oman was amongst the first countries in the region to establish a Ministry of Environment in the early 1980s, which over the years has been replaced by the Ministry of Environment and Climate Affairs. The political vision of sustainability in Oman is illustrated by the following statement:

Sustainable development is the backbone of the philosophy of the Omani renaissance and development plans. It is an imperative dictated by the location of the Sultanate at the southern tip of the Arabian Peninsula, characterized by aridity, water scarcity and sparse vegetation. In this context, the National Conservation Strategy (NCS) for the Sultanate of Oman was designed to ensure that environmental considerations are incorporated in all aspects of development projects beginning from the conceptual to the execution stage. Furthermore, the National Biodiversity Strategy and Action Plan (NBSAP), which has received cabinet approval represents the basis for the exploitation and consumption of biological resources in a manner that maintains a balance in the ecosystem (AlSaid, 2002).

In that statement, the government highlights major issues that should be raised and tackled immediately (AlSaid, 2002):

- i. The need to protect water resources and to ensure the quality of potable water through water purification and wastewater treatment facilities.
- ii. To combat desertification and its consequent degradation of ecosystems and depletion of natural resources.
- iii. To prevent pollution and the loss of biodiversity, especially the safe discharge of oil wastes and ballast water and other wastes from tankers and ships.
- iv. Protecting global biodiversity, by the expansion of protected areas and increasing the vegetation cover, especially in mountains, by 20% by the year 2005.
- v. To deal with the adverse impacts of climate change by fully adopting international conventions and strategies regarding carbon sinks, reforestation, cleaner production technologies and cleaner development mechanisms.

2.5. WHY STUDY URBAN SUSTAINABILITY IN OMAN?

The American Institute of Architects has set out certain objectives regarding sustainability and among these, “architects need to accept the responsibility for their role in creating the built

environment and consequently, believe we must alter our profession's actions and encourage our clients and the entire design and construction industry to join with us to change the course of the planet's future". The researcher was influenced into the choice of research on sustainability in urban planning by various factors, especially the involvement that this practice has with decision makers. Criticism within the society has emerged against technical and professional bodies within the construction and urban planning fields as the solutions implemented have not met the society's ambitions and aspirations. It is envisaged that this research will enhance the understanding on these crucial topics, and eventually contribute towards this public debate of urban sustainability in Oman's cities.

It is imperative that we reflect on how sustainability is defined by the decision makers and consultants in Oman. This was identified as one of the key gaps in knowledge (gap of *definition*) as an outcome of the literature review in Chapter 3. (Willis, 2005) argued that "a prerequisite to achieving sustainable urban form is knowing what it is". (Webster and Williams, 2005) stated that "the current position facing those involved in steering urban change is that both the mechanisms for attaining sustainable development and the future form which sustainable development might take remain ill-defined and contested".

Section 9.2 deals with the sustainability definition in Oman as narrated by various participants in this research. There might be many that sympathise with those points of views that lean towards development and growth when it comes to defining sustainability for Oman as opposed to the alternative versions tackling climate change, conservation and environmental protection. Nevertheless, at this stage of the thesis, the reader would need to appreciate the different dimensions of urban sustainability, identified in Chapter 3, and the framework for urban sustainability dimensions, shown in Chapter 6, before closing out on a particular definition of sustainability of Oman.

2.6. WHY MUSCAT AS A CASE STUDY?

Muscat is chosen as a case study since it represents to a great extent the nature of urban development in Oman since 1970s, and this is evident in more than one aspect. First, the

framework for governance in urban development is largely the same for Muscat as a capital or for the other regions in Oman, and the driving organizations responsible for this are quite similar, apart from Muscat Municipality acting as the main organization responsible for executing infrastructure, as opposed to the Ministry of Municipalities responsible for the same in other regions, or for Dhofar Municipality responsible in Dhofar region. The policies affecting the urban development in Muscat, such as plot distribution is designed in the same principles as for the other regions. The situation that was persistent in Muscat at the early 1970s was very much similar in shape and to a certain extent in scale as other key regional towns, such as Nizwa, Rustaq and Sohar. It is true that the architecture of Sur or Salalah differ slightly than Muscat, but this research project is not necessary about style of urbanism or architecture.

In essence, the mechanisms for urban development that are at play in Muscat, as the capital of Oman, are to a certain extent representative of those mechanisms in other parts of Oman. There is a difference in scale of urban development, which is basically emanating from the fact that Muscat is the capital of Oman, and as such the main focus for government investment and expansion. The lessons that can be learned from the history of urban development in Muscat are definitely useful and applicable to other regions. In addition, the other cities or regions of Oman were deprived of the same urban development established in Muscat since their regional development strategies were not undertaken except in the mid-90s, as evident in the urban development historical index, shown in appendix b. As such, it would not be possible to pick alternative case studies from any other region of Oman apart from Muscat that is worthy of such research.

Nevertheless, it is still possible to argue whether Muscat is truly representative of urban development in Oman, considering its style, policies, mechanisms, scale and magnitude. While this may continue to be a debate, there are other research projects that have attempted to study urban development and planning in Oman from within the perspective of Muscat as case study. The most recent examples of this are: Urban growth from patchwork to sustainability, Case study: Muscat (Al Gharibi, 2014); Towards sustainable patterns of urbanisation in Oman, 2 case studies in Muscat (unpublished research project conducted by German University of Technology

in Oman, and Sultan Qaboos University and funded by The Research Council, 2010 to 2014); Monitoring and modelling urban expansion using GIS & RS: case study from Muscat (Al Awadhi, 2007).

There may be an enquiry on whether this research project should become a comparative analysis between Muscat and the other major cities in the Gulf (GCC). There has been initial discussions early in this project to compare Muscat against similar cities, whether in the Arab World or similar in climatic characteristics. However, this was ruled out from the beginning for a few reasons. First, the literature background that was necessary to carry out such research was not immediately available or foreseeable, especially when considering the amount of time required gathering the necessary literature resources for this project itself. Secondly, there is an argument that other GCC capitals do not necessarily hold similar characteristics to Muscat: neither in style or shape of development, nor in governance or policies, or even in the targets and objectives for development.

For example, there is minimal similarity between Muscat and Dubai, Doha or Abu Dhabi. These other three capitals in the GCC aspire for a different example of urbanism, and are not subjected to the same policies of urban planning, the least of which is plot distribution as a mode for encouraging self-development of residential plots by citizens. The development goals within these three GCC capitals are quite different to that of Muscat; in essence they all aspire to develop around modernistic international metropolitan cities designed more drastically for the expatriates rather than the local citizens. The product of urbanism in these three capitals is quite different from the distinctive approach undertaken in Muscat, primarily in its traditional Arabic fabric, scale and style. This is compounded even more when considering the sustainability dilemma between these GCC capitals, as the principles of development and growth are different when compared to Muscat, and possibly the definition of sustainability or its objectives may be different. The researcher nevertheless included a few case studies as examples of sustainability strategies in section 3.6.3.

2.7. PROBLEMS AND GAP ANALYSIS

The challenges within the quest for sustainability in Oman in general, and in urbanization and city planning, specifically, are great. The following list highlights some of those issues:

- i. *History of town planning in Oman:* there seems to be a wide gap in the knowledge regarding the documentation of town planning development in Oman and how it relates to the different periods of economic and political development.
- ii. *Governance, Accountabilities, Responsibilities and policies in Oman's town planning:* The fact that there are many organizations that are responsible for certain elements of town planning has resulted in a myriad of systems and approaches that compete and sometimes contradict with each other. Changes in political and economic environments occasionally empower certain agencies to perform functions that are not usually within their domain.
- iii. *Is sustainability on the agenda of town planning?* Is it perceived as a mature concept in the political and economic domains?
- iv. *What sort of sustainability are we after?* The nature of the sustainable dogma is different in Oman when compared to European cities, or others for that matter, as the social and economic drivers are undeniably different. Furthermore, the fact that Oman is still on the journey to build the infrastructure and continue its development imposes different challenges and barriers on the equation of sustainability.
- v. *Society attitude towards town planning* and how we can decipher or interpret their awareness, ambitions, expectations, and their preferences to the existing paradigm in town planning and urban sustainability. Elements of research could involve the consumer attitude to sustainable solutions, their critical assessment of government policies and regulations, their awareness and understanding of contemporary trends of living standards and sustainable urban lifestyles, their willingness and ambitions towards living in harmony within ecological boundaries, and so on.

2.8. CHAPTER SUMMARY

It is clear after reading through the above sections concerning the various contextual elements of the country that Oman has witnessed a remarkable social and economic development since the 1970 when His Majesty Sultan Qaboos ascended to the throne. His government has continued to emphasize the importance of protecting the environment as well as the historical legacy of Oman and that any future development should not come at the expense of its social and environmental assets. Nevertheless, any massive overhaul of a country like Oman will have its successes and shortcomings. This research project identified gaps in the area of urban sustainability and would strive to address them in what is reported in the upcoming chapters. It is logical that the discussion is taken from this local context to a wider global context to address the significance of the topic of urban sustainability and to identify and compare the problems and gaps in this area. This will be covered in the form of *literature review* in Chapter 3.

CHAPTER 3: URBAN SUSTAINABILITY IN THE GLOBAL CONTEXT

3.1. OVERVIEW

The concept of sustainable development is steadily approaching recognition, if not full disciplinary autonomy, becoming the focus of new theoretical and normative reflection. However, the same cannot be said of a more specific field of application of that same concept - the urban environment. (Camagni, 1998).

This chapter will start with broad definitions, historical review and trend analysis surrounding sustainability, urbanism and urban sustainability. Urban sustainability, which is the focus of this research, will be further studied in terms of the methods of measuring its performance, either in indicators or dimensions, and this will be followed by gathering the literature knowledge on the challenges and barriers to urban sustainability, which are all covered in section 3.4. Section 3.5 is dedicated for the urban sustainability assessment with two parts: indicators and dimensions. Section 3.6 will review the lessons from history, European cities and from various case studies from the Middle East. Section 3.7 will present the literature on strategies and their implementation. The literature gathered and analysed so far in the chapter will then be further dissected, in section 3.8, to filter out the common gaps in knowledge, section 3.9, and how that related to the context under review, Oman. The chapter ends with a summary in section 3.10.

3.2. SUSTAINABILITY

The essence of the whole topic should be related to the fundamental question: why should we care about sustainability? (Young, 1996) provides the following answer to this question:

1. We have responsibilities to others.
2. World's population are growing.
3. Resources are depleting.

4. Natural and vernacular environments are degrading.

One of the most influential and visionary books in the history of urban planning is Ebenezer Howard's *Garden Cities of To-morrow* (1898) which outlined the strategy for addressing the problems of the industrial city, as well as attempting to create a city that is balanced, which fits within the paradigm of sustainability. (Howard, 1965) wrote: "each city might be regarded as a magnet, each person as a needle; and, so viewed, it is at once seen that nothing short of the discovery of a method for constructing magnets of yet greater power than our cities possess can be effective for redistributing the population in a spontaneous and healthy manner".

Lewis Mumford played a central role as an American advocate of garden city ideas. His book *The Culture of Cities* (Mumford, 1938) inspired generations of later urbanists, such as Kevin Lynch, who would continue Mumford's emphasis on developing a normative urban planning agenda in books such as *Good City Form* (1981). Mumford said:

Today our world faces a crisis: a crisis which, if its consequences are as grave as now seems, may not fully be resolved for another century. If the destructive forces in civilization gain ascendancy, our new urban culture will be stricken in every part. Our cities, blasted and deserted, will be cemeteries for the dead: cold lairs given over to less destructive beasts than man. But we may avert that fate: perhaps only in facing such a desperate challenge can the necessary creative forces be effectually welded together. Instead of clinging to the sardonic funeral towers of metropolitan finance, ours to march out to the newly plowed fields, to create fresh patterns of political action, to alter for human purposes the perverse mechanisms of our economic regime, to conceive and to germinate fresh forms of human culture. (Mumford, 1938)

Aldo Leopold, an environmentalist and ethicist, questioned the norms of economic value and presented his doctrine that societies should live within "their sustained carrying capacity". He declared his land ethic thus: "it is inconceivable to me that an ethical relation to land can exist without love, respect, and admiration for land, and a high regards for its value" (Leopold, 1970).

In her book, *the death and life of Great American Cities* (1961), Jane Jacobs presented her arguments about dense urban neighbourhoods and emphasized pedestrian-oriented urban form: "automobiles are often conveniently tagged as the villains responsible for the ills of cities and the disappointments and futilities of city planning. But the destructive effects of automobiles are

much less a cause than a symptom of our incompetence at city building” (Jacobs, 1961). She added: “one principle emerges so ubiquitously, and in so many and such complex different forms, that [it] becomes the heart of my argument. This ubiquitous principle is the need of cities for a most intricate and close-grained diversity of uses that give each other constant mutual support, both economically and socially. The components of this diversity can differ enormously, but they must supplement each other in certain concrete ways” (Jacobs, 1961).

The Limits to Growth (Meadows, 1972) was unique because it was the first to utilize computer technology and scientific methodology to analyse the future of mankind and to investigate whether the growth in human population and resource consumption were sustainable. The authors presented the following conclusions:

1. “If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometimes within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity”.
2. “It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential”.
3. “If the world’s people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success”. (Meadows, 1972)

There probably is nothing more influential in this debate of sustainability than the release of the 1987 report *Our Common Future* (Brundtland, 1987). It presented the most commonly used definition of sustainability: “development that meets the needs of the present without jeopardizing the ability of future generations to meet their own needs”. The report further elaborated that: “in essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations” (Brundtland, 1987). This report included three fundamental components for sustainable development:

1. Environmental protection
2. Economic growth without damage to the environment
3. Social equity

The word *development* in the above definition, as explained by (Hui, 2008), implied two important aspects: it is omnidisciplinary: it is applicable to the whole world and not limited to a number of disciplines or areas; and it has not set limits as continuation of development is the aim of the development. Moreover, Hui detects two concepts within this definition: *the concept of needs*, compromising of the conditions for maintaining an acceptable life standard for all people, and *the concept of limits* of the capacity of the environment to fulfil the needs of the present and the future, determined by the state of technology and social organization” (Hui, 2008).

(Ratcliffe and Stubbs, 2013) stated that “sustainable development does not mean having less economic development; on the contrary, a healthy economy is better able to generate the resources to meet people’s needs and new investment and environmental improvement often go hand in hand. What it requires is that decisions throughout society are taken with proper regard to their environmental impact”.

(Siegel and Loftness, 2008) described the linked domains of sustainability as environmental (natural patterns and flows), economic (financial patterns and equity), and social (human, cultural, and spiritual).

(Seghezze, 2009) argued that there is a limitation with the WCED definition (Brundtland, 1987) which could be mitigated if sustainability is seen as “the conceptual framework within which the territorial, temporal, and personal aspects of development can be openly discussed”.

The sustainable design process “holistically and creatively connects land use and design at the regional level and addresses community design and mobility; site ecology and water use; place-based energy generation, performance and security; materials and construction; light and air; bioclimatic design; and issues of long life and loose fit” (Siegel and Loftness, 2008).

From an architect’s point of view, (Foster, 2003) argued that: “sustainability is a word that has become fashionable in the last decade. However, sustainability is not a matter of fashion, but of

survival. Sustainable architecture can be simply defined as doing the most with the least means. The Miesian maxim ‘Less is more’ is, in ecological terms, exactly the same as the proverbial injunction, ‘Waste not, want not’ ”.

(Thayer, 1989) defined sustainability as “a characteristic of a process or state that can be maintained indefinitely”. One last definition of sustainable development that needs to be mentioned here is that identified by *The Omani Economic Association*, declared in its Fourth Conference: “sustainable development is a social process that is conscious, continuous, directed based on a national and independent resolve towards attaining structural transformations and creating political, social and economic changes that permits subsequent growth of the social capabilities and continuous improvements to its living standards” (Economic Association, 2013).

3.3. URBANISM

“It is sometimes said that the industrial revolution stimulated the greatest human migration in history. This migration swept first through Australia, Europe and North America and is still in the process of transforming Asia and the rest of the world” (Rees and Wackernagel, 1996). They refer, of course, to the mass movement of people from farms and rural villages to cities everywhere. Furthermore, they recognize that cities offer key collective infrastructure for achieving sustainability on a global scale. This is done through the economies of scales that cities offer, especially in terms of waste management, mass public transport, and high population density.

This section will address in particular the development of the city, its role and how urban planning is defined and developed over the last few decades. It will also provide insight into the trends of urbanism and how that relates to sustainability.

3.3.1. THE ROLE OF THE CITY

The following list is essential in understanding the historical development of cities and the nature of its role. As per (Jenks and Dempsey, 2005), the city performs the following functions:

- i. Seat of power, wealth and knowledge

- ii. Catalyst for social change and revolution
- iii. Birthplace of democracy (itself a feature of sustainability)
- iv. Contained myriad of diverse and intense connections and activities (where people live, work, shop and play) meeting the need of economic production and social reproduction
- v. Bring together people from different backgrounds and cultures
- vi. Place for the community rather than the individual
- vii. Link the past, present and future

In addition, (Briggs, 2005) argues that cities exist because of two major human requirements:

- 1. To facilitate transaction (social, economic).
- 2. To enable freedom of association and expression.

There are three factors that are profoundly altering the potential for any city to remain successful in the long term (Briggs, 2005):

- a. The shift to knowledge economy.
- b. Increasing globalization of trade, labour, culture and politics, as well as the new opportunities created by digital communication and information sharing systems.
- c. Systemic inter-relationships between different cities and places.

(Girardet, 2008) identifies the following four factors that actually shape urban development which are essential for this research as they will appear in the scene later on: economic power, commercial interests, transport technologies and planning legislation.

(Rees and Wackernagel, 1996) identify some advantages of urban settlements, which are as follows:

- Lower costs per capita of providing piped treated water, sewer systems, waste collection, and most other forms of infrastructure and public amenities;
- Greater possibilities for, and a greater range of options for, material recycling, re-use, remanufacturing and the specialized skills and enterprises needed to make these things happen;

- High population density, which reduces the per capita demand for occupied land;
- Great potential through economies of scale, cogeneration, and the use of waste process heat from industry or power plants, to reduce the per capita use of fossil fuel for space-heating;
- Great potential for reducing (mostly fossil) energy consumption by motor vehicles through walking, cycling, and public transit.

3.3.2. URBAN PLANNING

What is urban planning? The following influential urban planners provide their version of urban planning definition (Ratcliffe and Stubbs, 2013):

- (Keeble, 1969): the art and science of ordering the use of land and siting of buildings and communities routes so as to secure the maximum practicable degree of economy, convenience and beauty.
- (Hall and Tewdwr-Jones, 2010): planning is the making of an orderly sequence of action that will lead to the achievement of a stated goal or goals.
- (Solebury, 1974): planning is a concern of government and a field of public administration.

Fredrick Olmstead (City planning Movement), the father of American town planning, summarizes the aims of planning (Olmsted, 1914):

1. Means of circulation: the distribution and treatment of the spaces devoted to streets, railways, waterways and all means of transportation and communication.
2. The distribution and treatment of the spaces devoted to all other public purposes.
3. Concerns the remaining or private lands and the character of development there on, in so far as it is practicable for the community to control such development.

(Giddings et al., 2005) state that “the last two centuries have seen a transformation in cities from being relatively contained to widespread urban sprawl”. They identify the cause for this: “as production has moved location or closed down, there has been a trend of population migration away from the cities to the suburbs, smaller towns and semi-rural areas”. In terms of private investment and its influence on the growth of the city, they state that “the pace and scope of

development has often been driven by property developers with no interests within the city, so that the urban scale and appearance is defined more by the need of capital”. Unfortunately this meant that the “priority of policy has moved from meeting social needs to attracting and meeting the needs of capital”. As a consequence, “the role of the city authorities is mainly in support of the private sector, striving to attract investors, to support property development and increasingly to encourage the private provision of services” (Giddings et al., 2005).

3.3.3. URBANISM – TRENDS

The following are some statistical figures that show the growth of urbanization between 1900 and 2000 (Girardet, 2008):

- 1900: 15% of 1.5 Billion global population lived in cities
- 2000: 47% of 6 Billion global population lived in cities
- 1900: 4 cities of 1 million and more: Beijing, Tokyo, Delhi and London
- 2000: 200 cities with 1 million, 100 cities of 1-10 million, 20 megacities (over 10 million)
- By 2030: 60% of world population will live in cities

Figure 3.1 shows the estimated and projected size of the world’s urban and rural populations over the period from 1950 up to 2030. There has been a high rate of urbanization which coincides with a decline in the rural populations since 2000.

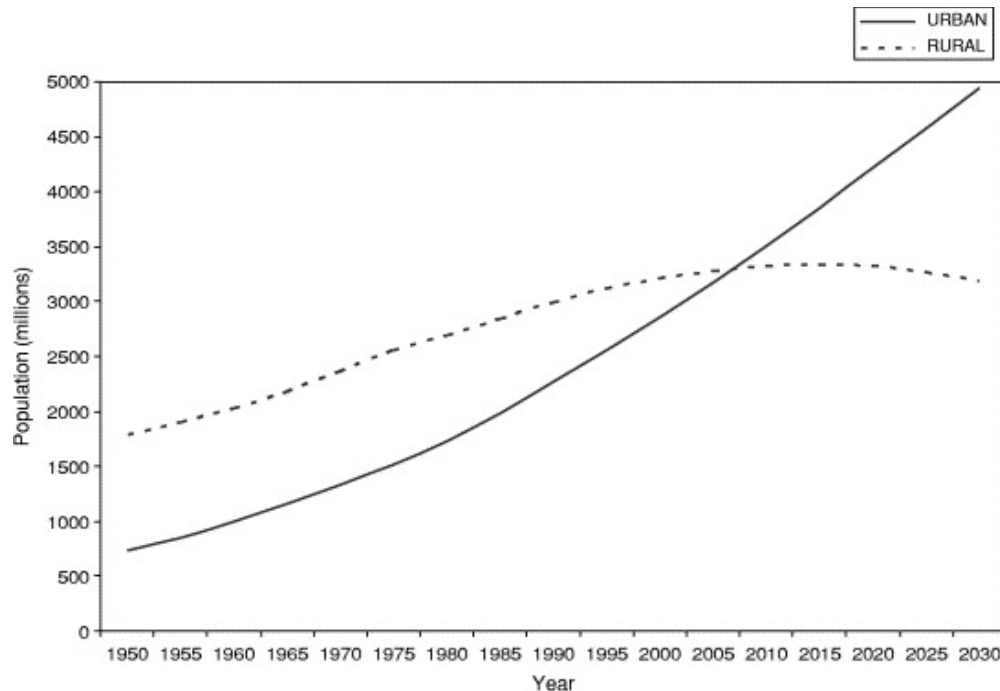


Figure 3.1 Estimated and projected size of the world's urban and rural populations, 1950-2030. (United Nations, 2003)

The development of new town concepts can be divided into 3 stages (Benna, 1996):

- A. Up to the end of World War II: for example: British Garden Cities of Letchworth 1903, Canberra, Ottawa, and Khartoum.
- B. The decade after World War II: for example: British town and country planning Ordinance 1946.
- C. 1960s and onwards: the need for new town internationally recognized. In UK, 10 news towns started between 1961 and 1968. In USA, new towns were viewed as the answer to the failures of urban renewal programs, of subsequent sub-urbanization and the attempts to create ideal societies.

(Girardet, 2008) identifies the following ten factors that contribute to urban growth:

- a. Migration due to job and business opportunities
- b. Urban education, health and other services
- c. Reproduction of urban populations
- d. Cheap energy supplies
- e. Technology development

- f. Import substitution and economic growth
- g. Economic globalization
- h. Urban political and financial power
- i. Urban-centred transport systems
- j. Easy access to global food supplies

Although not directly related to the scope of this research, but it is meaningful to reflect on the various trends of urbanism and urban planning. The following are briefly mentioned in this context as they have been influential in the discourse of urban planning (Girardet, 2008):

- British reformed Ebenezer Howard wrote his book: *Garden Cities of Tomorrow* (Howard, 1965).
- Fredrick Olmstead, the father of American town planning (Olmsted, 1914).
- Le Corbusier's living machine – also proposed Garden Cities
- Urban village – created around pedestrian street, pavements, public squares and parks.
- Eco-villages: there are now 15,000 such villages worldwide, including 11,000 existing villages with sustainable lifestyles in various parts of the world.
- The movement of the new urbanism: CNU (Congress of New Urbanism): stands for reordering of the built environment, the revival of 'place making' and the creation or restoration of compact mixed use cities (CNU, 2014).

(Halla, 2007) identifies the following three stages for the professional practice development of urban planning and urban design:

- For a century lasting from 1850s to 1940s: the professional practice was guided by the *urban design paradigm*, which embodies architectural concepts and principles of municipal engineering.
- For the following half a century lasting from late 1940s to early 1990s: the professional practice was guided by the *procedural or master-planning paradigm*, which embodies the concepts of technocracy, bureaucracy, rigidity and comprehensiveness.

- Since 1990s: the professional practice has been guided by the *political-economy or urban management paradigm*, which embodies participatory, transparency, flexibility and being strategic.

3.4. URBAN SUSTAINABILITY

(Jenks and Dempsey, 2005) identify that the foundation to urban sustainability is to “achieve a high quality of life for the whole community within a socio-economic framework that minimizes the impact of the city on the local and global environment”. They suggest that “crucial to the development of a sustainable city is the commitment and will of the population”. Unfortunately there is an emphasis on people as consumers rather than as citizens and therefore sustainable cities need active involvement of the people; they need active citizens. This section provides literature background to the concept of urban sustainability.

3.4.1. URBAN SUSTAINABILITY - DEFINITION

(Willis, 2005) argues that “a prerequisite to achieving sustainable urban form is knowing what it is”. (Webster and Williams, 2005) state that “the current position facing those involved in steering urban change is that both the mechanisms for attaining sustainable development and the future form which sustainable development might take remain ill-defined and contested”.

(Adinyira et al., 2007) define urban sustainability as ‘a desirable state or set of urban conditions that persists overtime. It is often characterized by issues such as inter-generational equity, intra-generational equity, protection of the natural environment, minimal use of non-renewable resources, economic vitality and diversity, community self-reliance, individual wellbeing, and satisfaction of basic human needs”.

(Willis, 2005) identifies the following guiding principles towards a sustainable city: Self-determination and inclusion, memorialization, liveability and balance, arts and culture, productivity, decentralization, sustainability, diversity, efficient transportation and pride of place.

(Jenks and Dempsey, 2005) argue that the city has to meet the business requirements of the new economic paradigm by: employing the right people; increasing interaction and communication;

promoting accessibility, openness and convenience; achieving flexibility of operation, functional, financial and physical; and maintaining and promoting value through image differentiation.

(Willis, 2005) adds the following argument towards achieving any of these principles: “does the political will exist to overcome the current state of reluctance by some developers to use sustainable technologies?”

3.4.2. URBAN SUSTAINABILITY – CHALLENGES

It is obvious that one has to identify the problems and its challenges before attempting to analyse it or yet alone devise solutions to resolve it or improve on it. (Williams, 2010) presents two faces to the challenge of sustainability:

1. *The challenge of ‘the vision’*: do we know what ‘the sustainable city’ is?
2. *The challenge of change*: do we know how to bring about ‘sustainable urban development’?

(Frey and Yaneske, 2007) list the following challenges to sustainability:

- a. Extreme natural hazards: earthquakes, volcanoes, Tsunamis, extreme weather and climate change, Asteroid impacts
- b. Sustaining the natural environment: the 6th mass extinction is underway caused by human activity: habitat loss, exploitation, alien species, climate change, pollution
- c. Sustaining the engineered environment: health, food, water, energy
- d. Cultural inheritance
- e. Accounting for value: where many man-made indexes on sustainability and climate change do not take into considerations all the factors and is not, sometimes, scientifically sound

(Rees and Wackernagel, 1996) identify the challenge of sustainability in the sense that any city cannot achieve sustainability alone, and should always be linked to how other cities address sustainability: “cities necessarily “appropriate” the ecological output and life support functions of distant regions all over the world through commercial trade and natural biogeochemical cycles. Perhaps the most important insight from this result is that *no city or urban region can*

achieve sustainability on its own". Regardless of local land use and environmental policies, a prerequisite for sustainable cities is sustainable use of the global hinterland" (Rees and Wackernagel, 1996).

3.4.3.BARRIERS TO URBAN SUSTAINABILITY

(Briggs, 2005) state that "the greatest hurdles to achieving sustainability lie neither in the environmental nor economic spheres, but in the social". (O'Meara Sheehan et al., 2007) identify the following barriers to equitable cities:

1. Weak governance – the 3 Cs: corruption, clientalism, and cronyism.
2. Violence and stigma.
3. Anti-urban bias: cities as threat to nature.
4. Skewed international assistance.
5. Counterproductive incentives and fear of change "sticking with the way things have always been".
6. Inadequate data for benchmarking.

In terms of the institutional mechanism constraints, (Wong, 2004) identify the following:

1. Limitations on the availability of finance and human resources.
2. Difficulty in mobilizing the relevant experts and stakeholders.
3. Lack of coordination between statistical agencies and the indicator focal point.
4. Low level of awareness among stakeholders.
5. Low level of commitment.
6. Competing work demands and government leadership transitions that results in discontinuities in the implementation in the indicator process.

(McLennan, 2004) forecasts that "a sustainable future is possible and achievable within this century if we continue to remove the barriers to sustainability and apply appropriate technologies and the knowledge we continue to acquire. That most of the barriers to a sustainable future are not technological but fear and ignorance based". Alternatively, another study concerning sustainability strategies in North American cities highlight that "political fragmentation and a lack of clear policy guidelines from senior governments have combined with the consumer

preferences of a largely affluent population to perpetuate discontinuous, low density sprawl as the predominant urban form” (Reese et al., 2005).

3.5. URBAN SUSTAINABILITY ASSESSMENT

It is commonly stated that one cannot manage what cannot be measured. Developing new means to measure urban performance is a crucial mechanism to assist cities in preserving the natural capital of Earth in the long term. So far, conventional measures of economic performance and urban quality of life have not been adequate to capture the dependencies between urban society, economic development, and the environment. Furthermore, “although cities affect and are affected by natural systems beyond their physical boundaries, the interdependence between urban systems and the regional and global environment is not reflected in urban decision-making. No signals on the state of natural resources and on the sustainability of their current uses are typically provided to urban communities” (Alberti, 1996).

(Pope et al., 2004) defined sustainability assessment as a process by which the implication of an initiative on sustainability is evaluated. (Therivel et al., 1992) defined it as a formal process of identifying, predicting and evaluating the potential impacts of a wide range of relevant initiatives (such as legislation, regulations, policies, plans, programmes, and specific projects) and their alternatives on the sustainable development of society.

(Maclaren, 1996) define urban sustainability reporting as “a tool for informing local government, as well as individuals, businesses, and other organizations, about the progress that they are making towards achieving urban sustainability”. There are many urban sustainability assessments methods that can be identified throughout the literature. (Adinyira et al., 2007) concluded that there are three groups of methods which can be grouped on the basis of their methodological foundations: “environmental-in general methods, Life cycle assessment methods and sustainability indicator assessment methods”.

(Singh et al., 2009) argue that “sustainability indicators and composite index are increasingly recognized as a useful tool for policy making and public communication in conveying

information on countries and corporate performance in fields such as environment, economy, society, or technological improvement. By visualizing phenomena and highlighting trends, sustainability indicators simplify, quantify, analyse and communicate otherwise complex and complicated information”.

(Walton et al., 2005) stress that robust and comprehensive methodologies for the assessment of sustainability in the urban context are fundamental for various types of urban policy-makers such as planners, architects, engineers and managers.

Urban sustainability indicators play a crucial role in helping decision makers ensure the continuous success of their cities. However, “a review of current practice suggests that priority is often given to the measurability and policy relevance of these metrics. Their analytical validity – i.e. their ability to act as meaningful representations of the urban system and thus inform appropriate policy responses – is less certain” (Keirstead and Leach, 2008).

(Curwell and Cooper, 1998) conclude that “this presents a considerable challenge, as the questions presented by the need to assess and create more sustainable buildings and cities require wider horizons, much greater resource efficiency and effective participation in decision making”.

3.5.1. URBAN SUSTAINABILITY INDICATORS

“Indicators provide quantitative and qualitative information that help to determine urban development priorities” (Syrian, 2009). This section outlines the different tools and methods used internationally to monitor sustainability:

- A. *SEAs*: Strategic Environmental Assessments
- B. *BREEAM*: Building Research Establishment Environmental Assessment Methods (BREEAM, 2014)
- C. *LEED*: Green Buildings Council's Leadership in Energy and Environmental Design (USGBC, 2014)
- D. *Green Building Challenge* (Canada, 1998-2007)
- E. *Australian Building Greenhouse Rating Scheme*

- F. NABERS: National Australian Building Environmental Rating System (NABERS, 2014)
- G. *Green Star*: by Green Building Council of Australia (2003)
- H. *SAP*: Standard Assessment Procedure in UK
- I. *NatHERS* and *FirstRate*: in Australia
- J. *EcoQuantum*: in Netherlands
- K. *Green Guide to specifications*: in UK
- L. *Envest* and *Ecopoints*: by Building Research Establishment in UK
- M. *Estidama*: meaning "sustainability" in Arabic, by (Abu Dhabi Urban Planning Council, 2014)

(Walton, et al, 2005) provides a similar list of metrics, models and tools for sustainability assessment, as shown in Figure 3.2 below.

BRE SC	BREEAM	Living standards measurement survey	Multi-scale Integrated Analysis of Sustainability
CSA	HK-BEAM	PRAM	Full Cost Accounting
SPARTACUS	BRE Eps	Sustainability Balanced Scorecard (SBSC)	Whole Life Costing
SEEDA SC	ATHENA	QUEST	Building for Environmental and Economic Sustainability
SCALDS	Boutstead	LASALA	Life Cycle Assessment Sima Pro 5
CITY Green	GaBi 4	Quality of Life Assessment	ENVEST
PLACE's	TEAM	Community Profile	PoleStar
ECOTECT	EcoPro	Genuine Progress Indicator	P2/FINANCE
DOE 22	CEEQUAL	Community Impact Assessment	E2/FINANCE
BDA	Social Capital Assessment Tool (SOCAT / SCAT)	Dashboard of sustainable development	EXMCO
GBTool	Index of Sustainable Economic Welfare	Corporate Sustainability Assessment (SAM)	EXMOBILE
LEED	Social/Human Capital Rapid Appraisal Model	Community Sustainability Assessment	NI Equality Impact Assessment
SPeAR	ISCAM	Sustainability Calculator	Strategic Environmental Assessment
MSDG	UN Human Development Reports / Index	Wellbeing Index	Natural Step
EcoCal	Social Capital Assessment Tool	Social Impact Assessment	SIGMA

Figure 3.2 A sample of Metrics, Models and Tools ((Walton, et al, 2005)

Majority of these sustainability indicators are aimed at measuring the performance of buildings and rarely useful to cater for a wider measurement or analysis of the urban city performance. Nevertheless, it is important to note here that urban sustainability indicators are generally constructed around the following framework (Alberti, 1996):

- Key variables to describe urban and environmental systems and their interrelationships;
- Measurable objectives and criteria that enable us to assess these interrelationships; and
- Feedback mechanisms that enable the signals of system performance to generate behavioural responses from the urban community at both the individual and institutional levels.

(Walton, et al, 2005) argue that robust and comprehensive methodologies for the assessment of sustainability in the urban context are essential for urban decision makers such as planners, architects, engineers and managers. During their study, 675 tools applicable to the assessment of sustainability in regard to urban developments were identified with 165 of these undergoing evaluations against a series of criteria identified as important for the integrated assessment of urban sustainability. Its vision is to develop a comprehensive and transparent framework that encourages key decision-makers to systematically assess the sustainability of urban development taking account of scale, life cycle, location, context and all stakeholder values. The results of their work confirmed that “there is no tool currently capable of simultaneously covering all assessment criteria but demonstrated the need not for a new tool but for a framework that integrates those that already exist. Consequently, the consortium proposes the development of an integrated sustainability assessment toolkit (ISAT)”.

3.5.2. URBAN SUSTAINABILITY DIMENSIONS

Since a single indicator will seldom be able to give the full picture, it is often useful to employ a wide range of indicators to characterize the different dimensions or aspects of a situation. (Maclaren, 1996)

The following is a wide spread understanding of the sustainability dimensions where one cannot exist without the other (Jenks and Dempsey, 2005):

- i. Equity: social benefits
- ii. Ecological: environmental sustainability
- iii. Economical: efficiency

(Eastaway and Støa, 2004) suggest enhancing the above triangular approach by adding “*governance*” as a fourth pillar: “governance relates to the cooperation, partnerships and participation of different actors in the process of sustainable urban development”. This correlates with the fourth dimension that (Spangenberg, 2004) suggests which is the *institutional* dimension. (Hasna, 2006) supplements the three common themes of sustainability mentioned earlier with a fourth dimension called “*technology*”.

In terms of urban sustainability, (Alberti, 1996) identified three dimensions that need to be considered in measuring urban sustainability: urban quality, urban flows and urban patterns. On a different approach, (Seghezze, 2009) identifies five dimensions of sustainability: *place* contains the three dimensions of space, *permanence* is the fourth dimension of time, and the *persons* category represents a fifth, human dimension.

Beatley has identified 6 dimensions for the Green Urbanism:

1. Strives to live within its ecological limits
2. Designed to function in ways analogous to nature
3. Strives to achieve a circular rather than a linear metabolism
4. Strives towards local and regional self-sufficiency
5. Facilitates more sustainable lifestyles
6. Emphasize on high quality of neighbourhood and community life

From the above, it is clear there is a debate about the suitability of the common three dimensions of sustainability (economic, social and environmental). Moreover, at a local context, the triangular approach may not be sufficient to address sustainability, let alone urban sustainability. This topic will be revisited in Chapter 6 concerning Urban Sustainability Dimensions (USDs).

3.6. LESSONS

Many cities around the world have developed sustainable urban development plans for leading their urbanization process towards a desired status of urban sustainability (Shen et al., 2011). The following section identifies various lessons learned from history, and current trends in European cities as well as from various case studies from within the Middle East.

3.6.1.LESSONS FROM HISTORY

Perhaps the most notable statement regarding this topic is available in (Frey and Yaneske, 2007) who conclude with the following lessons learned from settlements in history:

1. The current reactionary approach to achieve sustainability needs to be replaced by the systematic appraisal of the current state of play and what needs to be done to re-establish a symbiotic city-hinterland relationship.
2. In cases where there is certainty that human activity will cause damage to the environment, the reactionary approach needs to be complemented by precautionary measures to prevent damage occurring in the first place.
3. For cases where environmental change is unforeseen or unforeseeable, resources need to have been put aside as insurance to fund future unknown remediation of damage that was not prevented because it was not foreseen.

3.6.2.LESSONS FROM EUROPEAN CITIES

(Beatley, 2004) identified the following lessons to be learned from European cities:

1. Demonstrate the critical role that municipalities can and must play in addressing serious global environmental problems.
2. Innovation in the urban environment offers tremendous potential for dramatically reducing our ecological impacts.
3. Initiatives and strategies should serve to enhance liveability and quality of life.
4. It is possible to apply virtually every green or ecological strategy even in highly urban or compact settings.

5. Process: Understanding the great power of partnership and collaboration between different parties with an interest in sustainability is a key part of the successful urban sustainability process.
6. Need to recognize the differences in governmental structures.
7. Political, social and cultural conditions might favour exemplary green ideas.
8. Need to recognize regionally unique cultural values and differences that have significant planning and land use shaping implications.
9. Sustainability must go hand in hand with humanizing cities and strengthening their liveability and sociability.

3.6.3.CASE STUDIES FROM THE MIDDLE EAST

It is appropriate to review some of the work surrounding urban sustainability within the Middle East. The authors for the Syrian Urban Development Policy Memorandum on Sustainable Urban Development argue that the highly centralized government system is now generating risks for future urban development (Syrian, 2009):

- Centralized patterns of priority setting, decision-making, and fund allocation on which all kind of implementation measures depend.
- Intensified urban management demand with which the regional and local administrative structures can hardly cope as long as they are not fully legally empowered and adequately staffed.
- Frequent unexpected and flexible planning and implementation requirements to which the regulatory framework does not respond.

Furthermore, they identify that “city mayors rarely think about urban issues, such as how to mitigate poverty, reduce the level of unemployment, encourage job generation, or regularize informal settlements. These issues are as of yet too abstract. Instead, the cities focus is directed towards projects”. While addressing the problems in a systematic manner, they suggest that “the quality of planning can be enhanced through dialogue, cooperation, and idea competition for urban design, public (and larger private) buildings, public spaces and parks” (Syrian, 2009) .

Another case study that has been reviewed in this research is the city of Jeddah in Saudi Arabia (Jeddah, 2009). It is clear that the existing city of Jeddah has already witnessed the signals of unsustainable city growth such as sprawl: “sprawl has also imposed significant costs on the city in terms of the need to provide much greater lengths of utility and highway infrastructure to serve these widely dispersed areas. This is one of the key causes for the current under-provision of basic water and sewage infrastructure in many parts of the city” (Jeddah, 2009). The same would be echoed throughout the problem analysis phase of this research, particularly in addressing the urban planning problems for Muscat, the capital of Oman.

Land use plays a significant role in the Middle East cities, especially when viewed within the context of the high rate of urbanization and growth achieved with the oil wealth. In Jeddah, the following issues with the use of land are significant and have a huge impact towards its future (Jeddah, 2009):

- a. Misallocation: unregulated and under-regulated
- b. Over-allocation: the planning system in Jeddah has consistently set growth boundaries for the city which make too much land available for development. The result has been fragmented development of a large area rather than the coherent development of smaller zones. This has three causes:
 1. insufficient attention to conservation of land
 2. weak planning controls
 3. land grants
- c. Lack of control and uncertainty: land ownership data is scattered, there are no mechanisms to compel development of vacant land.
- d. Land speculation: the combination of too much new land being released into the market with weak control over development has fuelled land speculation around Jeddah.

The JSP sets the following strategic objectives (Jeddah, 2009):

1. Balanced growth within Jeddah Governorate, supporting positive growth in satellite centres.

2. Ensure Jeddah's urban structure provides efficient and consistent access to housing, services and employment.
3. Ensure the provision of land to support the requirement for urban growth.
4. Ensure Jeddah grows in a compact and resource efficient manner.
5. Regenerate Jeddah's metropolitan centre to create a thriving government, commercial and tourist district.
6. Support the development of a high quality realm and distinctive urban character.
7. Encourage the development of liveable, walkable neighbourhoods.

A third case study that is worthy of mentioning here is Plan Abu Dhabi 2030. The executive summary of its Urban Structural Framework Plan (Urban Planning Council, 2007) advocates that it is first and foremost grounded in the cultural and environmental identity of Abu Dhabi. The key directions of this plan are: sustainability, a unique environment, an evolving culture, identity and opportunity, excellence and liveability, and connectivity.

3.7. STRATEGIES AND IMPLEMENTATION

In the context of planning and design strategies for sustainability and profit, (Pitts, 2004) outline that strategic planning encompasses:

1. Development of strategies
2. Use of benchmarking and target setting
3. Analysis of trends and performances
4. Setting of goals for achievement

When it comes to the strategy tools, (Kaufmann-Hayoz and Gutscher, 2001) promote the use of five basic type of strategies instruments focusing on the ecological dimension of sustainability which aims to achieve environmentally responsible action: “command and control instruments, economic instruments, service and infrastructure instruments, collaborative agreements, and communication and diffusion instruments”. They suggest that these are of a general character that would allow for the inclusion of specific groups of instruments for promotion of the other dimensions of sustainability: economic and social sustainability.

(Allen and Browne, 2010) identify that policies and strategies to meet some basic human objectives are as difficult to identify as the objectives themselves. They suggest that “such policies must weight trade-offs between goals and values within changing socio-economic conditions”.

(Barr, 2003) argues that “policymakers are becoming increasingly interested in the means by which individuals can be encouraged to engage in environmental actions around the home”. Strategies may also address the factors associated within a particular scope and try to take account of these factors. For example, (Barr, 2003) conducted an empirical research and a large questionnaire survey to argue that environmental action is open to a range of influences, focusing especially on environmental values, situational characteristics and psychological variables.

In terms of implementation, the following are six successful factors for implementing sustainability that have been identified by (Lindberg and Connely, 2007): vision, commitment, practicality, capacity building, effective incentives and disincentives, and communication.

(Frey and Yaneske, 2007) have come up with the following conclusion regarding the implementation of any sustainable initiative:

1. There is a reasonably clear idea of the complexity of social, economic and environmental issues of sustainability and an understanding that their interdependencies and interactions have to be taken into account.
2. However, when it comes to the translation of policy statements into sustainable development action plans, then the comprehensive view of social, economic and environmental indicators is lost as nations focus on the parameters they consider essential for their development and ignore others.

They identify a number of factors that are responsible for this:

1. The lack of moral obligation to achieving social equity.
2. Invisibility of the environmental impact of resource consumption in developed nations (consumers not concerned about the impact of their consumption level).
3. The nature of current conventional economics.

4. Lack of knowledge of environmental and ecological systems.

Although different to this context, we can consider the silent killers of strategy implementation and learning (Eisenstat and Beer, 2000) to understand more about shortcomings in the implementation process:

1. Top-down or laissez-faire senior management style.
2. Unclear strategy and conflicting priorities.
3. An ineffective senior management team.
4. Poor vertical communication.
5. Poor coordination across functions, businesses or borders.
6. Inadequate down-the-line leadership skills and development.

3.8. INTERPRETATION AND CRITICAL REFLECTION

This chapter provides a wider perspective of sustainability within the global context with the aim to employ this knowledge in this particular research that has a local context, Muscat and Oman. The following thoughts are the researcher's impression about the presented literature and where he pinpoints its impact or influence on this particular study.

Firstly, it is undoubtedly clear that sustainability, as a term, is widely used for different means and interpretations. The definition of sustainability is a challenge for more mature research streams and for the wider urban development experts and specialists. This will be addressed in this research, and will be reported in section 9.2.

Secondly, sustainability has different dimensions and focus for various regions and within various research disciplines. For instance, the dimensions of sustainability in the urban form and city scale are somewhat different from the built environment and building scale. It is also different from the environmental dimension. The European focus on sustainability, closely knit around climate change and renewable energy, is different from the developing countries focus, mainly on development, growth and provision of basic human needs. It will also be visible in later stages how this compares with the sustainability focus in Oman, and the dimensions that are contained within its overall urban or development strategy.

Thirdly, sustainability has deep historical roots, and various examples were shown of how it was propagated and brought into the global realm and public attention. Nevertheless, it is evident that the road to sustainability or its approach was continuously revolving around varying objectives and targets, and the results that were celebrated were of different magnitude and scale. In other words, the shape of what sustainability constitutes are quite different and many, and therefore it is not easy to ascertain which of these sustainable measures are engineered, intentional or successful.

Fourthly, the general literature does not contain much attention towards sustainability strategies or assessment of their implementation, which will be one of this particular research questions. This may be attributed to the fact that, in many occasions, sustainability initiatives were carried out through projects, treaties or regulations, as clearly articulated in the previous sections. It is rare to find a national strategy for sustainability or an assessment of its implementation.

In addition, it is hard to identify how regional differences impact sustainability definition, dimensions or implementation. Moreover, there is not much research carried out to identify the drivers for sustainability for particular regions or local environments, or what may be the barriers in its execution.

3.9. GAP IN KNOWLEDGE

In view of the above literature review on the general topics of sustainability, urbanism and urban sustainability, the following key gaps in knowledge emerge:

1. **The gap of definition:** recalling (Willis, 2005) argument that “a prerequisite to achieving sustainable urban form is knowing what it is”. More precisely for this research, one cannot assume that the Omani version or interpretation of sustainability or urban sustainability is aligned to the global definition, which by itself is not concrete. For instance, one cannot assume that climate change is the other face of sustainability in Oman’s version, or that development in the European sense has the same meaning for Oman, a country that has only started development in 1970 and that is still building its infrastructure, which is far from complete according to the society’s expectation or needs.

2. **The gap of *methodology*:** if we were successful in defining what a sustainable city is, we are more likely to face the dilemma of identifying how we can achieve it. Moreover, which particular method obtains the results that are sought? For instance, do we focus on exciting the social conscious for striving towards urban sustainability? or should we start with the authorities first to set the ground rules and what can be achieved, in order to lead by example?
3. **The gap of *scope* – which urban sustainability *dimensions*?** It is clear from the above literature review that there is a wide debate on what sustainability constitutes, and that it definitely is not limited within the traditional triangular approach of society, economy and environment. Moreover, there does seem to be a disconnection between dimensions of sustainability and the dimensions for urban sustainability. Obviously the two need different lenses and a different angle, and for sure urban sustainability needs a different focus as the results it aims for will end up in some sort of a physical form, which is not necessarily the same results for sustainability. What should be addressed in the quest for urban sustainability and what should be left out? What is the threshold or scale between what can be claimed urban (city) and what is definitely architectural (building)?
4. **The gap in *decision making*:** the above literature review clearly stimulates the essence of the political will and policy making in addressing various aspects of sustainability, and this has also been viewed when reflecting on lessons from Europe or the Middle East. For instance, (Syrian, 2009) argue that “the highly centralized government system is now generating risks for future urban development, such as centralized patterns of priority setting, decision-making, and fund allocation on which all kind of implementation measures depend”.
5. **The gap between *strategy and implementation*:** from the list of gaps identified here, this particular one is genuinely lacked in literature, and there is very little written about it within the context of sustainability. There is not much research surrounding development of sustainable strategies, their challenges or barriers and how they impact the achievement of the objectives set forth. Moreover, there is not much literature to

determine how successful strategies and policies enforced have been in the attainment of sustainability goals.

6. **The gap of measurement:** Although urban sustainability indicators have been commonly utilized as the performance measure for communicating the status of the practice, they have not always been conclusive, comprehensive or transferrable to other context. This may be because different practices use different sets of indicators according to their particular needs, and they are usually developed under different methods. However, “whilst there are cases where urban sustainability indicators are effectively in use, the experiences gained from each practice have not been shared and used for the development of new urban development plans and for improving the decision-making process in the selection of indicators” (Shen et al., 2011).

3.10. CHAPTER SUMMARY

This chapter includes the literature review around the topics of sustainability, urbanism and urban sustainability. It provides a review on the origins of these topics, along with various definitions of each that are commonly cited in the literature. It focuses specifically on urban sustainability and the development of the city, along with review of common challenges and barriers. The discussion also focuses on lessons learned from history, European cities and case studies from the Middle East. The main benefit of this chapter is the identification of six key gaps in knowledge: gap in definition, gap of methodology, gap of scope, gap in decision making, gap between strategy and implementation, and gap of measurement. This will be the focus of this research and will drive the selection of the research aims, objectives and questions that will be identified in Chapter 4.

CHAPTER 4: THE RESEARCH METHODOLOGY

4.1. OVERVIEW

Emerging concerns about sustainability are apparent in a number of societal sectors, including the political and economic sectors, universities, and the public at large. This growing interest is driven by widespread dissemination of the fact that a growing world population and the depletion of natural resources are threatening our sustainability, and by such visible phenomena as increasing oil and grain prices. Reflecting this interest and concerns, sustainability science is becoming a distinctive research field (Clark and Dickson, 2003; Komiyama and Takeuchi, 2006; Kates et al., 2001; Kajikawa, 2008; Vucetich and Nelson, 2010; Wiek et al., 2011). The multidisciplinary, interdisciplinary, and trans-disciplinary characteristics of sustainability have been emphasized repeatedly (Komiyama and Takeuchi, 2006; Development, 1999; Perrings, 2007; Kajikawa, 2008).

Having identified the gap in the knowledge regarding urban sustainability from within the review of the local context (Chapter 2) and the global context (Chapter 3), this chapter will identify the aims, objectives and research questions along with the research methods that will be employed to carry out this research to cover up this gap. It provides insight into the structure of this research and its research framework. The research is developed through a combination of research methodologies (qualitative and quantitative) and using different analysis tools.

4.2. RESEARCH STRATEGY

To offer a general plan for research and to ensure that research questions are answered using appropriate methodologies, it is important to highlight the “research strategy”. The applied strategy determines the type of findings that can result from the research.

In this research, different strategies at different stages of the research were applied. The nature of the design of this research can be called a *multi-strategy research* (Morse, 2003), (Creswell,

2012), (Johnson and Onwuegbuzie, 2004), (Creswell and Clark, 2007) where each method complements and builds on the strength of the other. The researcher applied a mixed method study (Leech and Onwuegbuzie, 2009) (Creswell, 2013, Tashakkori and Teddlie, 2003, Teddlie, 2009, Johnson et al., 2007) which attempts to bring data from qualitative and quantitative methods. To achieve the objective of the research study, there are two different broad methodological approaches to select, which are: qualitative approach and quantitative approach. Throughout the design of this research, the researcher considered the different aspects of multi-strategy approach such as the sequence of the research methods data collection that were used either simultaneously or sequentially (Morse, 1994, Morse, 1991) and the priority of the used method (Morse, 1991). Figure 4.1 illustrates the integration of data in mixed methods research.

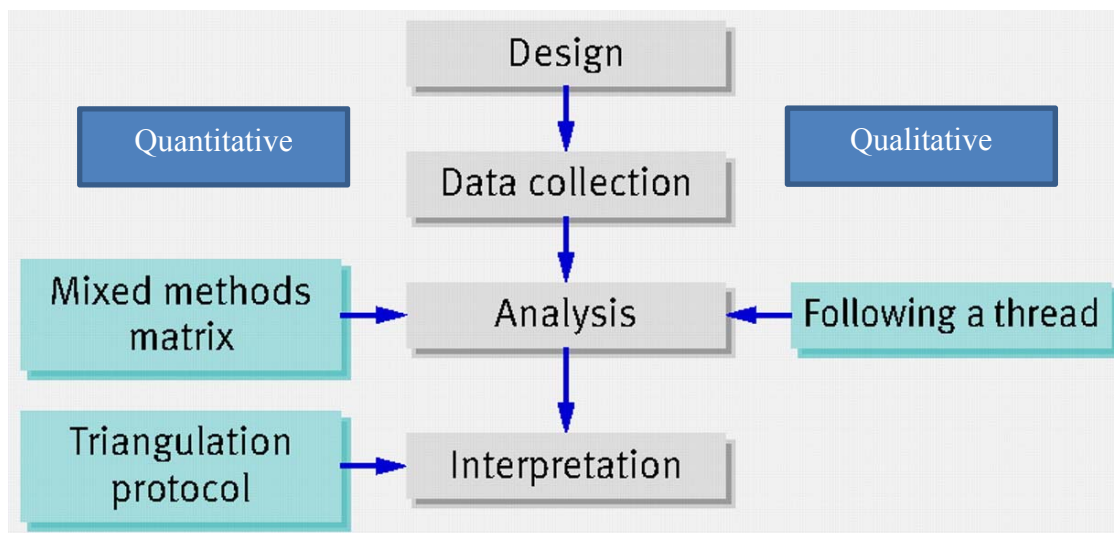


Figure 4.1: integrating data in mixed methods research(O'Cathain et al., 2010)

4.3. RESEARCH DESIGN

According to (Frankfort-Nachmias and Nachmias, 2007):

A research design is a program that guides the investigator in the process of collecting, analysing and interpreting observations. It is a logical model of proof that allows the researcher to draw inferences concerning casual relations among the variables under investigation. The research design also defines the domain of generalizability, that is, whether the obtained interpretation can be generalized to a larger population or to a different situation.

(Trochim, 2006) sees a research design as the structure of a research project, as the ‘glue’ that holds together all of the elements in a research project. (Baines and Chansarkar, 2002) state that every research is unique and has its own objectives and can be tackled in different ways, but it should utilize the best and suitable research methods to achieve its objectives.

Figure 4.2 shows a general picture about the research methodology. The knowledge phase (problem analysis phase) will be presented in Chapter 7. The process analysis phase will be presented in Chapter 8. All will be built around the framework of USDs, which will be covered in Chapter 6. A detailed description is given within the next subsections.

METHODOLOGY FRAMEWORK

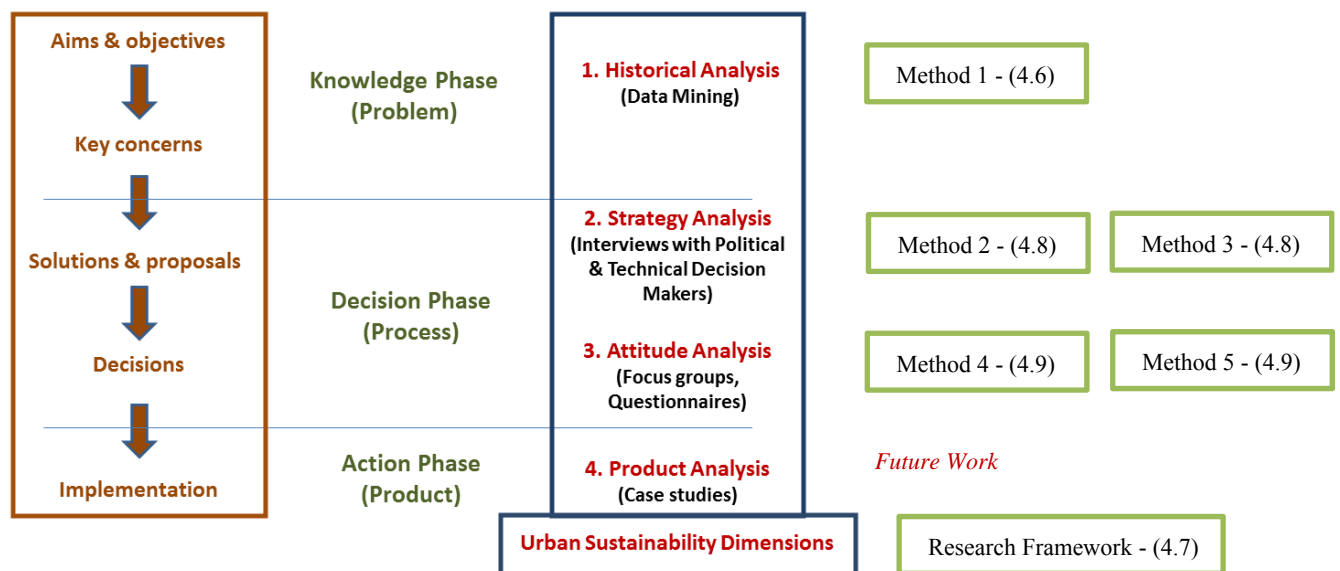


Figure 4.2: Research Methodology Framework

4.3.1. Qualitative research

Qualitative research investigates data from direct fieldwork observations (Patton, 2005). Patton discusses how qualitative researchers engage in naturalistic inquiry, studying real-world settings inductively to generate rich narrative descriptions and construct case studies. Qualitative research concentrates on the acquisition of data relating to experiences, feelings and judgment. Such data are gathered from people directly involved in the environment under investigation, whether subjects or observers (Bryman, 2006). The core of qualitative analysis lies in the related

processes of describing phenomena, classifying it, and seeing how the concepts interconnect (Dey, 1993, Dey, 2003) as illustrated in Figure 4.3.

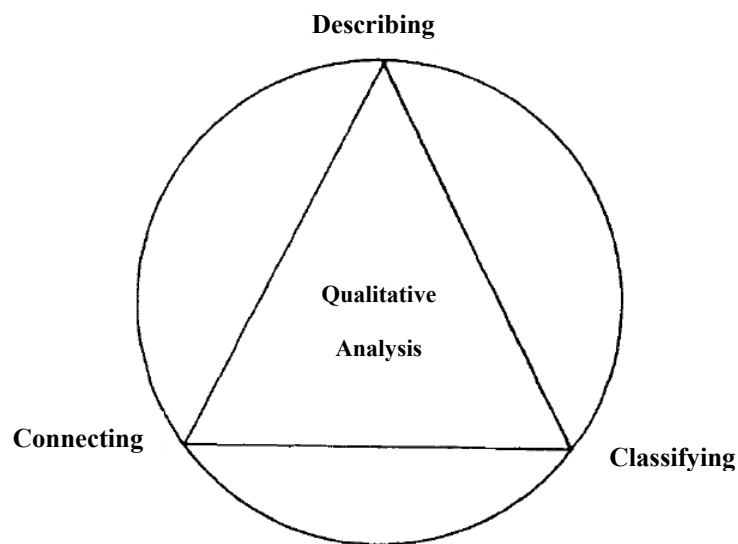


Figure 4.3 Qualitative analysis as a circular process (Qualitative data analysis by Ian Dey 1993)

Qualitative methods may be most simply defined as the techniques associated with gathering, analysis, interpretation, and presentation of *narrative* information. Many qualitatively oriented researchers subscribe to a worldview known as *constructivism* and its variants (Teddle, 2009 Creswell, 2013, Glaser, 2002, Flick, 2009).

Constructivists believe that researchers individually and collectively construct the meaning of the phenomena under investigation. Answers to qualitative research questions are *narrative* in form. Qualitative data analysis is the analysis of narrative data using a variety of different inductive and iterative techniques, including categorical strategies and contextualizing (holistic) strategies. Because these strategies typically result in themes, qualitative data analysis is also referred to as *thematic* analysis (Teddle, 2009).

4.3.2. Quantitative research

Quantitative research is a method of data collection aimed at gathering information, which can be quantified. When represented as set units, the data may be easily compared and analysed statistically. The units or scales of data must be created appropriately and, when collected, may

then be analysed easily. The ease of comparing data in this way enables vital patterns to be seen and provides data for further research (Bryman, 2006).

Quantitative methods may be most simply and parsimoniously defined as the techniques associated with gathering, analysis, interpretation, and presentation of *numerical* information (Teddlie, 2009). Quantitative researchers originally subscribed to the tenets of *positivism* – the view that “social research should adopt scientific method, which this method is exemplified in the work of modern physicists, and that it consists of the rigorous testing of hypotheses by means of data that take the form of quantitative measurements” (Atkinson and Hammersley, 1994).

4.3.3. Mixed methods

It is about integrating methods and can be defined as the application of two or more methods of data collection in the study of some aspects of human behaviour (Creswell, 2013, Tashakkori and Teddlie, 2003, Teddlie, 2009, Johnson et al., 2007).

In mixed methods studies, the researcher intentionally integrate or combine quantitative and qualitative data rather than keeping them separate. The basic concept is that integration of quantitative and qualitative data maximizes the strengths and minimizes the weaknesses of each type of data. This idea of integration separates current views of mixed methods from older perspectives in which investigators collected both forms of data, but kept them separate or casually combined them rather than using systematic integrative procedures. One of the most difficult challenges is how to integrate different forms of data. Three approaches have been discussed in the literature: merging data, connecting data, and embedding data (Creswell and Clark, 2010).

There are many reasons why mixed methods were employed in this particular research project:

- To view problems from multiple perspectives: to enhance and enrich the meaning of a singular perspective that might have been obtained from otherwise one method.
- To contextualize information: to take a macro picture of the actual issue in urban sustainability in Oman and add in information about individuals' assessment, behaviour and attitude of the current scenario of urban development in Oman.

- To develop a complementary picture: to compare, validate, or triangulate the collected data and results such as obtaining data around a certain topic through interviews, focus groups or public questionnaires.
- To provide illustrations of context for trends: which can only be done by gathering qualitative data (such as in interviews) and comparing this against trends for a particular aspect (that can be quantified from within the public questionnaires).
- To strengthen the reliability and validity of the study: to overcome problems of bias and validity and to overcome the deficiencies of any one method by combining methods and thus capitalizing on their individual strengths to an extent that each method reveals different aspects of empirical reality.

Stages in data analysis:

(Wellington and Szczerbinski, 2007) identify the following stages in data analysis:

1. *Immersion*: getting an overall sense or feel for the data.
2. *Reflecting*: “stand back” from the data or to “sleep on it”.
3. *Taking apart / analyzing data*: de-contextualization
 - a) Carrying it up into manageable ‘units’ or chunks
 - b) Selecting or filtering out units which can be used
 - c) Categorizing or coding units
 - d) Attempting to subsume subsequent units of data under these provisional categories
4. *Recombining / synthesizing data*: re-contextualization
 - a) Searching for patterns, themes, and regularities
 - b) Looking for contrasts, paradoxes and irregularities
5. *Relating and locating your data*: involves the use of constant comparison and contrast (categories, methods, themes)
6. *Knowing when to stop*
7. *Presenting qualitative data*

The question that should be asked after the above description of the stages of data analysis is how do we analyze the data? (Wellington and Szczerbinski, 2007) responds as follows:

1. The categories used to analyze data are pre-established (if they are derived from the literature – sometimes called *priori*): this is covered under section 4.8 which sets out the framework of USDs, which can be considered as categories.
2. The categories used to analyze data are not pre-established but are derived from the data themselves (called *posteriori*).
3. Some categories are pre-established while others are derived from the data.

All of these stages will be apparent throughout the remainder of this report on methodological design as well as in the remaining chapters that will present the results, and their interpretation.

4.4. REVIEW OF THESIS STATEMENT

The research framework is employed to prove the following thesis statement:

Urban sustainability in Oman for the next forty years may better be driven by comprehending the history of its urban development over the past forty years, with emphasis on ascertaining the decision making process with lessons from urban development strategies coupled with implementation consequences. This can only be possible by dissecting the relevant urban sustainability dimensions (USD) suitable for this context.

4.5. RESEARCH AIMS, OBJECTIVES AND QUESTIONS

Research questions guide investigations and are concerned with unknown aspects of a phenomenon of interest (Creswell, 2013, Creswell, 1994, Teddlie, 2009). Determining the research questions is an extremely important step in both the quantitative research process and the qualitative research process because these questions narrow the research objective and research purpose to specific questions that researchers attempt to address in their studies (Onwuegbuzie and Leech, 2006). Moreover, research questions in mixed methods studies are vitally important because they, in large part, dictate the type of research design used, the sample

size and sampling scheme employed, and the type of instruments administered as well as the data analysis techniques (Onwuegbuzie and Leech, 2006).

This section outlines the identified aims, objectives and questions for this research. (Silverman, 2010) has advocated that the research questions should have the following three features:

1. *Answerability*: this is regarding the data required to answer the questions, and how the data will be collected.
2. *Interconnectedness*: the meaningful connection among the questions.
3. *Substantively relevant*: that the questions are interesting and worthwhile, justifying the investment of time and effort.

Rather than repeating them again in this section, the list of aims, objectives and research questions can be reviewed in section 1.4.

4.6. RESEARCH METHOD 1: ANALYSIS OF OMAN URBAN DEVELOPMENT HISTORY (QUALITATIVE)

This research method is a direct response to Aim 1 as covered in section 4.6.1. This section contains narrative of the purpose of this method, how the resources are documented and recorded in a database, and statistics on the data collected. Chapter 5 is dedicated for the elaboration on the literature review as well as the analysis of the history of urban development in Oman.

4.6.1.Preparation of the instrument

It was clear from the outset that the amount of data collected would require a database that would collate all of the literature resources and references. This was done initially using *Microsoft Excel*, but then redeveloped using *Microsoft Access*. Figure 4.4, shows a snapshot of the database in its final version. The software utilized, Microsoft Access, allows the generation of custom made reports, which the researcher can utilize in his analysis, as covered in the resources and data collection section that follows.

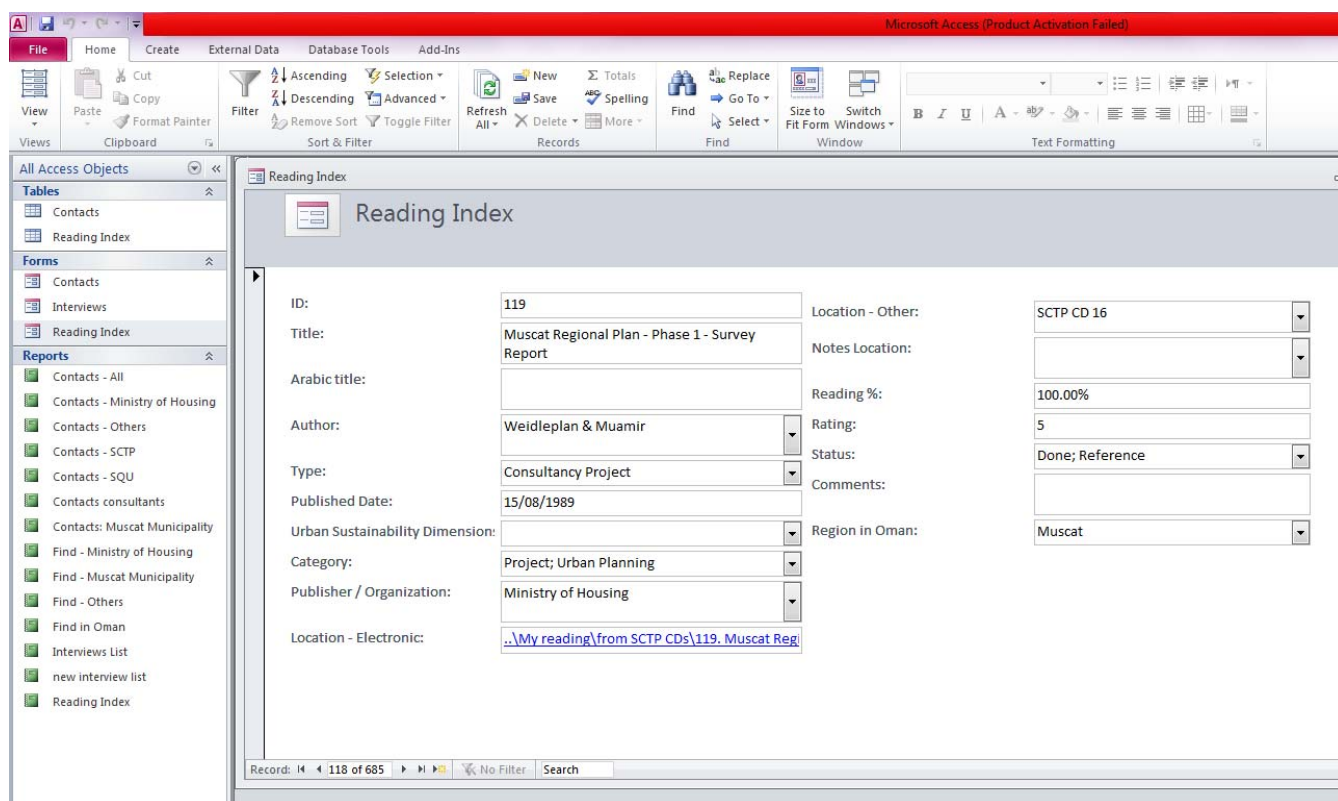


Figure 4.4 Snapshot of the Reading Index

4.6.2. Resources and data collection

The latest version of the *reading database* included **687** records. The following statistics are useful in understanding the type of resources gathered in this database; note that this is only example of the main types of references tabulated and not the whole:

Books: 21 references

Conferences: 46

Consultancy projects: 256

Journals: 22

Official reports: 60

Project reports: 74

Thesis: 11

Total references about Oman: 411

Table 4.1 provides a glimpse into the different periods associated with this study, and the volume of references collected for each period. Moreover, they show the quality of these references by tabulating the number of resources within each period that are rated 5 (very good) and 4 (good) within a scale of 1 to 5.

Period	Total	Rated 5	Rated 4
Before 1969	3	1	0
1970-1979	24	8	2
1980-1989	127	19	11
1990-1999	234	22	8
2000-2009	174	26	28
2010 and beyond	58	4	15
Not dated	67	5	7
<i>Total</i>	687	85	71

Table 4.1 Matrix from the reading index comparing period and rating

4.7. THE RESEARCH FRAMEWORK/AGENDA: URBAN SUSTAINABILITY DIMENSIONS (USD)

This research requires a framework that will guide its development and execution, as well as the analysis and discussion of its results. Moreover, this framework could be identified as the *agenda* for addressing urban sustainability in Oman. The researcher has opted to employ *urban sustainability dimensions* instead of *urban sustainability indicators*, and this will be justified in chapter 6. This framework is a response to aim 2 as discussed in section 4.6.2 above.

This section will amplify the different stages for identifying and selecting these USDs. They are as follows:

- Stage 1: investigating USD in general literature
- Stage 2: investigating USD themes in Oman town planning key concerns (1970 to 2010)
- Stage 3: investigating USD themes in Oman town planning aims and objectives (1970 to 2010)
- Stage 4: matrix analysis of Stage 1-3, and selection of USD, as well as sub-dimensions.
- Stage 5: providing definitions for each selected USD, as well as sub-dimensions.

It is clear that, among the stages mentioned above, stage 1 corresponds to a great extent to the literature review conducted in Chapter 3, and stages 2 and 3 correspond to Chapter 5 concerning

the history of urban development in Oman. Therefore, and following a logical order, Chapter 6 is dedicated to illustrate the process, and to provide a comprehensive and logical approach for the selection of USDs that are specifically suitable for the research context, Oman.

Nevertheless, it is important here to inform the reader, in advance, about the selected USDs and sub-USDs, as they are crucial in following up the remaining research methods that will be discussed in the following sections. The list is shown below in Table 4.2.

No.	USD	No.	Sub-USD
1	Urban Planning	1.1.	Settlement Patterns
		1.2.	Urban Design
		1.3.	Land Use
2	Urban Services	2.1	Housing
		2.2	Energy (Electricity)
		2.3	Water
		2.4	Municipal Services
3	Urban Economy	3.1	Economic Development
4	Urban Environment	4.1	Environmental Protection
		4.2	Climate Change
5	Urban Society	5.1	Public Participation
		5.2	Social Equity
6	Urban Mobility	6.1	Urban Transport
7	Urban Management	7.1	Urban Development Management
8	Urban Quality	8.1	Urban Quality
9	Urban Resources	9.1	Land Resources
		9.2	Resource Management

Table 4.2 List of selected USDs and sub-USDs

4.8. RESEARCH METHOD 2 & 3: SEMI-STRUCTURED INTERVIEWS & FOCUS GROUPS (QUALITATIVE)

4.8.1. Purpose

These research methods covers aim 3, 4 and 5 identified early. They focus on discussing the strategies and their implementation, as well as providing informed and technical recommendations towards improving urban sustainability in Oman. Qualitative accounts and voices are crucial in understand the participants' human factors such as attitude, which is often necessary in social science and educational research (Patton, 1990, Miles and Huberman, 1994).

(Sommer and Sommer, 1992) argue that, during interviews, a person may reveal both manifest and latent content. The *manifest content* is that which is obvious and conveyed in the spoken information of the interview (refers to what the person says). The *latent content* indicates what the person means. Furthermore, they describe three main types of interviews:

1. *Unstructured interviews*: their main goals are to explore all the alternatives in order to pick up information, to define areas of importance that might not have been thought of ahead of time, and to allow the respondent to take the lead to a greater extent.
2. *Structured interviews*: the questions are formulated beforehand and asked in a set order and in a specified manner for consistency, and the questions may be open-ended.
3. *Semi-structured interviews*: where all respondents are asked the same questions, but the order in which they are asked differs from one person to the next.

(Gilham, 2001) stresses that the overpoweringly positive feature of the interview is the richness and vividness of the material it turns up. Questions that are distinct will throw up material which is distinctive in its content and this greatly eases the task of analysis.

Focus group is a type of group interview designed to explore what a specific set of people think and feel about a topic. It is useful for clarifying the meaning of images, words or products and locating points of concern, disagreement or ambiguity. The group size usually ranges from eight to twelve, and has been pioneered in the 1940s by sociologists at Columbia University (Sommer

and Sommer, 1992). They argue that there are two types of focus groups: *exploratory* (what issues are important) and *confirmatory* (find the response of people). The benefit of the focus group is that it can produce stimulating discussions that reveal perceptions and concerns that might go undetected in a survey and is more efficient than individual interviews. However, the downside of this is that proceedings may be difficult to summarize, and the complex issues cannot be explored with individuals to the same degree than is possible in an interview. The researcher believes that the use of focus groups can supplement the other method, such as interviews. .

4.8.2. Targeted Participants and their selection

In the same way that the previous research method required a *reading index* database to record its references and resources, both of these research methods have also benefitted from a similar tool, the *Contacts Database*. Likewise, this was done in *Microsoft Access*, and the main elements of it are: ID, title, name, organization, job title, type (political, government, consultant, researcher, etc.), address and contact details, and details about the interview.

The screenshot displays the Microsoft Access interface for a database named 'Contacts'. The ribbon at the top includes tabs for File, Home, Create, External Data, Database Tools, and Add-Ins. The 'Database Tools' tab is active, showing options like Filter, Sort & Filter, Records, Find, and Text Formatting. The left-hand 'Navigation Pane' lists 'All Access Objects' categorized into Tables (Contacts, Reading Index), Forms (Contacts, Interviews, Reading Index), and Reports (Contacts - All, Contacts - Ministry of Housing, Contacts - Others, Contacts - SCTP, Contacts - SQU, Contacts consultants, Contacts: Muscat Municipality, Find - Ministry of Housing, Find - Muscat Municipality, Find - Others, Find in Oman, Interviews List, new interview list, Reading Index). The main window shows a data entry form for 'Contacts' with the following fields:

- ID: (New)
- Title: [Dropdown]
- Name: [Text]
- Organization: [Dropdown]
- Job Title: [Text]
- Type: [Dropdown]
- Address: [Text]
- Telephone: [Text]
- Mobile: [Text]
- Fax: [Text]
- Email: [Text]
- Comments: [Text]
- Qualification: [Dropdown]
- Field: [Dropdown]
- Link: [Text]
- Status: [Text]
- Meeting: [Dropdown]
- Interview Code: [Text]
- Interview Date: [Text]
- Interview Duration: [Text]
- Interview Mode: [Dropdown]
- Quick Survey: [Dropdown]
- Pages (Word): [Text]
- Words: [Text]
- Pages (hand written): [Text]

Figure 4.5 Snapshot from the contacts database

Figure 4.5 shows a snapshot of this database. In total, the database, in its final version, contained **167** records. These were collected through various means:

- *From literature review*: as gathered in the literature database, discussed above in section 4.7, regarding the resources gathered to analyse the history of urban development in Oman.
- *From initial interviews with specialists in this field*: this was at the early stages of this research project where the researcher was able to gather a list of people with relevant experience in this field.
- *During the actual interviews*: some participants provided their recommendations to interview other people who they thought had played a significant role in urban development in Oman.

It was deemed that the recorded list of potential interviewees identified in this record, totally 167, had played significant role in urban development decision making, or have knowledge to provide reasonable assessment and recommendations on its discourse and potential for urban sustainability in the future. As such, the researcher approached this task of conducting interviews by setting up a period of time in Oman, approximately 6 weeks, to conduct these interviews. Contact was established with many of these potential candidates with the intention of targeting members from various organizations and those that have played a role throughout the period of the study (i.e. not only current employees of these organizations). Figure 4.6 that follows in the next page illustrates the period during which each interviewee had been in the position of decision making or had played his role in the field of urban planning (for the academics or consultants). Furthermore, *Appendix K* provides more details about the participant's profile, in terms of qualification and experience.

On the other hand, the selection of the participants in the focus groups was attempted to represent a random selection, and the candidates were not associated with urban planning so they are not considered specialists. This was somewhat challenging as the period allowed for conducting these focus group interviews was limited in duration, and therefore the selection was based on calling a focal person who was responsible of identifying the other participants in the

focus group. Eventually, the groups being called did not represent a particular set of people apart from one of the groups that contained 5 engineers who have knowledge in development projects, but no prior experience with urban planning. The other 3 groups were a mix of people working in various fields. I must admit that there is a limitation to this research method in that the participants in the focus group did not include general public, such as locals of various educational backgrounds, and may actually not be representative in terms of gender background as well. Therefore, there may be a reasonable argument that the knowledge obtained in this research method does not necessary provide a proper sample representation of the public and because of this, I decided to consider this research method as secondary in the final write-up and it is merely brought into the dissertation as support to other primary research methods. This will be further discussed in Chapter 10 under limitations in research methodology and the challenges.

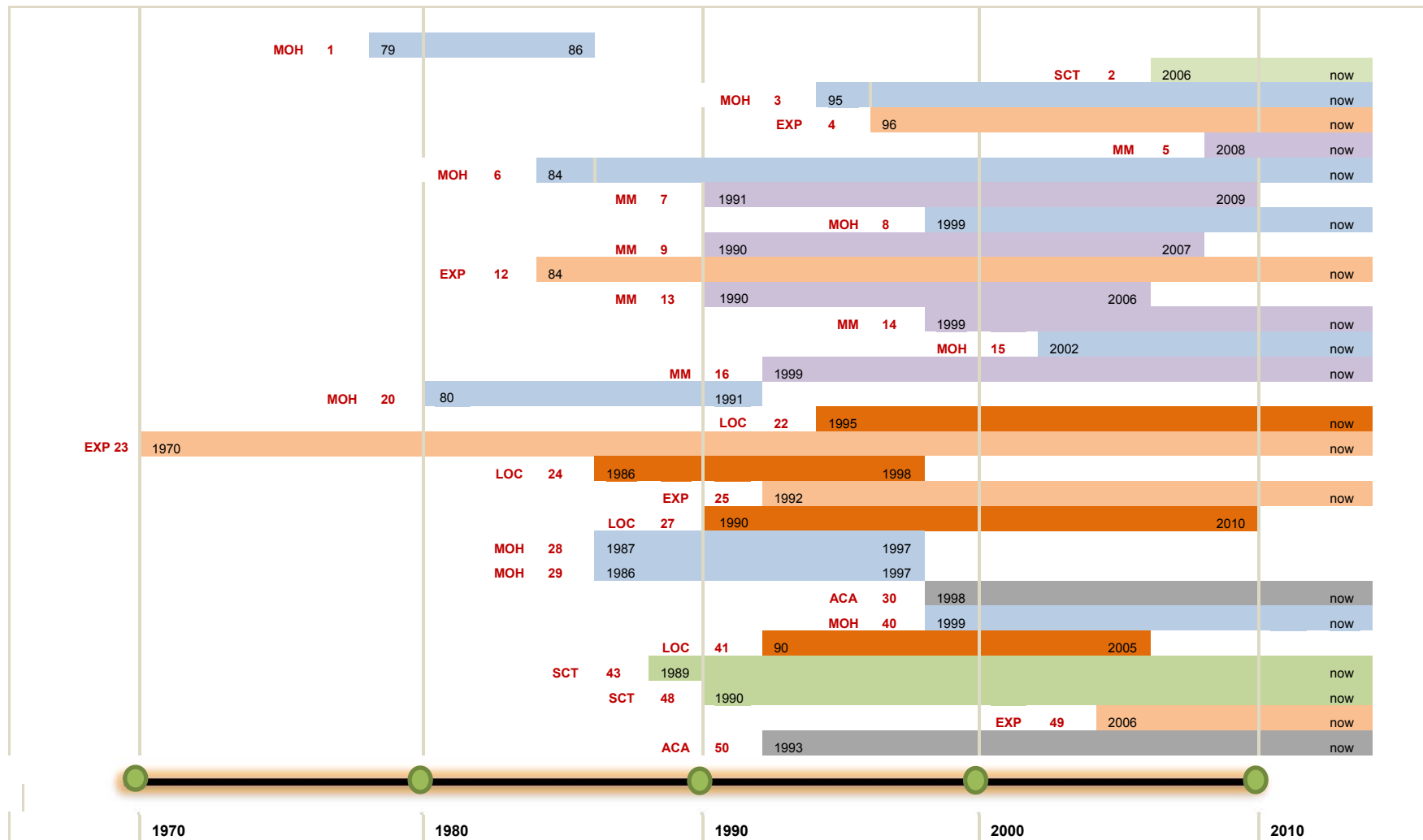


Figure 4.6 Interviewees profile and experience

4.8.3.Preparation of the instruments

This section will outline the tools that were used for both of these research methods, more specifically the database for identifying and organizing the questions. As stated earlier, the purpose of this method is to collect contemporary knowledge regarding urban development and urban sustainability in Oman, and to identify three elements that are critical (problems and challenges, factors and barriers, and recommendations), and each of them respectively corresponds to an era of the past, present, or future. The approach adopted was to focus on the 15 selected sub-USDs (as shown in table 4.2 above) and to design the interview questions in such a way as to gather feedback on those sub-USDs. Again, the researcher opted to create a database for these questions, so that it would be easier to pull out the appropriate questions for each interviewee target group.

The screenshot shows the Microsoft Access 'Questions' database form. The 'All Access Objects' pane on the left lists the following objects:

- Tables:** Indicators, Public Attitude questions, Questions, Type of Questions, USD
- Forms:** Public Attitude questions, Questions
- Reports:** Candidate Focus Groups, Candidate Muscat Municipality, Candidate Questions Electricity, Candidate Questions Housing, Candidate Questions SCTP, Candidate Questions SQU, Fillout Questions Electricity, Fillout Consultants, Fillout Questions Housing, Fillout Questions SCTP, Fillout Questions SQU, New Focus Groups, New Questions consultants, New Questions Electricity, New Questions Housing, New Questions Muscat Municipality

The main form area contains the following fields:

- Number: [Text Box]
- Field1: [Dropdown Menu: Urban Planning]
- Indicator: [Dropdown Menu: Settlement Patterns]
- Type of Questions: [Dropdown Menu: Strategy / Implementation (Past)]
- Questions: [Text Box: What are the main strategies that control urban settlement patterns in Muscat?]
- Arabic: [Text Box: ما هي الاستراتيجيات الرئيسية التي تتحكم في أنماط الاستيطان في المناطق الحضرية في مسقط؟]
- Prompt: [Text Box: urban growth and urban sprawl]
- Key concerns: [Text Box: dispersed population; linear urban development; dispersal of urban functions; ribbon development; Urban Sprawl, growth & physical expansion]
- Aims_Objectives: [Text Box: Development of a distinct centrality pattern; Connecting urban settlements]
- Strategy: [Text Box: Muscat City Plan (1973, Makiya Assoc., John R. Harris), Greater Muttrah Plan (1972, VIAK), Muscat Struct. Plan 1977 (Llewelyn - Davies), CASP 1982, Muscat Area Structure]
- Interview technical: [Dropdown Menu: Ministry of Housing; SCTP]
- Interview Political: [Dropdown Menu: H.E. Munir bin Baqir al Moosawi (SCTP); H.E. Saleh Al Farsi (Housing); H.E. Sultan bin]
- Attitude Questions: [Dropdown Menu]
- Status: [Dropdown Menu: Done]

Figure 4.7 Snapshot from the Questions database

A snapshot of the *Questions database* is shown in figure 4.7. This database contains the following 4 key segments:

A: Question Type:

- **ID number**
- **USD:** e.g. *Urban Environment*
- **Indicator:** sub-USD: e.g. *Environmental Protection*
- **Type of question:** 4 types were utilized:
 - o Strategy / Implementation (past)
 - o Performance (current)
 - o Barriers / drivers (current)
 - o Recommendations (Future)

B: Question:

- **Question:** The final version of the question.
- **Arabic:** the translation of the question into Arabic.

C: Supporting Material:

- **Prompt:** This would be used to support the researcher in explaining the elements associated with this question.
- **Key Concerns:** This is a result from the history of Urban Development in Oman literature review, Chapter 5, which indicates any key concerns that were relevant to this USD.
- **Aims & objectives:** as in Chapter 5
- **Strategy:** as in Chapter 5

D: Target Group: Category for which this question is applicable.

Appendix E provides the final list of questions for interviews, and Appendix H provides the final list of questions used for focus groups.

4.8.4. Results Analysis

(Sommer and Sommer, 1992) narrate the following method for analysing the interview results:

1. *Transcription:* refers to putting the responses into clear form for data analysis, such as transcribing answers from a tape recorder, and recopying handwritten notes that contain symbols and abbreviations.

2. *Quantification*: tabulating the results in numerical form.
3. *Coding*: is the process by which lengthy answers are reduced and sorted into specific response categories.
4. *Reporting interview results*:
 - a. The most clear, significant results should be described first.
 - b. Areas of less agreement and importance comes next
 - c. Trivial or irrelevant findings should be ignored or placed in an appendix.

4.9. RESEARCH METHOD 4 & 5: QUICK SURVEYS AND PUBLIC QUESTIONNAIRES (QUANTITATIVE)

4.9.1. Purpose

These methods respond to aim 3 and aim 4. However, they are quantitative methods, and therefore do not collect much data regarding the strategies or how they were implemented, especially in the case of the general public who are obviously far disconnected from such activities. The sections that follow detail the contents of these quick surveys and questionnaires.

4.9.2. Preparation of the instruments

The aim of these research methods is to understand decision makers' and citizen's visions and attitudes towards urban sustainability. This was conducted using *quick surveys* that were handed out to the participants in these interviews, and evaluated statistically. The same *Questions Database* was employed again for this purpose, as illustrated in figure 4.6 above. The questions for the *quick survey* were embedded in the same database for the *public questionnaire*. In total, there were 73 questions developed for both the quick survey and public questionnaires, but only 18 questions from them were utilized for the quick survey. The same quick survey was used for the participants in the semi-structured interviews and the focus groups, which means that there were 57 quick surveys that were collected in total, and they can be viewed in Appendix F. 63 questions were dedicated to the public questionnaire, and they can be viewed in Appendix G.

4.10. RESEARCH TRIANGULATION

In mixed method research, data are collected and analyzed separately for each part to produce two sets of findings. When the researcher attempts to combine these findings, this process is called *triangulation* (O’Cathain et al., 2010). The term *triangulation* describes a process of studying a problem using different methods to gain a more complete picture. This technique involves producing a “convergence coding matrix” which displays findings emerging from each method to support any argument. This is presented in a format that articulates agreement, partial agreement, silence or conflict between these findings from different methods. This triangulation approach builds on the findings from one particular method and supplement it with another set of data obtained through another method which helps to identify themes and trends of any particular subject.

Table 4.3 summarizes the research questions in relation to the objectives and aims they are related to. Furthermore, the table identifies the type of research method used to answer each of these questions, and gives a reference to the chapter where these questions will be encountered and resolved. There is a clear interrelationship between each of these research questions, and this is evident in the natural progression of tackling them in subsequent chapters. This will hopefully make a smooth narrative approach to the text, and a comprehensible flow of the content of these chapters.

	Research Questions	Objective	Aim	Method	Chapter
1	What are the key milestones (strategies, projects, policies) in urban development of Oman?	1	1	Oman Urban Literature Review	Ch 5
2	Who are the key players throughout the history of urban development of Oman (organizations, individuals)?	1	1	Oman Urban Literature	Ch 5
3	How has Urban Development strategy and implementation since 1970 led to current problems and issues?	1	1	Oman Urban Literature	Ch 5
4	What are the key urban sustainability dimensions that are relevant to the context and history of	2	2	Oman Urban Literature + global literature	Ch 6

	Oman?					
5	What are the main problems and challenges associated with urban development in Muscat?	3	3	Oman Literature Interviews Focus Groups Questionnaires	Urban	Ch 7
6	What are the main factors and barriers that control the sustainable growth of Muscat?	3	3	Oman Literature Interviews Focus Groups Questionnaires	Urban	Ch 7
7	What are the contemporary sustainable strategies and the attitudes and agendas of stakeholders?	3	3	Oman Literature Interviews Focus Groups Questionnaires	Urban	Ch 7
8	How have strategies been implemented in Muscat existing town developments?	4	4	Oman Literature Interviews	Urban	Ch 8
9	What are the problems and successes in the implementation of these strategies?	4	4	Oman Literature Interviews	Urban	Ch 8
10	How can urban planning processes be improved to provide a sustainable urban future?	5	5	Oman Literature Interviews Focus Groups Questionnaires	Urban	Ch 9
11	What are the lessons that can be used for better implementation of the upcoming urban development strategies (such as Oman National Spatial Strategy)?	5	5	Oman Literature Interviews Focus Groups Questionnaires	Urban	Ch 9

Table 4.3 Research Triangulation and how they are reported within the chapters

There are certain criteria that were employed during the data gathering (using the various methods identified above) and during the data interpretation (using the various tools such as NVivo and SPSS). These may be best described as follows:

- Anchoring around certain categories: The set-out of the USD framework was essential to provide categories for organizing the data gathering and subsequent discussions during interviews and focus groups. These USDs were a measure for anchoring the discussions

around specific dimensions and topics, and often there were sub-USDs or topics that emerged during the interviews without which the discussions would have run astray.

- Comparison and Cross-interrogation: the data was being gathered from various research methods (identified above) and from various types of participants (decision makers, consultants, public) which provided an opportunity for the research to cross-check the opinions, judgments or facts being presented against others obtained through different methods or participants. Throughout the interpretation stage, the researcher was able to bring such data into one location (within NVivo) and to compare the results. It was often possible to compare the data obtained from the participants against the text collected from the historical references, and sometimes against the statistical data obtained from the public questionnaires or the quick surveys. Such examples will be presented in later chapters.
- Obtaining the data from the relevant resource: Since it was possible to interview decision makers who were responsible for certain strategies or their implementation, it was possible to investigate the essence of the strategies actual history and fate, and this will be presented in Chapter 8. Occasionally, it was possible to presented to these decision makers the questions around a particular topic or the criticism that were provided by other participants (for example, comparing the results around the implementation of Muscat Regional Plan between those that were involved in that period and those that are currently in the decision making role).
- Comparing data from different categories of participants (different organizations, different disciplines): this became a powerful tool to segregate the opinions that were biased from an organization perception (for example, comparing the questions from SCTP participants versus Muscat Municipality participants).
- Gathering evidence and case studies: it was possible during the interpretation to capture evidence, facts, examples, or case studies of decision making that represent a certain approach being investigated or uncovered from within the responses gathered from various participants. This helped to connect threads of thoughts being uncovered from the

results and such organization of data made it easier to present such evidence throughout the written text.

- Selection of results to be reported in the end: the criteria was as follows:
 - o The most clear, significant results were picked up first, interrogated, and further investigation of how various research methods address them.
 - o Areas of less agreement and importance came next.
 - o Trivial or irrelevant findings were considered insignificant and occasionally ignored. They may become useful for future research or certain reports concerning a different research question or objective.
- Qualitative vs. quantitative data: this marriage was considered useful in outlining certain results that were presented through the participants and supplemented with a statistical result obtained from the public questionnaires and quick surveys. This was more applicable to attitudes, decision making and urban development problems (for example: plot distribution system and its implementation).

4.11. RESEARCH LIMITATIONS

I must admit that there are some limitations in this research methodology in the following aspects:

1. Focus group limitations: The participants in the focus group did not include general public, such as locals of various educational background. Therefore, there may be a reasonable argument that the knowledge obtained in this research method does not necessary provide a proper sample representation of the public and because of this, I decided to consider this research method as secondary in the final write-up and it is merely brought into the dissertation as support to other primary research methods.
2. Lack of female representation: this is applicable to both semi-structured interviews and focus group. For the interviews, less than 20% of the interviewees were female and this may be attributed to the fact that females are less dominant in this engineering field. The impact of this on the results or its interpretation is difficult to identify or to cater for.

3. The exclusion of tribal structure dimension: the Omani society is heavily dictated and influenced by an established tribal structure and hierarchy that impacts various aspects of life (politics, economic, social, etc.). There may be an argument that the tribe has an impact on urban planning or development, but the researcher has not identified this from the literature resources utilized in this research and it didn't creep up in the research methods conducted. To investigate this sufficiently, there may be a need to allow for other factors within the research method so that sufficient data is collected to understand it more in depth, and since this was not conducted or allowed for in the initial design of the research method, the researcher resolves to identify this as a possible future research work.
4. Semi-structured interviews: It may be questionable how to decipher when the interviewee would be providing his opinion to the set of questions presented during the interview that represents his individual opinion or his official opinion as a decision maker. Figure 4.6 identifies those interviewees who are still playing a decision making role in their organizations. Nevertheless, it would not be possible or practical to segregate the opinions being delivered throughout the interviews from being individual or official opinion, but I will attempt to identify those throughout the narration of the results to the extent possible.

4.12. CHAPTER SUMMARY

This chapter started with a detailed narrative of the research design and the employment of a mixed research methodology approach that combines the use of qualitative and quantitative research methods. The gap in knowledge identified earlier in chapter 2 and chapter 3 were recollected, and a research thesis statement was identified with its aims, objectives and research questions. In summary, there were 5 main aims summarized under the following titles: history of urban development in Oman, USD framework, Contemporary approaches in urban development in Oman, the gap between strategy and implementation, and finally the improved approach towards urban sustainability.

Five research methods were described in sufficient details showing the purpose of the method, how the instruments are prepared, the possible participants and management of the data. They include: analysis of historical literature, semi-structured interviews, focus groups, quick surveys and public questionnaires.

Chapter 5 will address the first research method concerned with the analysis of Oman's history of urban development and sustainability, which has been identified as a significant gap in knowledge. This will uncover a wealth of knowledge that has remained hidden as well as insight into the substantial array of strategies, milestones and projects that were put together to develop the urban environment of Oman's cities since 1970.

CHAPTER 5: HISTORY OF URBAN DEVELOPMENT AND SUSTAINABILITY IN OMAN

5.1. OVERVIEW

The main purpose of this chapter is to develop a comprehensive understanding of the history of urban development in Oman between 1970 and 2010, and to provide insights into strategic initiatives towards sustainability that have been proposed throughout this period. It addresses objective 1 and questions 1, 2 and 3 covered in section 1.4.

The rest of the chapter briefly discussed the development since 1970 which are followed by governance system (section 5.2); the hierarchy of urban planning (section 5.3); methodology for implementation of urban plans (section 5.4); key urban planning strategies (section 5.5); other strategies (section 5.6) and finally analysis and identification of trends (section 5.7).

5.1.1. THE MAIN OBJECTIVE OF THE POLICY FOR TOWN PLANNING

The most recent publication of this objective is located in (SCTP, 1991): “the general policy of urban planning aims specifically to create the necessary elements of the natural environment and conservation so as to be attractive and effective in the long run”. However, the root of this objective can be traced to the 3rd SCTP meeting held on 25/6/1986 where it was agreed that the general policy of urban planning aims specifically to “create and maintain the natural environment so as to be attractive and effective in the long run and give pleasure, and winning the consent of all citizens and increase their pride in their country” (SCTP, 1998).

(Oborn, 1982) narrates an earlier version of this objective in his thesis: “one of the targets that have been set for the *Town Planning Department* (TPD) is that it should “conduct town planning with the aim of improving the outlook of towns and villages”.

5.1.2.OMAN URBAN DEVELOPMENT AIMS AND OBJECTIVES

In 1975, *The First long term development strategy (1975-1995)* identified ten long-term development goals (SCTP, 2008b):

1. Working towards development of new resources for the national income beside the income from oil resources and replace it in the future
2. To increase investments directed towards income generating projects, especially in the areas of industry, mining, agriculture and fisheries
3. To emphasize on the development of national human resources capable of assuming its role in the Omani economy
4. To allocate investments among different regions, so that its benefits are shared equally by all the regions and citizens of the country. This will lead to the elimination of the less developed regions.
5. Supporting and development of present human settlement and their maintenance against the mass migration to densely populated centres.
6. Completion of the infrastructure.
7. Attention shall be given to water resources as it is vital element for the continuation of the economic activity and its development; and protection and maintenance of the environment.
8. Supporting domestic trading activities through removal of barriers related to transportation, storage and other obstacles which inhibit/complement the development of commercial markets. The aim is to increase the competitiveness and secure a reasonable level of commodity prices.
9. Completion of the constituents for national economy based on the private sector activity on the basis of free competition and through provision of loans for the vital projects in accordance with the available resources of the state.
10. Promotion of the efficiency of the state administrative apparatus.

The *Second long term development strategy (1996-2020) - Vision for Oman Economy* (as approved by Royal Decree no. 1/96), sets out new objectives, which are as follows (SCTP, 2008b) (Economy, 1996):

- 1) Developing human resources and upgrading the skills of Omani nationals to abreast of technological processes, to manage the dynamics of this progress in an efficient way, and face the ever-changing domestic and global conditions
- 2) Creating the conditions of stable macro-economic climate with the aim of developing a private sector capable of the optimal use of human and natural resources of the Sultanate, using methods characterized by efficiency and conservation of environment
- 3) Encouraging the establishment of an effective and competitive private sector, and consolidation of mechanisms and institutions that will enhance joint government private sector visions, strategies and policies
- 4) Enhancing the standard of living of the Omani citizens and working toward the reduction of inequality between regions and different income categories. The government will also ensure that all citizens reap the fruits of development process.
- 5) Preserving the gains achieved in the past 25 years, safeguarding and developing them, along with the completion of the necessary basic services.

Oman National Spatial Strategy (ONSS) by SCTP, floated in a tender in 2008, aimed at achieving the following (SCTP, 2008b):

1. Achieving more balanced regional development by enabling all urban and rural areas to reach their potential regardless of its size and location.
2. Better spread of job opportunities.
3. Safe and healthy environment.
4. Well educated and trained manpower.
5. Better quality of life.

5.1.3.OMAN URBAN PLANNING KEY CONCERNS

Oman National Spatial Strategy (ONSS) by SCTP has provided the most recognizable set of key concerns to urban development in Oman. These are listed below (SCTP, 2008b):

- 1) Inadequate or absence of land use and zoning plans, regulations and enforcement that meet sustainable development principles.
- 2) The outdating of existing spatial plans which resulted in inability to deal with the increasing demand for land from various resources.
- 3) Poor coordination between different governmental planning tiers and agencies that deal with spatial and physical planning.
- 4) Ineffective utilization of land and services due to low density and urban sprawl in absence of clear vision for urban growth directions.
- 5) Inefficient data management systems.
- 6) Weak enforcement (or absence) of regulations of planning standards, policies and development control.
- 7) Limited public participation in the planning process.

5.1.4.PLOT DISTRIBUTION AND HOUSING POLICIES

It is the legal right for every male national (and females as of 2008) to apply for a residential plot through the Ministry of Housing when he/she is ready to have a family or has entered the job market, usually at the age between 22-25 years. The role of the Ministry of Housing, among many, is to survey available land for development, draw up a town planning scheme which would be coordinated with and approved by other government units, and issue these plots (usually between 600 m² and 1000m² in area) to nationals through various means, but usually by a withdrawal from a pool of plots to give all equal opportunity. It is not necessary for a person to be allocated a plot close to his original birthplace, especially when considering the new cities that emerged within Muscat.

The owner, usually of a young age, perceives this plot as an asset that he may use to trade for money or other plots. As such, many quarters of a planned city are not filled up with housing units immediately, and many new cities take as long as twenty years to be fully developed. The

infrastructure and services are usually provided by various government entities once there are enough settlers in a particular area to make the investment worthwhile. There are some cities that are over twenty years old that do not have a network of water distribution system. Many still don't have facilities for waste water treatment or even public landscaped areas. In addition, many new cities are faced with a shortage of car parking as it is usual, in many cases, to see big houses transformed into apartment buildings that become populated with different nationalities among individual housing units.

There are many challenges to existing town planning and they constitute an array of problems that concern the micro as well as the macro planning. The fact that different organizations and governmental units are responsible for different services poses a challenge especially in the coordination and in delivering these services in the order that the community demands. Furthermore, the plot award have been unstable as there were years when it was very difficult to obtain a plot due to, probably at least, technical and procedural issues. Muscat Area Structure Plan – Phase 2 – Strategy report (Weidleplan and Muamir, 1989b) has identified at that period “there was a backlog dating back to applications filed approximately ten years ago”. On the other hand, and in recent years, there has been an unusual surge in plot distribution, as shown in Table 5.1 below, when these technical and procedural issues were no longer a constraint. For instance, the total number of plots distributed in Muscat jumped from 13,561 in 2004 to 30,165 in 2005. Table 5.2 provides similar statistics but for the whole country and it is visible that the total number of residential plots distributed jumped from 10,294 in 2003 to 30,384 whereas the number of commercial plots distributed during the same period increased by six folds. The statistics in table 5.2 for the years 2007 to 2010 shows a decline in this trend.

Type	1996	1997	1998	1999	2000	2001
Total	4,035	2,835	2,944	1,386	1,285	1,691

Total Number of Plots Distributed in Muscat (Ministry of Housing, 2002)

Type	2002	2003	2004	2005	2006	2007	2008	2009	2010
Residential			11,758			10,861	2,631	2,153	5,524
Commercial			1,439			0	15	220	121
Commercial and Residential			0			302	171	9	0

Industrial	364					153	124	61	133
Agricultural	0					0	0	0	0
Government	0					99	153	139	0
Total	1,846	2,697	13,561	30,195	18,165	11,415	3,094	2,582	5,778

Table 5.1 Number of Plots Distributed in Muscat by Type of Use (Housing, 2011)

Type of use	2003	2004	2005
Residential	10,294	30,384	321,276
Commercial	444	2,693	15,009
Commercial/ Residential	224	399	10,383
Residential/ Agricultural	–	–	81
Industrial	130	899	8,022
Agricultural	46	63	8,463
Govt. Residents*	616	749	7,138
Government**	135	227	1,131
Total	11,889	35,414	371,503

Table 5.2 Number of Plots Distributed by Type of Use throughout the Sultanate

*Housing units that are built by the government and distributed to social security families free.

**Government includes mosque, school and other government uses.

Source: Ministry of National Economy

Table 5.3 shows the total number of building permits by category for the same period, which indicates relatively steady growth in permits apart from a slight decline in 2004 and 2005, and over 67% increase between 2007 and 2008. In essence, there is no correlation between the volume of plots distributed in Muscat and the number of building permits.

Type	1996	1997	1998	1999	2000	2001
Total	1,700	1,905	1,951	1,552	1,475	1,589

Total Number of building permits in Muscat (Municipality, 2002)

Type	2002	2003	2004	2005	2006	2007	2008
Residential	1851	2043	1688	1497	2112	2351	3941
Commercial and Residential	104	119	122	108	117	117	205
Governmental	50	31	50	42	47	35	13
Other	46	45	39	58	63	62	135
Total	2051	2238	1899	1705	2339	2565	4294

Table 5.3 Major building permits in Muscat according to the type of permit (Municipality, 2008)

There are also other means of housing development in Oman. The government, through the Ministry of Housing, has various schemes for providing housing benefits and loans to low income families. There are developments for housing that the government sponsors and distributes to low income families, especially in rural areas. These houses, known as *social houses*, are designed as low cost housing and are of comparatively good quality construction that is provided within good infrastructure and community services.

5.1.5. REFLECTION ON POLICY AND OBJECTIVES OF TOWN PLANNING

The fact that one of the targets that have been set for town planning is to “conduct town planning with the aim of improving the outlook of towns and villages” (Oborn, 1982), does not draw the real picture in this regards. Both *The First long term development strategy (1975-1995)* and *Second long term development strategy (1996-2020) - Vision for Oman Economy* draw more appropriate objectives for town planning as discussed earlier. I believe that *The First long term development strategy* had set rational and practical objectives that would have, had it been executed properly, delivered fruitful result for town planning. Section 6.6.3 identifies the main shortcomings for this important development strategy.

On the other hand, there is a need to emphasize the unique nature of urban planning and development in Oman. It is unlike many examples in other parts of the world where land is usually owned by a few that would provide it to private developers and real estate companies who lead the task of designing, constructing and selling the housing units. In Oman, the government, earlier on, forecasted the huge investment required for housing developments and estates that would go beyond its ability to deliver housing units to the nationals in a timely fashion, especially when considering the scarcity of resources and the sprawl of existing cities. The previous section described the plot distribution system and its parameters. However, there are various dimensions around plot distribution that impacts urban development in general, and urban planning in particular that would be examined and discussed furthermore in latter sections in this dissertation, more specifically in conjunction with *Land use* USD. Nevertheless, there have been significant policies and regulations around plot distribution since the early 1970s that dictated urban development, especially in the organizational setup as issued under Royal

Decrees, and in the land regulations and zoning as issued under Ministerial circulars and orders. These can be properly reviewed in *Appendix C* which hosts the index for policies of urban development in Oman.

As far as building controls and permits, the local municipalities exercise some control during the design process, with some carefully detailed guidelines aimed at ensuring that the external architecture remains conservative and involve arched windows and external light colours. There are no such codes for enforcing stringent building materials and methods that are otherwise much needed to respond to the climatic conditions and energy shortage. The fact that the country, to a certain extent, lacks experienced professionals in the construction trade makes it difficult to enforce building regulations of such standards. Nevertheless, credit has to be given to the government for sustaining a traditionally homogeneous identity in architecture as opposed to the neighbouring states where modernism and lack of identity characterize the cityscape.

5.2. URBAN PLANNING GOVERNANCE IN OMAN

5.2.1. Overview

It is essential to understand the nature of the structure of organizations responsible for town planning, housing and development. *The Manual for Urban Planning* (SCTP, 1991) identifies these organizations based on the following structure, shown in Table 5.4.

	Responsibility	Organizations
1	Organizations responsible for General Policies for Town Planning	a. Council of Ministers (The Cabinet) b. Supreme Committee for Town Planning (SCTP)
2	Organizations responsible for Detailed Policies for Town Planning	a. Ministry of Housing b. Ministry of Transport and Communications c. Sohar Development Office
3	Organizations responsible for infrastructure and services	a. Ministry of Housing b. Ministry of Transport and Communications c. Public Authority for Electricity and Water d. OmanTel (responsible for Telecommunication services) e. Ministry of Regional Municipalities and Water Resources

f. Muscat Municipality

g. Office of the Minister of State And Governor of Dhofar

Table 5.4 Organizations responsible for Urban Development in Oman (SCTP, 1991)

The hierarchy of the planning framework is structured as follows, in Table 5.5 (SCTP, 1991)

Level/tiers	Planning tiers	Responsible Authority
Level 1	National Strategy	The Cabinet and Special Council/Committees
Level 2	Sectoral Strategy and Five Years Development Plans	Ministry of National Economy and concerned ministries
Level 3	Physical Planning and Policies	Supreme Committee for Town Planning and Ministry of Housing
Level 4	Town Structure Plans	Ministry of Housing, Sohar Development Office
Level 5	Local Plan	Ministry of Housing, Sohar Development Office

Table 5.5 Organizations' responsibilities according to planning tiers (SCTP, 1991)

The following subsections will focus on three organizations which were influential in the history of urban development of Oman: SCTP, Ministry of Housing and Muscat Municipality.

5.2.2. Supreme Committee for Town Planning (SCTP)

The timeline of SCTP history is illustrated in figure 5.1 below.

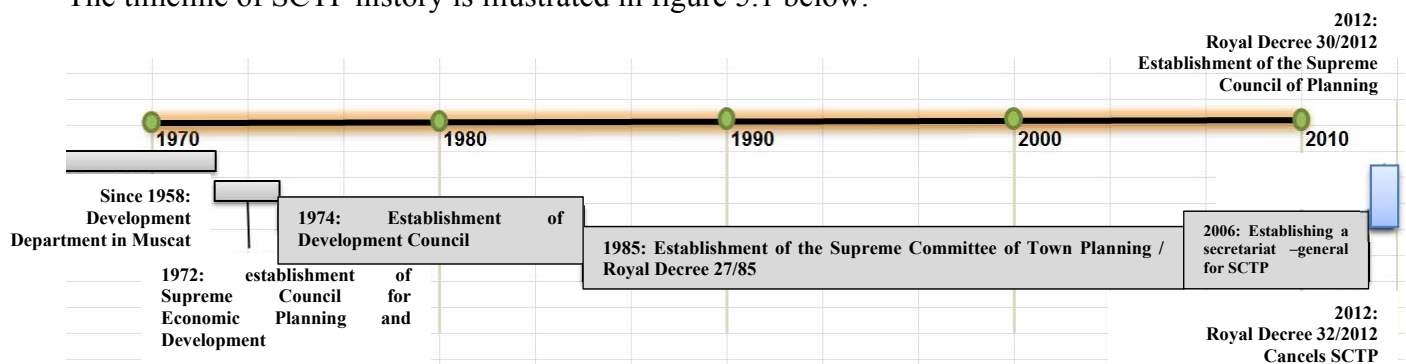


Figure 5.1 SCTP history timeline

It was formally established by Royal Decree No. 27/85, issued on the 24th of February, 1985, and was re-formed more than once. It was appended in the year 2012, by Royal Decree 32/2012, stating that all the jurisdiction of the SCTP shall either be transferred to the Ministry of Housing or to the newly created Supreme Council of Planning.

SCTP was responsible for the implementation of plans of economic and social development in the Sultanate in the fields of architectural, spatial, and through the preparation of detailed plans at the regional and urban areas. The main responsibilities of SCTP were (SCTP, 1996):

- Drafting the general policy of urban planning at all levels in accordance with economic, social and environmental considerations.
- Preparation of urban development strategy to achieve the objectives of the comprehensive and sustainable development in all governorates and regions of the Sultanate.
- Planning approvals to allocate land for different purposes.
- Setting out rules and legislation to regulate Urban Planning.
- Creating an integrated information system includes a geographic databases and maps for all provinces and regions of the Sultanate.
- Laying the foundations of property valuation and ownership under the law of expropriation for public interest.

5.2.3. Ministry of Housing

The timeline of The Ministry of Housing history, illustrating its various organizational names, is shown in figure 5.2 below.

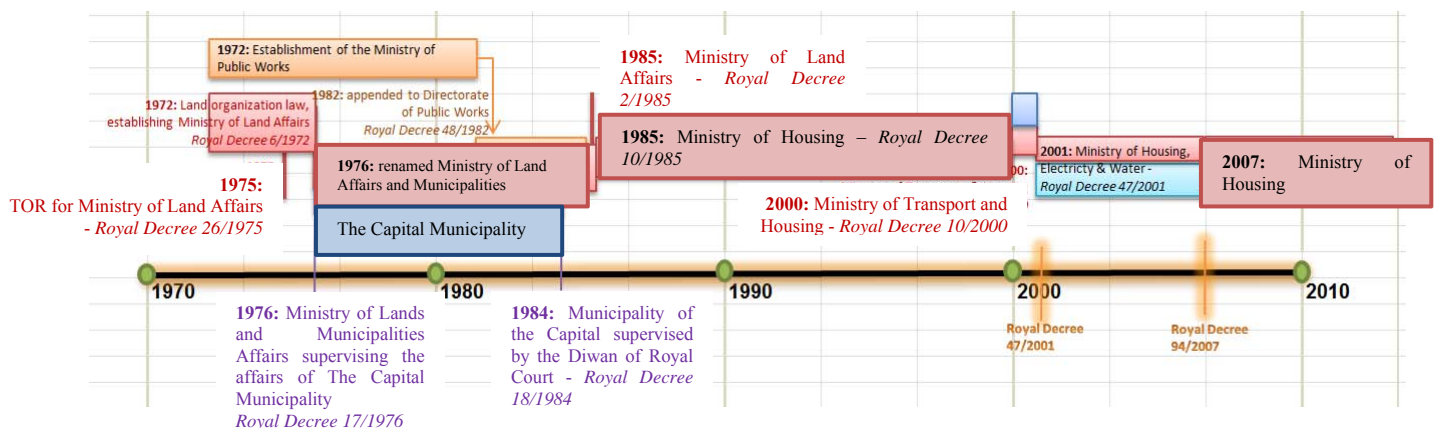


Figure 5.2 Ministry of Housing history timeline

On June 28, 1975, the Royal Decree No. (26/1975) was issued promulgating the Administrative Apparatus of the State and defining the terms of reference of the *Ministry of Land Affairs* as following:

1. Preparation of studies, researches and plans necessary for urban planning, in coordination with other authorities.
2. Preparation of detailed maps of planned areas in accordance with the general policy of urban planning.
3. Awarding ownership of land in various uses for citizens according to the government land entitlement regulations.
4. Allocation of lands required by the government.
5. Granting the usufruct right of lands.
6. Registering all types of ownership of land.
7. Conducting socio-economic studies to determine the future needs of social housing.
8. Dispute resolution in land conflicts and reviewing technical complaints relating to planning.

5.2.4. Muscat Municipality

The timeline of Muscat Municipality history, illustrating its various organizational names, is shown in figure 5.3 below.

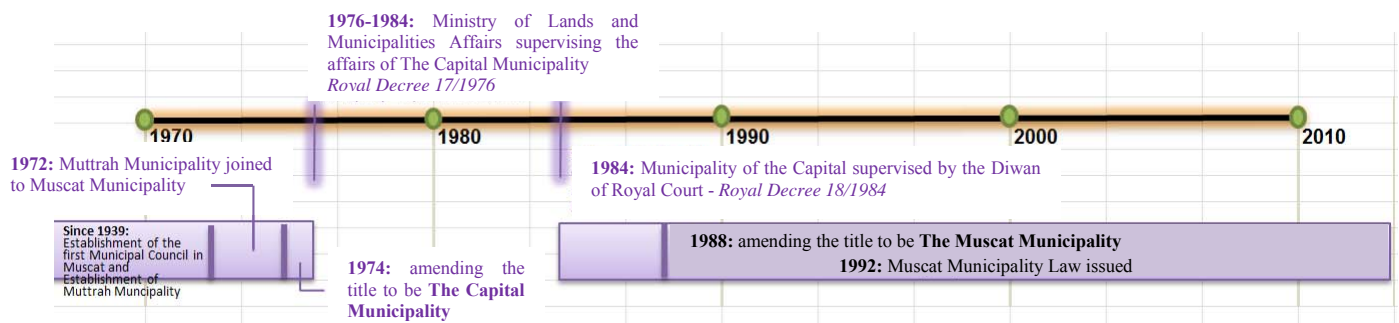


Figure 5.3 Muscat Municipality history timeline

The main responsibilities of Muscat Municipality are:

1. Fully responsible for its development projects (roads, bridges, etc.).
2. Regulation of local markets, public stores, and health affairs.

3. Other activities related to human public health (cleanliness, eating, drinking, garbage management and disposal).
4. Supervising building constructions, approving the plans and layouts of all types of buildings inside the Governorate, and issuing construction permits.
5. Ornamenting and greening the city through the building of public gardens and parks, children's playgrounds, and forestation. Figure 5.4 below shows two of the main examples of this work.



Figure 5.4 Examples of Muscat Municipality public gardens projects
(left – Qurm National Park) (right: Sahwa Gardens)

5.2.5. Other Organizations

The following Table, 5.6, in no particular order, shows other government organizations that have participated in different aspects of the urban development in Oman throughout the period of 1970-2010. Some of these organizations have changed in name, and others have ceased to exist.

Diwan of Royal Court Affairs	Ministry of Electricity and Water
Ministry of Regional Municipalities and Environment	Authority for Electrical Regulation
Ministry of Regional Municipalities and Water Resources	Ministry of Land Affairs and Municipalities
Ministry of Environment and Climate Affairs	Public Authority for Water Resources
Ministry of Defence	The National Survey Authority - Ministry of Defence
Ministry of Agriculture	Ministry of Development
Planning Committee for Development and Environment in the Southern Region	Development Council
Ministry of National Economy	Ministry of Finance and Economy

Ministry of Communications	Ministry of Transport and Communications
Ministry of Commerce and Industry	Public Establishment for Industrial Estate
Dhofar Municipality	Research Council
Ministry of Information	

Table 5.6 List of other organizations that participated in Urban Development in Oman

5.2.6. Summary and reflection

Figure 5.5, on the following page, illustrate the development of organizations, and how they merged and split, and how some of them were cancelled or replaced by new entities, for the period covering 1970-2010.

In terms of reflection on the organizational hierarchy and development for urban development, I believe this has been carefully devised since the early 1970s especially around land use and distribution, as well as municipal services and infrastructure. The focus within this research project is to identify the success and lessons learned in examining the relationship and performance of the 3 key organizations that had the most significant contribution to urban development in Oman. This would be subject to more scrutiny and examination in latter sections of this dissertation and in respect to various USDs.

In terms of clarity of roles and functions associated with each organization, I believe sufficient attention had been given to draft these in clear terms and segregation of tasks, especially in Royal decrees that have identified the terms of references for each organization, which were occasionally revised such as the terms of references for the Ministry of Housing which had witnessed more changes and amendments in its title and role. Furthermore, there has been significant work around regulations, laws, frameworks, committees and policies associated with urban development in conjunction with the organizational setup and structure that are clearly documented in *Appendix C*. It is appropriate to deduce from this index that such regulatory work has been:

- **Comprehensive:** in terms of tackling various dimensions of development (land use, transport, environment, housing, etc.) and
- **Flexible and adaptable:** in terms of revising such regulations and improving them to suit the changing economic, social and political environment.

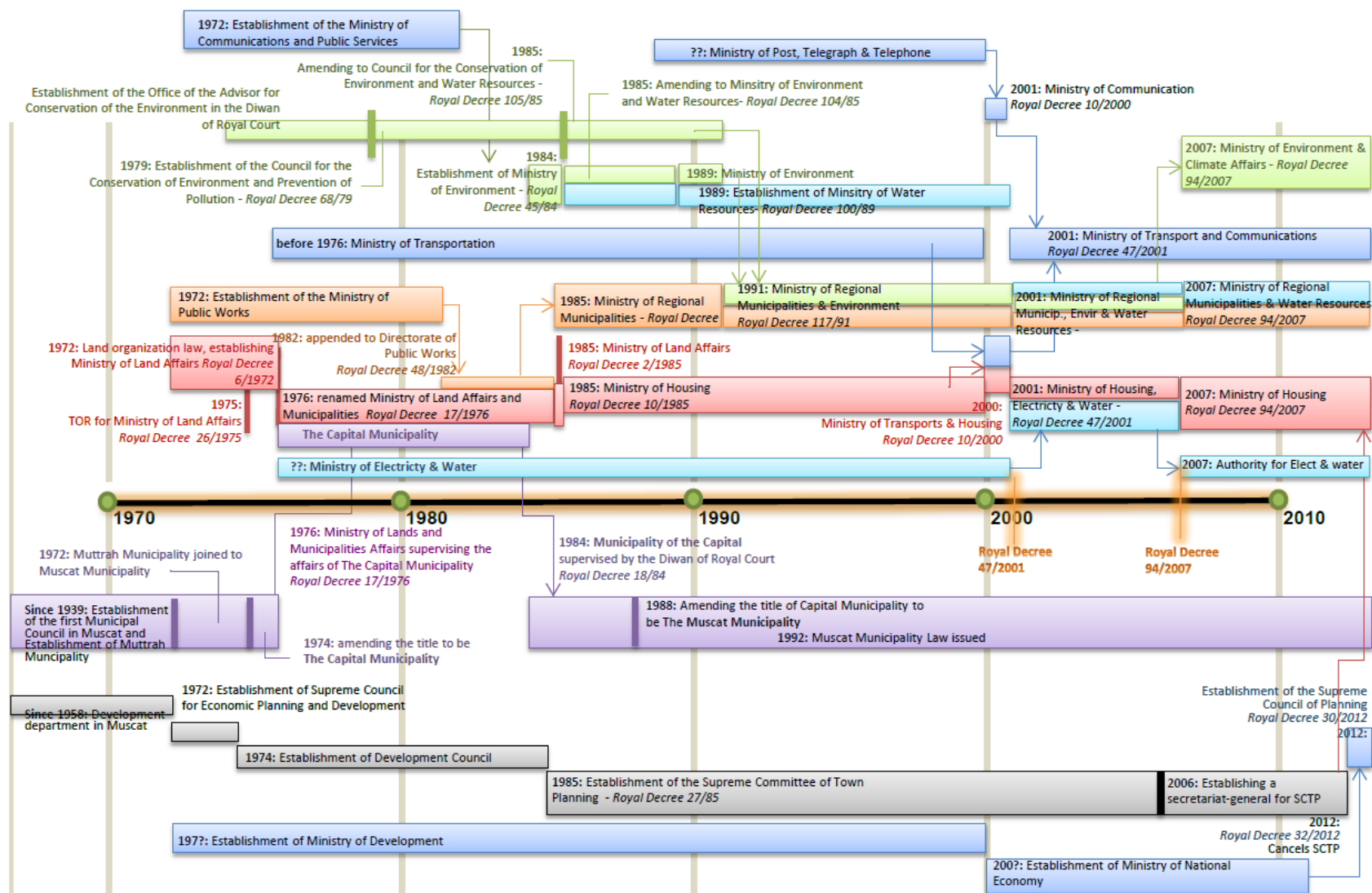


Figure 5.5 Timeline of development of organizations concerned with Urban Development in Oman (1970-2010)

There have been various attempts throughout the last forty years of development to amalgamate or distribute roles and functions between various organizations. The following are some key trends and findings that are worthy of highlighting:

1. **The golden era (1976-1984):** in 1976, Royal Decree 17/1976 stipulated that Ministry of Lands and Municipalities Affairs (the predecessor of the current Ministry of Housing) to supervise the affairs of The Capital Municipality (the previous title of Muscat Municipality): more than 23 major projects, strategies and milestones were delivered by this organization. Shortly after the Municipality separated from this group, and in 1985, SCTP was created to cover the gap for urban planning studies and strategies. For more details, refer to Appendix B for the timeline on history of urban development in Oman.
2. **“Amalgamation era”:** (Royal Decree 47/2001):
 - a. After a brief combination in 2000 in the name of Ministry of Transport and Housing, Ministry of Housing was amalgamated with Electricity and water under the title of Ministry of Housing, Electricity and Water;
 - b. Ministry of Communication was amalgamated with Transport under the title of Ministry of Transport and Communication; and
 - c. Ministry of Regional Municipalities and Environment was renamed as Ministry of Regional Municipalities, Environment and Water.

This trend was a repetition of a similar period between 1976 and 1984, as shown in figure 5.16 below.

3. **“Separation era”:** (Royal Decree 94/2007):
 - a. Ministry of Housing, Electricity and Water became Ministry of Housing again, and a new Authority for Electricity and Water was created (as part of privatization of the electricity and water sector)
 - b. Ministry of Regional Municipalities, Environment and Water split again to create Ministry of Regional Municipalities and Water, while a new Ministry of Environment and Climate Affairs was created.

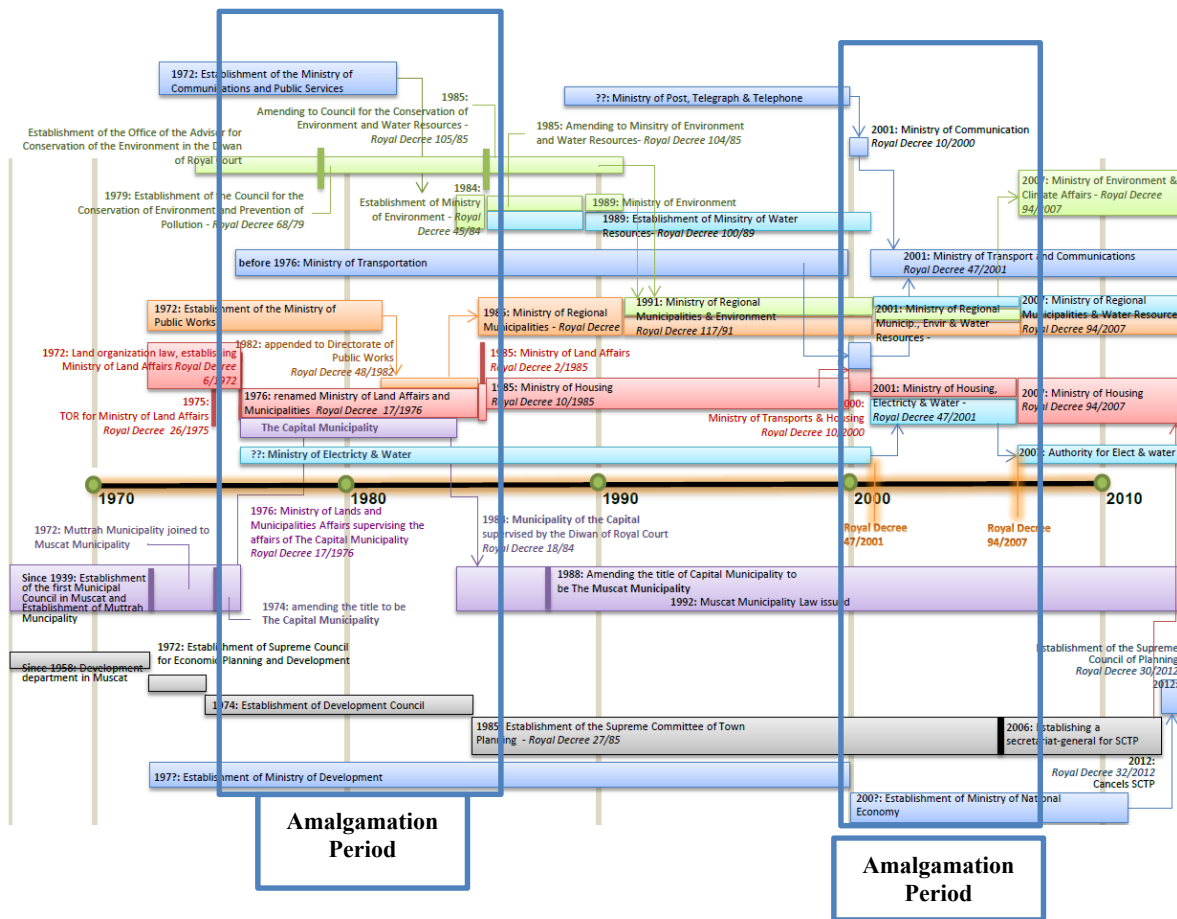


Figure 5.6 Amalgamation period trends in organizational development

5.3. THE HIERARCHY OF URBAN PLANNING

5.3.1. Overview

The SCTP meeting held on 25/6/1986 stipulated that four levels of planning will be developed and this will guide the future course of “natural” development of the Sultanate (SCTP, 1998).

For the purpose of describing the hierarchy of urban planning in Oman, three literature resources were utilized to clarify this, in the format of comparison, as shown in table 5.7 below. This clearly shows four levels of the hierarchy that defines the boundaries of urban planning in Oman. The following segments of this section describe each of these four levels.

Consultancy Services for the Preparation of Oman National Spatial Strategy (ONSS) (SCTP, 2008b)	Manual for Urban Planning (SCTP, 1996):	The General Policy for Urban Planning in Oman (Housing, 2009c)
Level 1: National strategy	Level 1: National Urban plan	Level 1: comprehensive national urban plan
Level 2: Sectoral strategy and 5 year development plan	Not mentioned	Not mentioned
Level 3: Physical planning and policies	Not mentioned	Not mentioned
Not mentioned	Level 2: Regional Urban Plan	Level 2: regional urban plan (regional planning)
Level 4: town structure plan	Level 3: Town and villages urban plan (structural plan)	Level 3: town and villages urban plan (structural planning)
Level 5 Local plan	Level 4: Local urban plans and implementation plans (detailed planning)	Level 4: local urban planning (detailed planning)

Table 5.7 Comparison of various resources identifying the hierarchy of urban planning in Oman

5.3.2. Level 1: National Spatial Strategy

(SCTP, 2008b) states that the outcome of the regional studies that were conducted in the late 1980s, which will be discussed in later sections of this chapter, proposed the following three alternatives in terms of the national spatial strategy:

1. **Regional Growth Strategy:** seeks concentrated investment in the regional centres within each region.
2. **Rural Development strategy:** focuses on the district centres and villages and is designed to stimulate the rural economy.
3. **Key town strategy:** promotes development within designated towns/secondary centres and encourages the economic integration of urban and rural areas.

Of these, the *key town strategy* was chosen as the preferred strategy for regional development throughout the country and, based on this, the settlement hierarchy was approved to constitute the following designation for centres, as tabulated in table 5.8:

	Centres	Description
1	Regional Centres	Designed to be the growth centre and to provide central services for the whole region – a maximum of 2 centres were selected depending on the geographical setting of the region
2	Secondary Centres	Larger number within each region and designed to provide secondary services with reduced catchment area
3	Local Centres	Include the rest of settlements within each region and provide basic services for the local areas within its catchment

Table 5.8 Designation of centres as part of the Key Town Strategy for Oman National Spatial Strategy

The map, figure 5.7, on the following page shows the outcome of this strategy in which several regional centres have been identified as key towns. The following table 5.9 summarizes the rationale and objectives behind this selection.

	Key town	Region	Activities/functions
1	Muscat	Muscat	Capital; national centre for employment, financial and higher level of services
2	Salalah	Dhofar	Industrial hub (containers, transshipment, free trade zone and tourism)
3	Sohar	Al Batinah	International hub for petrochemical and other heavy industries
4	Sur	Al Sharqiya	Liquid natural gas exports and gas related industries
5	Ad-Duqm	Al Wusta	Industrial hub with dry dock, commercial port, petrochemical industries and oil storage, mineral and aggregate export, and fishery related industries
6	Al Buraimi	Al Buraimi	A border town with UAE, commerce

Table 5.9 Key towns in Oman and their functions

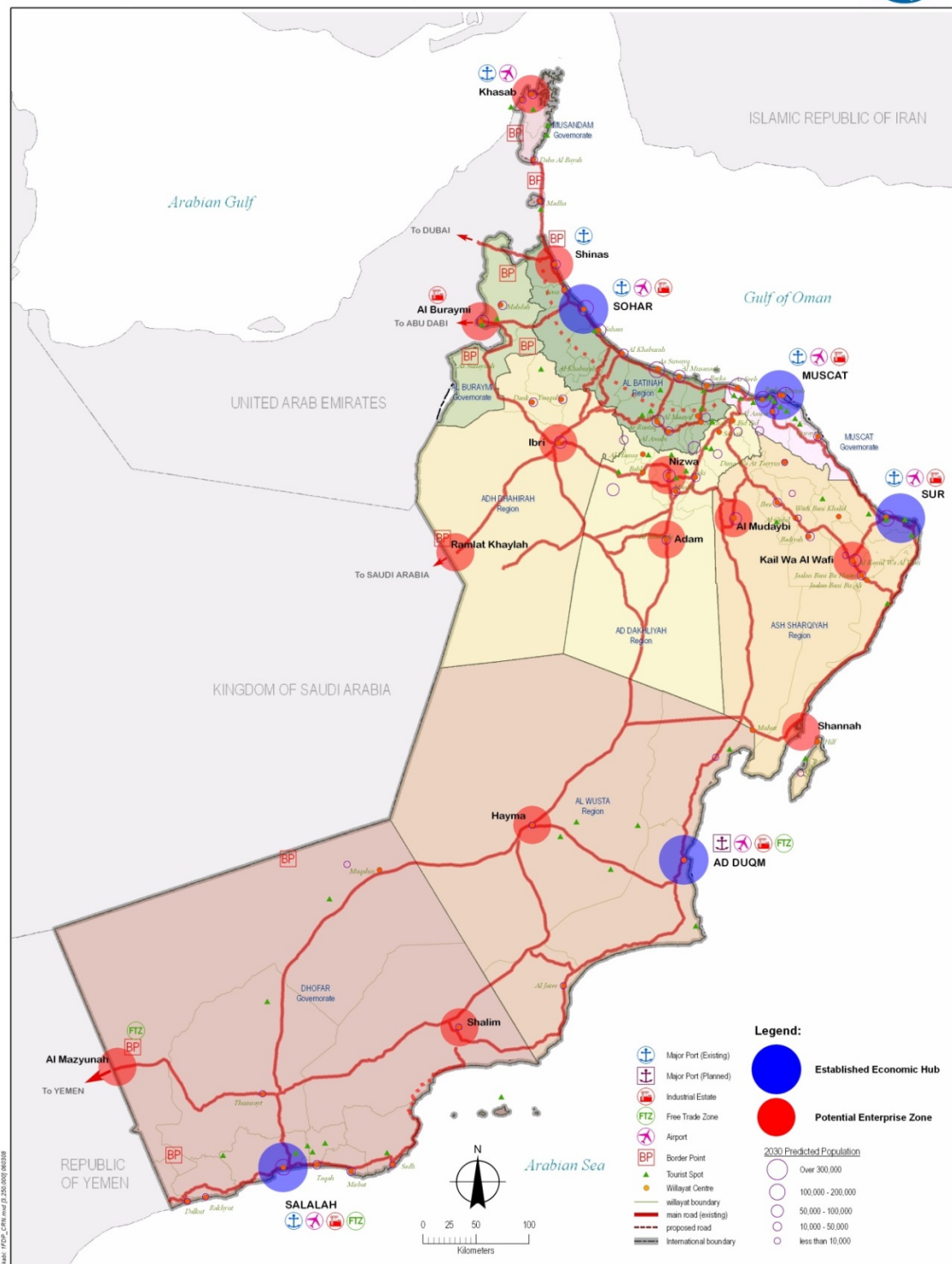


Figure 5.7 Key Town Centres in Oman as part of Oman National Spatial Strategy (by SCTP)

5.3.3.Level 2: Regional Planning (Scale: 1:100,000)

The development of regional plans enables the government to assess the development requirements and to prioritize and prepare the development programs and projects. It is always important to take into consideration the differences and unique aspects of each region, and its development potentials such as the characteristics of the population settlements and this in turn determines the accessibility to services such as education and health facilities (SCTP, 1991).

Moreover, this process enables the government to achieve coherence between the land use planning and the economic and social planning, as well as the achievement of the national urban planning strategy goals (Housing, 2009c).

This research project will focus on Muscat, as a case study, and various regional plans will be addressed. In particular, Muscat Regional plan (Weidleplan and Muamir, 1991b, Weidleplan and Muamir, 1990b, Weidleplan and Muamir, 1989b, Weidleplan and Muamir, 1989c) will be discussed in depth in section 5.5.

5.3.4.Level 3: Town Structural Plans (Scale: 1:10,000)

The structural plans are developed after planners produce the forecasted population growth and therefore determined the strategies for population settlement, land distribution and land use. These studies produce guidelines for the following elements: future requirement for facilities and services; identification of land use; deciding on the level and scope of services and facilities; provision of services based on forecasted population distribution; proposing development projects; and evaluating the comprehensive land requirement and its allocation (SCTP, 1991). Muscat Structural plan (1989-1991) (Weidleplan and Muamir, 1991c, Weidleplan and Muamir, 1990a, Weidleplan and Muamir, 1989a) will be discussed in depth in section 5.5.

5.3.5.Level 4: Local Plans (Detailed plans) (Scale: 1:2,000)

The detailed local plans focus on specific locations of the town, or villages with the objective of developing solutions to the challenges or problems that might exist in those locations. These solutions will be reflected in the detailed urban plans which identify land use and land allocation for different sectors (Housing, 2009c). In addition, these detailed plans are developed to analyze the required plot areas, provide harmony between the elements of urban planning, and provide

the basic infrastructural requirement and accessibility to major facilities and landmarks (SCTP, 1991).

5.4. METHODOLOGY FOR IMPLEMENTATION OF URBAN PLANS

5.4.1. Methodology for implementation of macro-level urban plans

At a macro scale level, the following methodology is adopted for the implementation of urban planning (SCTP, 1991) (SCTP, 1998).

1. The organizations responsible for planning will develop the Regional plans, the Town and village plans taking into consideration the general policy for town planning and the approved development plans according to economic and social considerations, taking into account the natural environment and cultural heritage and coordination with other relevant government organizations.
2. The *General Secretariat of SCTP* will review the regional plans, and prepare the national strategy for urban planning based on the Regional plans and present it to SCTP and obtain approval from the Cabinet.
3. Coordination with the relevant government organizations responsible for infrastructure and services, as well as other sectors so that the sectorial plans are compatible with the requirements of the urban plans.
4. SCTP will ensure that all plans within the four levels of urban planning have been prepared in accordance with the approved policies and procedures.
5. The responsible organizations will implement these approved urban plans and submit progress reports to the General Secretariat of SCTP.
6. The General Secretariat of SCTP will monitor this progress and submit reports to SCTP emphasizing the technical or financial constraints and issues.
7. Coordination committees will be set up between the organizations responsible for urban planning and the organizations responsible for infrastructure and services, and developing tools to organize the exchange of information.

8. SCTP will prepare the necessary systems to archive the information for land use so that it can be shared with other organizations.
9. SCTP may develop, based on the urban plans that are submitted to it, recommendations and perceptions for the investment plans that it deems adequate for the implementation of these plans and then seek approval from various relevant Councils and approval from the Cabinet.

5.4.2. Methodology for implementation of micro-level urban plans

At a micro level, the methodology utilized for preparation of detailed and local urban plans is as follows (Housing, 2009b):

1. Identifying the location of the *detailed planning site* according to the nature of the region and its appropriate use.
2. Conducting a survey of the site to reflect the typographical contours and the drainage pathways and its boundaries.
3. Ensuring that the site is in a government land and free of ownership allegations and conflicts.
4. Defining the boundaries of the site, and studying its accessibility and its interconnections with the surrounding transport corridors.
5. Studying its population capacity and hence the required services and facilities, and identifying the internal road network and its hierarchy in accordance with the criteria and procedures set by the general urban planning policy.
6. Preparing the initial elements of the detailed urban planning and their spatial distribution, taking into consideration the environmental and natural factors in terms of space, intensity and quality that commensurate with the planned population capacity.
7. Upon completion of an intermediate stage in the design of the scheme, the team will visit the site to ascertain the site constraints and ensuring adequate consideration of the physical conditions, and hence proceed with the preparation of the final draft.
8. Before approvals are obtained, coordination with the relevant government organizations is done by sending copies of the detailed plans so that they can provide their opinion and requirements in terms of plots and facilities.

9. Approvals are obtained, and detailed layouts are developed for all elements of the detailed plans of the site, and implementation resumes taking into consideration public participation through the local committees.

5.5. KEY URBAN PLANNING STRATEGIES

5.5.1. Overview

The comprehensive list of urban planning strategies, as well as other dimensions of urban development, such as water, environment and transport, is available for reference under the title, *Timeline of the History of Urban Development in Oman*, in Appendix B. As far as the researcher is aware, this is the first time such a timeline has been attempted for Oman, a fact positively commented upon by various officials and practitioners in this field in Oman. Figure 5.8 illustrates the major milestones of urban planning strategies (regional and structural) that have been conducted, specifically for Muscat, throughout the period 1970-2010. The following subsections will throw some light onto the most significant and influential milestones in this area.

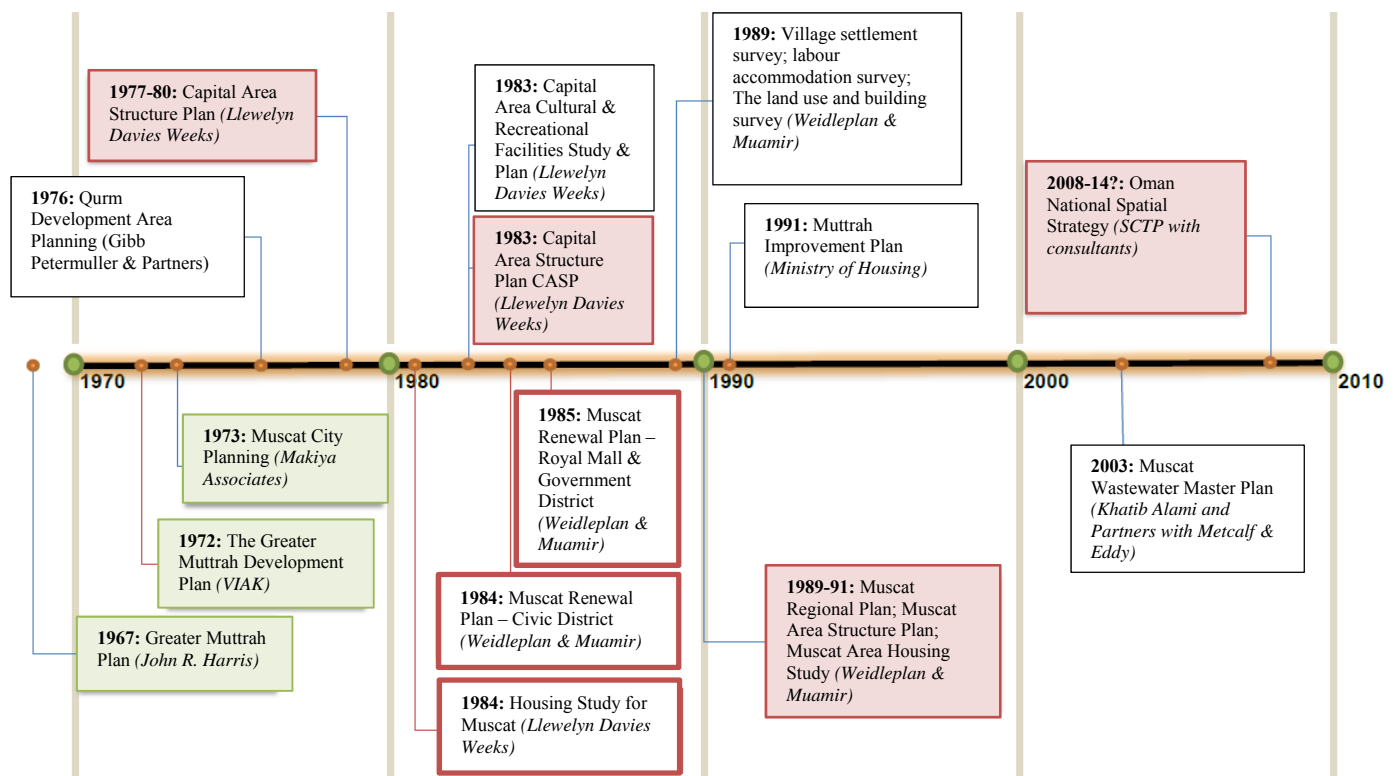


Figure 5.8 Timeline of the history of urban planning (regional and structural plans) in Muscat

5.5.2. The Greater Muttrah Development Plan (1967-1972) by John R. Harris and Partners

Barbara Wace reflects about this development plan: “two years before the first oil revenues were received, he (Sultan Said bin Taimur) asked a town planner and architect, John Harris, to prepare plans for the development of specified areas. One of the major schemes he prepared was for the cities of Muscat and Muttrah. The cities were mapped and a ground survey was made... A plan was finally approved by the Sultan in 1967, but so far very few know all the proposals. However, the first steps have involved the provision of services and modern facilities in the cities” (Wace, 1969).

Damluji described the report submitted by John R. Harris Architects as it remained open to a number of different development options:

They considered the possibility of Muscat continuing as the seat of government, and perhaps ‘coupled with its role as capital [becoming] a cultural centre.. [with] commercial development .. severely restricted’. In this scenario, the old city of Muscat would be devoted largely to public buildings and residences for the elite. On the other hand, a new capital might be established elsewhere, in which case they proposed that old Muscat and the neighbouring area of Sidab, on the bay, be developed as a tourist centre, retaining ‘as many of the attractive older buildings as is possible’ and necessitating ‘considerable and sympathetic renovation’ – though he also suggested that ‘the larger ones could be incorporated into hotels. (Damluji, 1998, p.21)

However, (Oborn, 1982) claims that “the plan itself consisted of little more than proposals for road layouts and contained few other detailed planning proposals”. (Townsend, 1977) reflected regarding this study:

.. the so-called ‘Greater Muttrah Development Plan’ was rushed through in six weeks with no thought given to alternative locations, with inadequate planning, no thought to likely water requirements and their source, or the likely cost, or the likely population growth.

5.5.3. Muscat City Planning (1972 to 1973) by Makiya Associates Consultants

In 1972, His Majesty Sultan Qaboos commissioned *Makiya Associates* to act as planning consultants to undertake a comprehensive survey of the existing city and to draw up proposals for conservation and future development. A master plan (Makiya, 1973) was developed

including planning proposals and legislative recommendations for implementation. The proposals suggest the following changes:

1. Definition of the status of the city in its national and economic context.
2. Role of Muscat in the development of the expanding metropolitan region.
3. Preliminary design and planning proposals for the physical extension of the city complex and its districts.
4. Survey studies of the components of the city.
5. Illustration of the urban and the architectural character of the walled city with recommendation for its preservation and enhancement.
6. Proposals for the integration of new buildings within the fabric of the city instead of the existing unstructured growth.
7. Definition of focal sites within the city wall and districts.
8. Preliminary study and suggestion for exploiting the natural potentials of Sidab as a winter resort.
9. A central civic *maidan* as a dominant aspect of design and planning considerations. (This was finally implemented in 2007 as shown in figure 5.9 below).
10. Existing mosques in the districts as the social nucleus of neighbourhood redevelopment.
11. Housing settlements in relation to Muscat and its surroundings.
12. Small rural clusters in the outskirts of the city.
13. Proposals for vehicular traffic movements and car parking, while maintain a pedestrian character to the city and recommending the use of a system of one-way streets that street widening.
14. Recreational grounds and green areas of marked local character and present proposals for their integration within the city's framework for open spaces.
15. A planned programme for action, to follow adoption of the policy of preservation and strongly urge immediate action for strictly checking the present uncontrolled growth.



Figure 5.9 New ceremonial route in Muscat old city – a concept proposed by Makiya in 1973

Analysing the Makiya plan, Damluji concluded the following:

Makiya associates defined Muscat as a cul-de-sac city, an enclave of historic buildings that should be kept intact. Their report emphasized the tremendous national value of Muscat's heritage, which they recommended should be enriched by maintenance and renovation and safeguarded against the onslaught of development. In order to retain the city's unique characteristics and original identity, they proposed restricting its function to that of nominal capital city and relocating the state administrative departments to the greater metropolitan area then being developed... A two-volume research document entitled 'Muscat City Planning' included a study of Muscat's architectural character, examining in depth its architectural details, historic monuments and public buildings including mosques, the suq, city walls and gates. (Damluji, 1998, p.24)

Although this project and proposal has remained at the heart of the urban development history of Oman, it is disappointing that the plan failed to gain acceptance.

5.5.4. The Greater Muttrah Development Plan 1972 by VIAK

Following the enactment of the Land Law in 1972, the Swedish firm of VIAK was engaged to advise the Technical Committee and was instructed to revise the Greater Muttrah Master Plan (VIAK, 1972). This was completed by November 1972 and the proposals contained in the revised version of the plan formed the basis for all future development in this area. In addition to revising the Master Plan, VIAK (illustrated in figure 5.10) also drafted proposals for Building Byelaws and a separate document was produced that provided more detailed proposals for a Central Business District which had been allowed for in the Master Plan and which was to act as the commercial heart of the country (Oborn, 1982).

The proposals contained in the *Revised Master Plan Report* formed the most detailed part of a proposed regional development programme extending from Sidab, which lies to the east of Muscat, along the coast to Seeb (Oborn, 1982). Oborn argued that:

Little consideration would appear to have been given to the long term implications: namely the limited room for future expansion, the lack of cooling sea breezes, the inability to ensure adequate water supplies and the congestion caused as the result of the sites location on the only route between the Capital and the Interior. (Oborn, 1982, p.76)



Figure 5.10 Illustration of Master Plan Report Proposals (Oborn, 1982)

5.5.5. Capital Area Structure Plan (CASP 1982) by Llewellyn-Davies Weeks

The main objectives of this study were (Llewellyn-Davies, 1982):

1. Establish size, distance and functional relationships among all old and current development areas.
2. Establish an overall regional road network.
3. Examine all available land for the development potentials.
4. Suggest an integrated development policy and implementation programme.

As clearly evidenced in future studies, (Weidleplan and Muamir, 1989a), this structure plan has not been fully implemented because of “external as well as internal causes”. Some of the development concepts that would have benefitted the Capital Area were:

1. Setting up of Industrial estate in Rusayl, Mawaleh and Ma’abela.
2. Proposal to develop light industries in the area under airport restrictions to ensure optimum utilization of land.
3. Proposal for a university in Seeb area to cater for education needs.
4. Proposals to develop some of the area under MOD restrictions which have good potential.
5. Development of a Government-Ministries and Offices area north of Al Khuwair.
6. Proposal for an organized large scale residential and commercial development in the Seeb area which has high development potential.
7. Improvement of existing road network, construction of new links to improve accessibility of some areas to relieve some of the links of an excess traffic.
8. Concept of a compact urban development with an optimum utilization of available land.

Figure 5.11 shows a drawing extracted from CASP 1982 (Llewelyn-Davies, 1982), identifying the major road network and predevelopment land use.

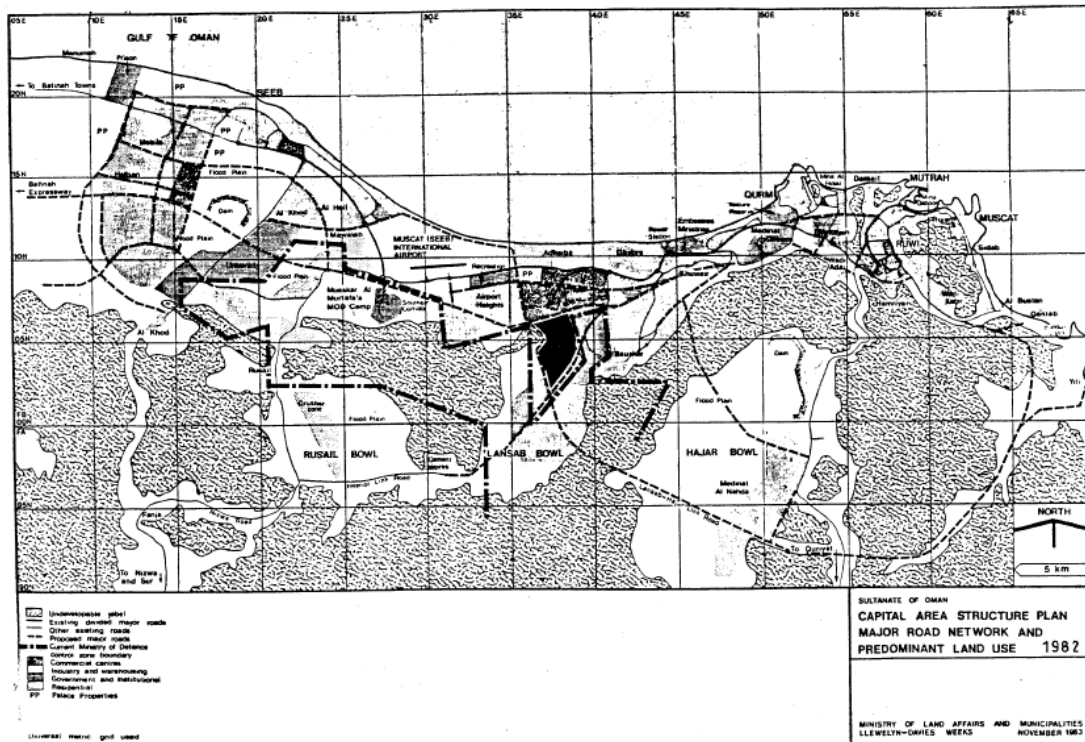


Figure 5.11 Drawing extracted from Capital Area Structure Plan 1982 (Weeks, 1983)

5.5.6. Proposals for the future development within the Capital Area (6 new projects):

In the early eighties, the government commissioned a few international consultancies to draft the proposals for six new developments in Muscat: Shati Al Qurm, Khuwair South, Ghubra South, Adhebia, Airport Heights, and Madinet Al Nadhda. Figure 5.12 shows the distribution of these new developments within the Capital area. In 1984, the government again commissioned a group of British experts, (Milton-Keynes and Corporation, 1985), with experience in planned urban development to take an independent view of the proposals of the six new communities and to report their findings to the government. Their recommendations outlined that Shati Al Qurm, Khuwair South, and Ghubra South plans are suitable for implementation with minor adjustments. In addition, they have identified that Adheiba proposals were unsatisfactory, Airport Heights plan to be revised and implementation to be considered at that time, and Medinat Al Nahda plan, although satisfactory, to be implemented at a later stage when the site is serviced by an adequate infrastructure network (Milton-Keynes and Corporation, 1985).

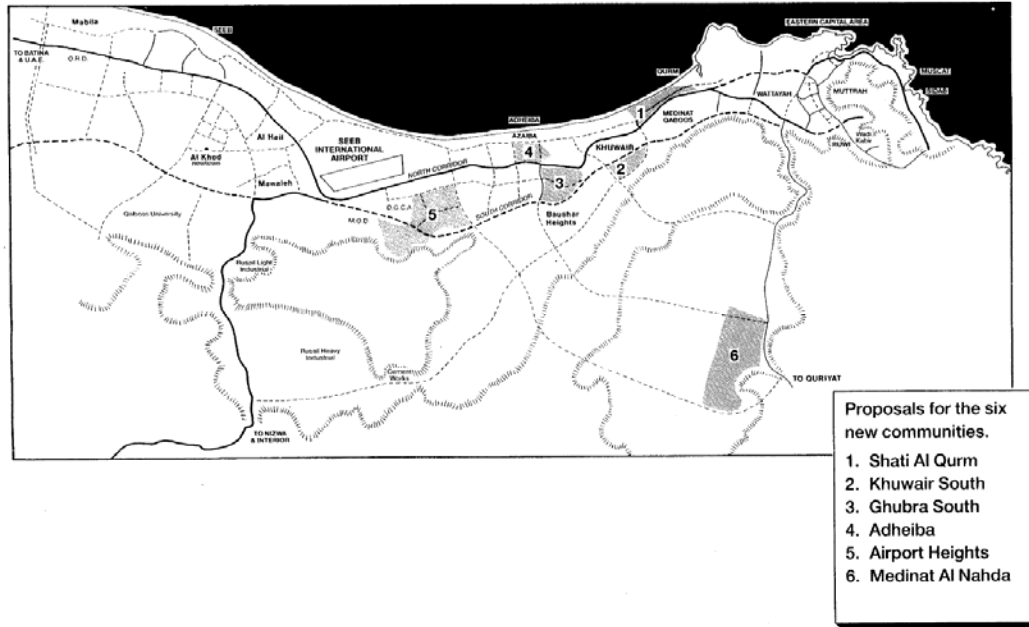


Figure 5.12 Proposal for 6 new developments within the Capital Area (Milton-Keynes and Corporation, 1985)

5.5.7. Muscat Regional Plan (1989 to 1990) by Weidleplan & Muamir

The framework of this Regional Strategy focused on the following six categories:

1. Mobilization of human resources
2. Diversification of the regional economy
3. Reduction of intra- and inter-regional disparities
4. Organization of the land use structure
5. Rational utilization of scarce natural resources
6. Maintenance and rehabilitation of the environment

(Weidleplan and Muamir, 1989c) identified three alternative development concepts which comprised different spatial development possibilities and consequently determined the requirements for specific socio-economic development options of the Muscat Region. They are presented and compared in Table 5.10 below. Appendix M shows extractions of drawings illustrating the urban planning associated with each alternative.

	Alternative Strategy	Features
1	Poly-central Development	Decentralized development of the Muscat Region by establishing a poly-central urban structure. This concept “foresees the independent socio-economic development of urban and semi-urban areas adjacent to the primary or capital centre on the appropriate hierarchical level.”
2	Mono-central Development	Further strengthening of the central service position of the Muscat Area. “This is achieved by extending the directly related hinterland and by increasing the socio-economic dependency of the existing hinterland from the central Muscat Area.”
3	Densified Ribbon Development	Saturation and densification of the northern coastal areas. “By this a highly condensed and continuous ribbon development is achieved which will stretch from Greater Muttrah in the east to the Batinah Region, including the Wilayat of Barka in the west, only interrupted by the international airport and the adjacent Ministry of Defense (MOD) area to the south of it in Seeb.”

Table 5.10 Alternative strategies for Muscat Regional Plan (1989 to 1990) (Weidleplan and Muamir, 1989a)

(Weidleplan and Muamir, 1989c) elaborated more on the description of the above three alternatives. Towards the end of the report, the consultant provided an evaluation of the three with a comparison of benefits and disadvantages, and has eventually recommended to the government adoption of the first alternative, which is the *poly-central development*.

The SCTP decision (no. 9/90) identified the approved alternative and the amendments made. It stated that the SCTP has discussed the three alternatives and has decided to approve the first alternative, the *poly-central development*, after some modifications (SCTP, 1998).

In addition, (Weidleplan and Muamir, 1991c) contained reference to the selected poly-central concept, mentioned under the title of “*twin-city development*”. “The recommendation of the ministries modifying the consultant’s proposals in Strategy 2, especially concerning the alignment of the second carriageway and the improvement of the basic supply of Al Amerat with a higher development, has been considered for the formulation of the selected alternative”.

This decision will be revisited in later sections of this research project, as it has been clearly debated whether this alternative, *Poly-central development*, has been achieved. Instead, there are many practitioners who have suggested that the third alternative, *densified-ribbon development*,

is prevailing after twenty years since this Muscat Regional Plan (Weidleplan and Muamir, 1989c) was implemented.

5.5.8. Muscat Area Structure Plan (1989-1991) by Weidleplan & Muamir

The terms of reference dictated that the Muscat Area Structure Plan will serve:

- As a strategic development guide for the planning area over the long term.
- As a physical plan to define major land-use areas, roads and utility corridors, town, district and local centres, and other public facilities.

This Structure plan also identified three alternatives, outlined in table 5.11 below. Appendix N shows extractions of drawings illustrating the urban planning associated with each alternative.

	Alternative Strategy	Features
1	Strategy of Maximum Expansion	continuation of present trends and development
2	Strategy of concentrated growth	intensified land use, increased densities, and high rate of achievement
3	Dispersed urban growth	

Table 5.11 Alternative strategies for Muscat Structural Plan (Weidleplan and Muamir, 1990a)

Among its many recommendations and highlights, it proposed a system for management of urban development. More specifically, it suggests the following (Weidleplan and Muamir, 1990a):

2. Promote people's participation in the planning and development process.
3. Involve both public and private institutions to achieve the tasks more efficiently.
4. Establish inter-sectoral coordination and avoid inconsistent, divergent and redundant activities.

It also proposed the role of *Implementation Coordinator* for the Ministry of Housing by widening its responsibilities. This is an important recommendation that would be evaluated in the latter stages of this research dissertation.

5.5.9. Oman National Spatial Strategy (ONSS) (2008 to present)

This strategy has been mandated through a Cabinet decision in a meeting number (6/2004) which stated: "to mandate the Supreme Committee for Town Planning, in coordination with the

Ministry of Housing, and other concerned ministries, to conduct a study for the preparation of sustainable land use map in the Sultanate to form as a framework for directing sectorial development programs and identifying the optimum land use and locations according to environmental, social and economic considerations”. The tender for this project has been floated in October 2008 (SCTP, 2008b).

The main objectives of the ONSS are to (SCTP, 2008b):

1. Provide a solid framework for land use strategy that will ensure a sustainable socio-economic development at the National and Regional levels and to propose specific policies conducive to the implementation of the proposed strategy in the light of the broad goals of the *national long term development strategy- Oman Vision (2020)*.
2. Define the way to improve the planning system and to bring together in the planning process, and to structure and feed their debate on the environmental, social, economic and other issues of strategies decisions.
3. Improve the planning process and the quality of information used in the process.
4. Should be formulated in accordance with principles of sustainable spatial development.

The study is to be prepared and developed into four broad phases as follows (SCTP, 2008b):

Phase 1: Analysis and assessment of current conditions and identification of development and planning.

Phase 2: Tender documents for the preparation of Regional Spatial Strategies (RSS).

Phase 3: Preparation of Regional Spatial Strategies (RSS)

Phase 4: Formulation of the National Spatial Strategy.

This research project will not address ONSS in depth, since the project has not reached its final stages. Moreover the progress of this strategy is not publicly available, apart from a few interviews with key players (Times, 2010), or workshops that have been conducted, one as recently as April 2012 (Oman Daily, 2012) which was to inform the residents in Batinah and Musandam region about the development of the strategy and its economic and social impact on

those regions. Moreover, ONSS has not had any significant impact for the urban development within the period of 1970-2010, on which this research project is focusing.

5.5.10. Summary and reflection

The comprehensive list of urban planning strategies is available for reference under the title, *Timeline of the History of Urban Development in Oman*, in Appendix B. It clearly shows a wealth of strategy development throughout the last forty years that, had they been well executed or implemented, would deliver a different urban environment today. More evaluation of the current state of play would be delivered in chapter 7 (problem analysis), and how we have reached where we are today in chapter 8 (process analysis).

It is interesting to show certain trends that emerge from this history of urban planning strategies, as shown in figure 5.13:

1. 1970 to 1990: 4 regional plans, 7 structural plans, 31 local plans
2. 1991 to 2010: 0 regional plans, 0 structural plans, 3 local plans
3. ONSS floated as tender in 2008 but not yet concluded (SCTP, 2008b)

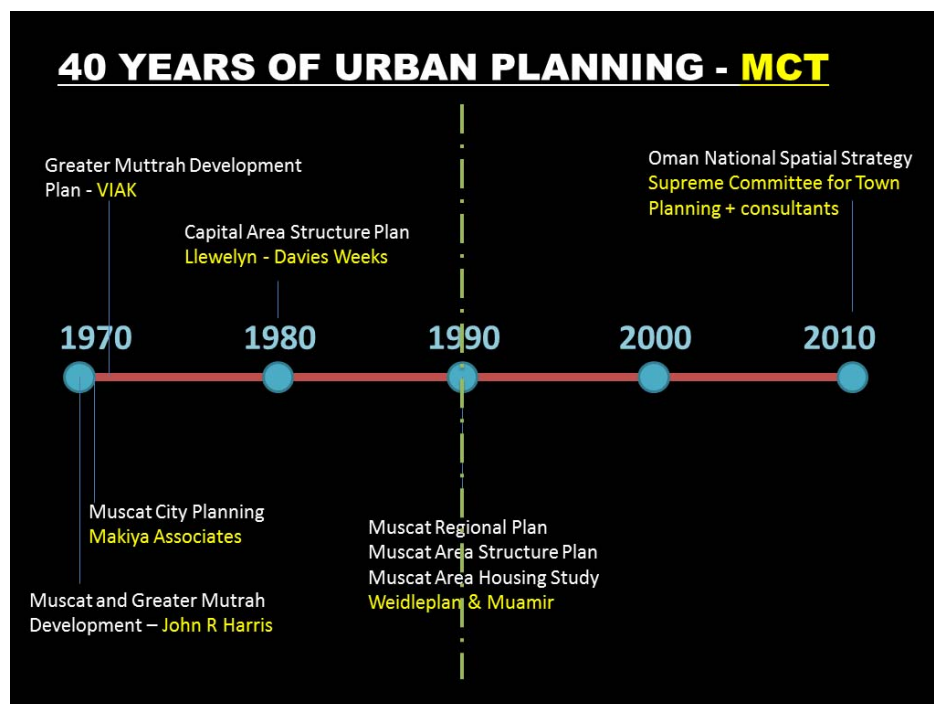


Figure 5.13 Major urban planning strategies in Muscat

4. The period from 1970 up to 1990 witnessed the development of major **key urban planning strategies (regional, structural and local) for Muscat** which unfortunately was not extended in the period (1990 to 2010).
5. For **other regions and towns in Oman**, the regional and structural plans were carried out during the period (1990 to 1996) and were rarely repeated (except for Sohar).

Major consultants working in urban planning in Oman:

- 1 VIAK: 1972 to 1988 (Muttrah) (VIAK, 1972).
- 2 Sir Alexander Gibb & Partners and Gibb Petermuller & Partners: 1974 to 1984 (Qurm Development Plan), road projects 1990.
- 3 Llewelyn - Davies Weeks: 1977 to 1986 (CASP 1977 (Llewelyn-Davies, 1977), CASP 1982 (Llewelyn-Davies, 1982), Housing Study Muscat 1981 (Llewelyn-Davies, 1981), Muscat local plans, Sohar.
- 4 Weidleplan & Muamir: (Regional Plans, Muscat Regional (Weidleplan and Muamir, 1991b) and Structural Plans (Weidleplan and Muamir, 1991a), regional towns structural plans 1989.
- 5 Dar Al-Handasah Consultants: CATS 1985 (DarAl-Handasah, 1987),, Oman Highway Master Plan 1981(DarAl-Handasah, 1981).
- 6 WS Atkins: since 1986: Sohar Structural Plan 1986 (Atkins, 1986)
- 7 Cowi Consult: Salalah plain land use 1986, Regional Plans 1989, regional towns structural plans 1989, Jebel Akhdar Planning study 1991, Commercial town at Maziona 1993 (COWI, 1990a, COWI, 1990b, COWI, 1989, COWI, 1991)
- 8 Mott McDonald: wastewater master plans for 9 towns 1992 (Mott and Watson, 1992)
- 9 Khatib & Alami Consolidated Engineering Company: Muscat Area Traffic Study 1994 (Khatib&Alami, 1995b, Khatib&Alami, 1995a); Muscat Wastewater Scheme (Khatib & Alami and Eddy, 2003)
- 10 Azri Architects (Oman): planning studies for Sharqiya Region 1996.
- 11 National Engineering Office (Oman): planning studies for Dakhliya and Dhahira Region 1996.

12 Parsons International & Company: major transportation projects in Muscat since 2003.

When one digs deeply into these strategies and their findings, whether in establishing the existing conditions and identifying its problems, or in identifying key objectives and the alternative solutions drafted for achieving them in the future, he would clearly find knowledge that is worthy of credit and could be considered as major achievements. In fact, it is clear that this abundance of strategies are unknown to the current decision makers or else they would have learned from them and may possibly attempt to revive them or use the knowledge contained to direct future approaches or projects. This research project pays tribute to these strategies and will in later stages identify the success or shortcomings in the strategy themselves or in their implementation.

5.6. OTHER STRATEGIES INFLUENCING URBAN DEVELOPMENT

5.6.1. TRANSPORT STRATEGIES

The following Figure 5.14 illustrates the major strategies and milestones within the transport sector in urban development in Muscat.

In addition, Figure 5.15 shows the proposed major road links in 1990 which clearly shows major strategic initiatives towards the improvement of road infrastructure in Muscat. For example, the central carriageway (item 4) and southern carriageway (item 5) were only implemented recently and opened to traffic towards end of 2008 and 2011 respectively.

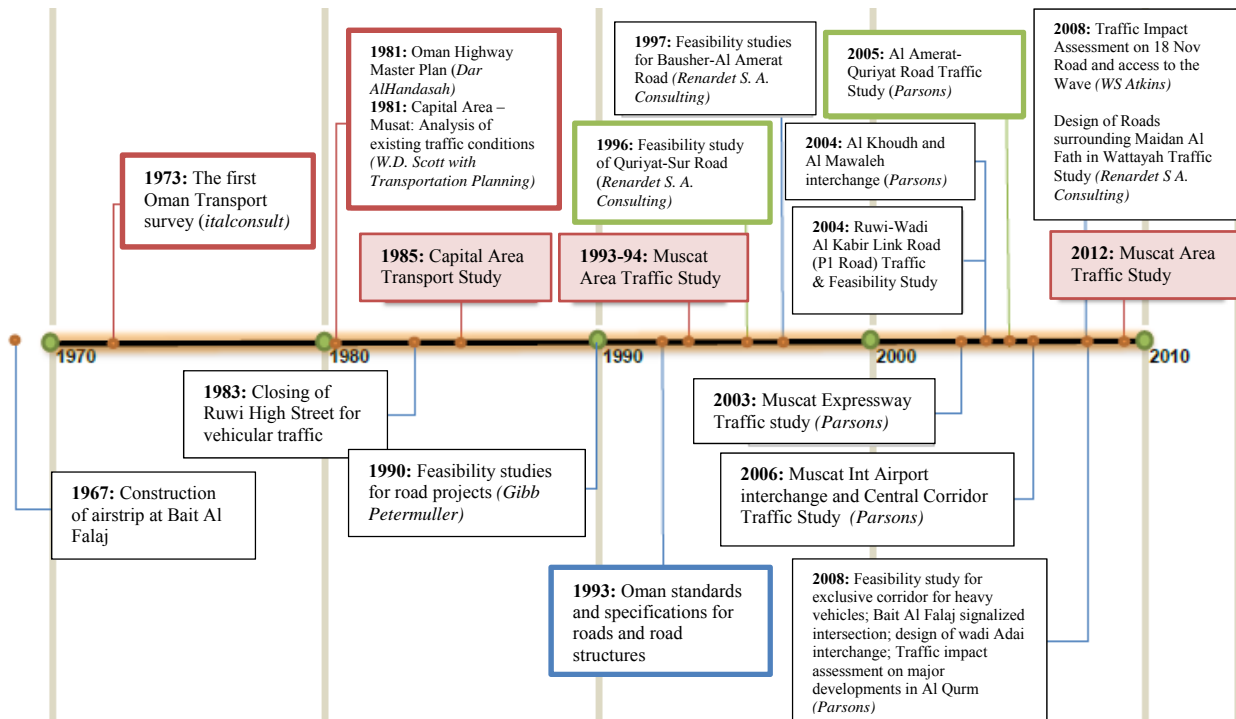


Figure 5.14 Timeline of the history of transport in Muscat

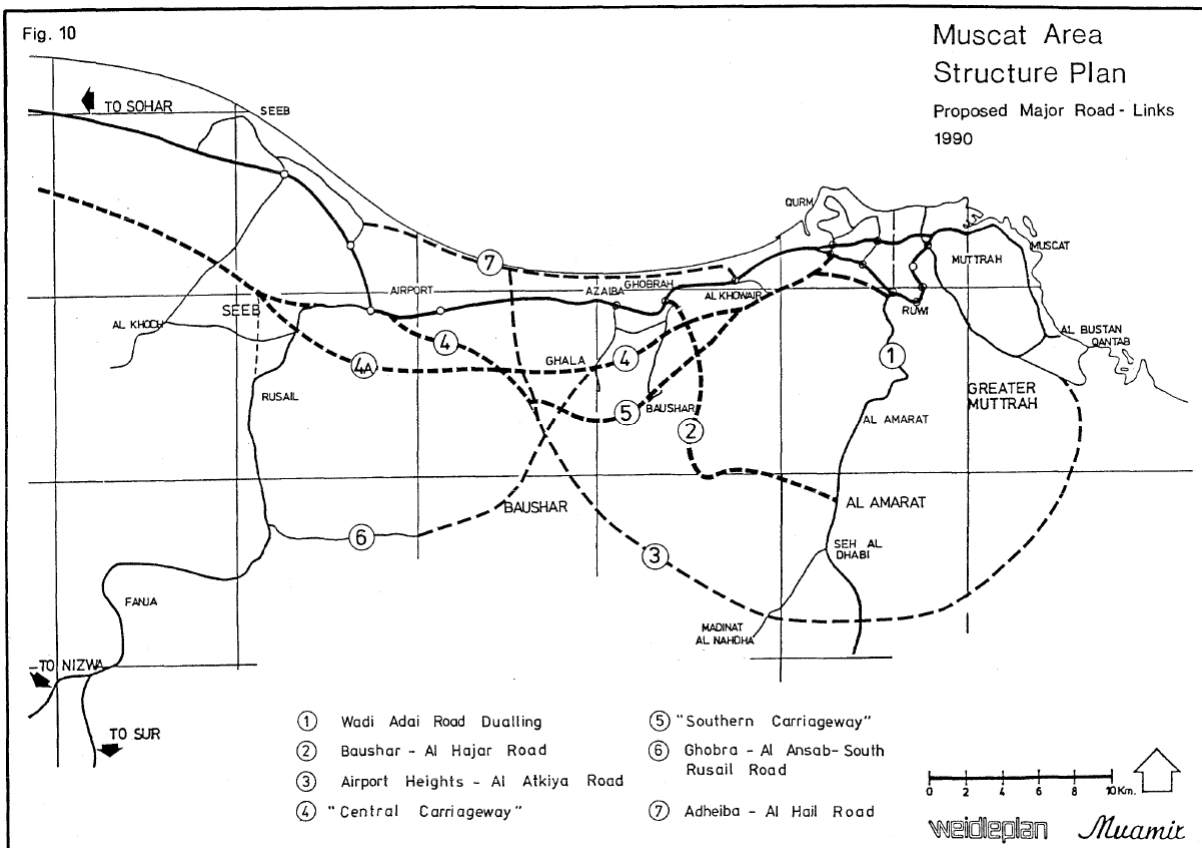


Figure 5.15 Proposed major road links 1990 (Muscat Area Structure Plan phase 2)

5.6.2. ENVIRONMENT STRATEGIES

Oman was amongst the first countries in the region to establish a *Ministry of Environment* in the early 1980s, as illustrated in figure 5.16 below, which over time has been replaced by the *Ministry of Environment and Climate Affairs* (MECA).

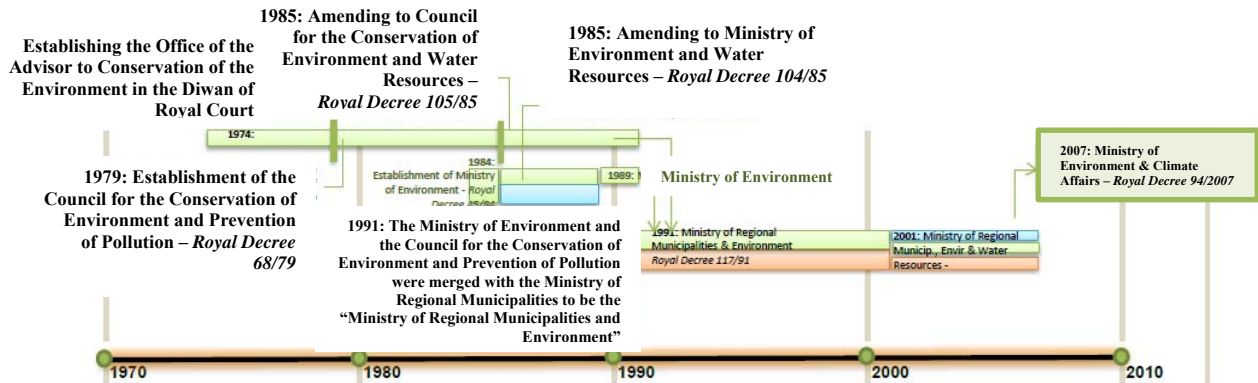


Figure 5.16 Timeline of the history of Environmental Organizations in Oman

Figure 5.17 shows the major milestones, including strategies that were developed over the years, the treaties and United Nations conventions that Oman has signed and ratified.

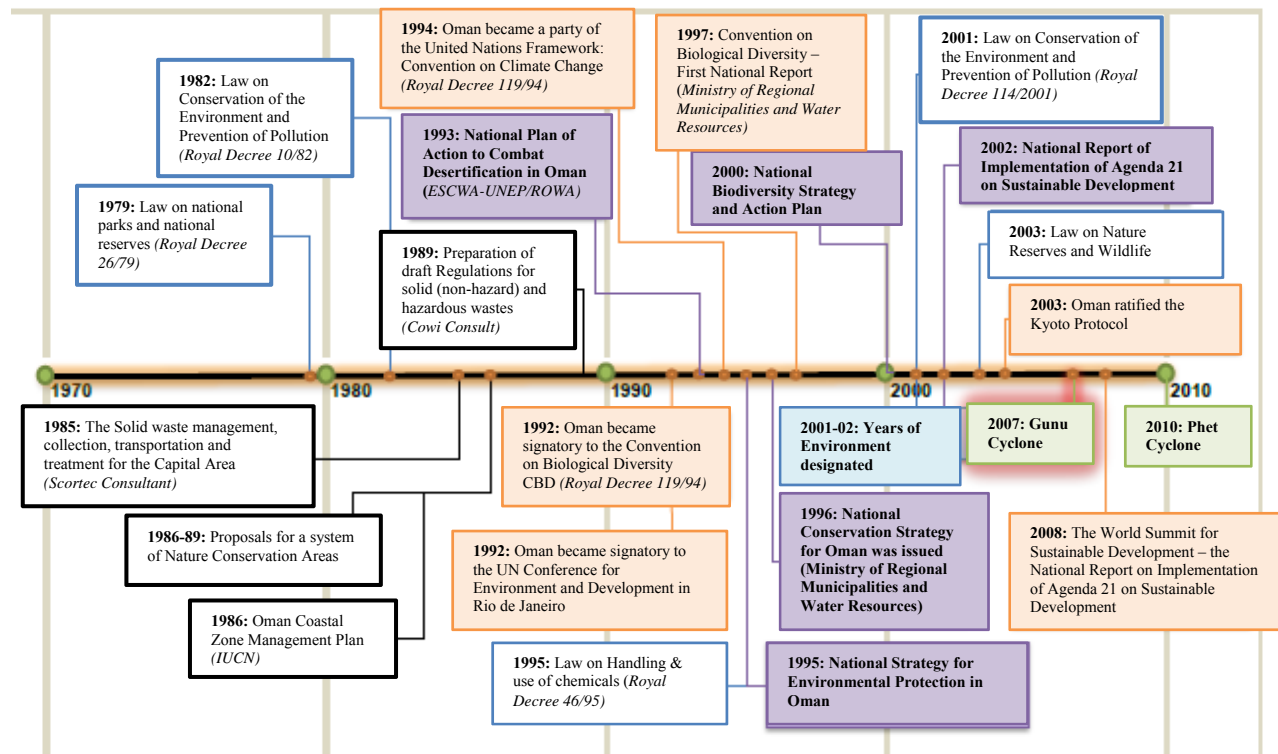


Figure 5.17 Timeline of the history of Environmental Protection in Oman

5.6.3.ENERGY STRATEGIES

A key document outlining energy strategies is the *Study on Renewable Energy Resources* commissioned by the *Authority for Electricity Regulation* and conducted by *COWI and Partners LLC* (COWI, 2008). The scope was to study different renewable energy sources (solar, wind, biogas, wave and geothermal energy) and compare the cost estimate of electricity of these sources with the present electricity cost in Oman using, primarily, Natural Gas. The study also aimed at providing an assessment of the available renewable energy technologies and the consultant's view of their technical suitability for use in Oman while also considering the incentives that could be developed to promote the use of renewable energy in Oman.

The study, which was reported on May 2008, found that there is a significant potential resource of renewable energy in Oman. It is summarized as follows (COWI, 2008):

- **Solar energy:** the level of solar energy density in Oman is among the highest in the world. There is significant scope for developing solar energy resources throughout Oman which has the potential to provide sufficient electricity to meet all of Oman's needs. The areas with the highest solar energy density are located in the desert, while the areas with the lowest solar energy density are located along the coastline and the southern mountains of Oman.
- **Wind energy:** the study has identified significant wind energy potential in coastal areas in the southern part of Oman and in the mountains north of Salalah. Wind speeds in these locations are comparable to recorded wind speeds at inland sites in Europe where large number of wind turbines are operating. The highest wind speeds occur during the summer months which coincide with peak periods of electricity demand.
- **Biogas:** the study finds it to have limited potential for electricity production.
- **Geothermal energy:** the study finds it to have limited potential for electricity production.
- **Wave energy:** the study finds the potential of wave energy to be marginal compared to solar and wind energy resources.

5.6.4.INTERPRETATION

1. There were significant **environmental** studies, projects, and treaties that were developed throughout the last forty years, and there was significant focus on sustainability themes and objectives.
2. In terms of **transport**, more strategic work and projects emerged in the second half of the study period (1990 to 2010). However, there has been a major Muscat Area Traffic Study every ten years or so: the first Oman Transport Survey (1973); Capital Area Transport study (1985); Muscat Area Traffic Study 1993-94; Muscat Area Traffic Study 2009 - Terms of Reference. In summary, for Oman, there were a total of 7 major transport studies for (1970 to 1990) and over 15 for (1990 to 2010).

5.7. Summary

Studying the history of urban development of Oman (1970 to 2010) as shown in this chapter, and following this with the problem analysis (Chapter 7) and process analysis (Chapter 8) will provide insights that will be useful for predicting the future problems, future implementation processes and challenges for the next forty years (2010 to 2050). This latter period is obviously the subject of the current strategy being undertaken by the government (Oman National Spatial Strategy).

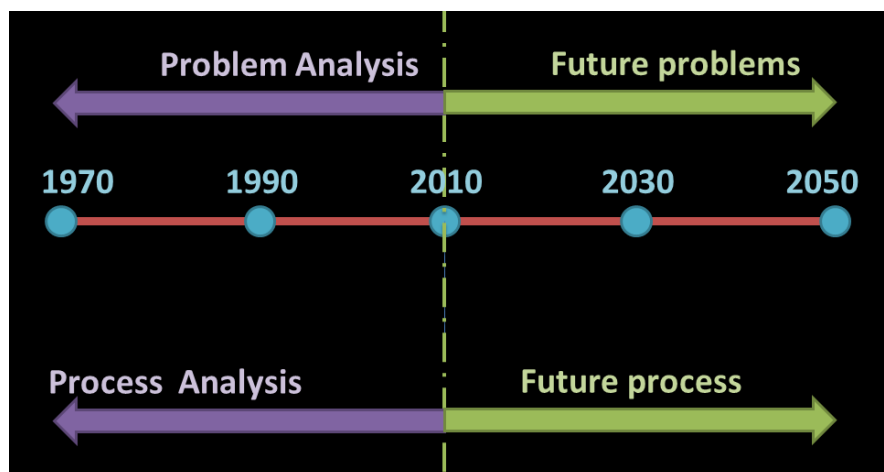


Figure 5.18 Past forty years (1970 to 2010) will help predict future urban development path for the next forty years (2010 to 2050)

The main purpose of this chapter was to develop a comprehensive understanding of the history of urban development in Oman between 1970 and 2010, and to provide insights into strategic initiatives towards sustainability that have been proposed throughout this period. After a brief review of the nature of built environment and urban development before 1970, the development after 1970 was reviewed, taking in consideration the objectives, main concerns and policies. This was followed with the urban planning governance, and the timeline of development as well as the terms of references for three main organizations were provided: SCTP, Ministry of Housing and Muscat Municipality. This was followed by identifying the hierarchy of urban planning in terms of levels: national spatial strategy, regional planning, town structural plans and local plans. The methodology for implementation of such plans was identified in section 5.4. The main focus of this chapter emerged in section 5.5 which identified the key urban planning strategies. Section 5.6 identified other areas such as transport, environment and energy. Finally, the chapter ends with analysis and identification of trends. This approach cemented the thesis statement that was developed earlier, and provides the resources required for identifying the applicable urban sustainability dimensions (USDs) specific for Oman, as will be reported in Chapter 6.

CHAPTER 6: THE FRAMEWORK – URBAN SUSTAINABILITY DIMENSIONS (USDs)

6.1. Overview

Two of the key gaps in knowledge identified in Chapter 3 are: **the gap of scope – which urban sustainability dimensions?** and **the gap of measurement**. The main purpose of this chapter is to cover these gaps, by defining a set of urban sustainability dimensions (USDs) that can be investigated and assessed. This will be used as a framework for investigating urban sustainability in Oman. It addresses objective 2 and question 4 discussed earlier in section 1.4.

To achieve this, literature associated with USDs and sustainability indicators is interrogated, leading to a description of the methodology for identifying the USDs relevant for Oman. The process consisted of five stages, which will be addressed in a series of sections within this chapter. The chapter ends with a summary, highlighting the omission of two USDs from the scope of this research.

6.2. WHY DIMENSIONS, NOT INDICATORS?

“Urban sustainability reporting is a tool for informing local government, as well as individuals, businesses, and other organizations, about the progress that they are making towards achieving urban sustainability” (Maclaren, 1996). There are many urban sustainability assessments methods that can be identified throughout the literature. “Indicators provide quantitative and qualitative information that help to determine urban development priorities” (Syrian, 2009).

While sustainability is contemporarily a global paradigm in urban development, this research project requires a framework that is responsive for its context. As described earlier in the literature review, chapter 3, sustainability has mostly been attributed with the traditional triangular dimensions: economy, environment, and society. Other researchers suggest additional dimensions such as: governance (Eastaway and Støa, 2004); institutional (Spangenberg, 2004); technology (Hasna, 2006); urban quality, urban flows and urban patterns. (Alberti, 1996); and (Seghezze, 2009) five dimensions of sustainability: *place* contains the three dimensions of space,

permanence is the fourth dimension of time, and the *persons* category represents a fifth, human dimension.

From the above, there is a wide variance between the use of urban sustainability indicators or urban sustainability dimensions. The indicators are somewhat more mature since they provide a quantitative measurement, whereas the dimensions provide a wider selection of topics that can be encompassed within the topic of urban sustainability. Since this research embarks upon a territory that is somewhat new and lacks earlier research into the performance measurement of sustainability, the researcher would resort to the choice of using urban sustainability dimensions.

The sections that follow will explore the contents and outcomes of each stage. However, before proceeding with the descriptive and illustrative analysis, it has to be mentioned that through extensive and comprehensive review of all literature resources for the three stages, the researcher was able to identify nine urban sustainability dimensions that were recurring as themes, indicators or dimensions across majority of these references. The researcher then decided to test this selection and derive its integrity and credibility by quantitative analysis as described in the following sections. The selected urban sustainability dimensions are reflected in each illustration in the columns, while the references are reflected in the rows.

6.3. STAGE 1: USDs IN GENERAL LITERATURE

The general literature that was employed in this task can be divided into four main segments: indicators and tools for measuring sustainability; reports developed by organizations and commissions; academic research work; and case studies that have some relevance to the context of this research project. A complete list of these resources and their evaluation are shown in Appendix D.

Table 6.1 below shows the comparative analysis between the four different types of general literature resources in terms of their association with the USDs. The figures here account for the number of times where the particular USD occurs in each literature resource.

Resource (out of number of references used)	Urban Planning	Urban Services	Urban Economy	Urban Environment	Urban Society	Urban Mobility	Urban Management	Urban Quality	Urban Resources
Indicators (out of 11)	6	9	3	11	3	8	3	9	9
Commissions (out of 5)	1	3	2	3	4	2	2	2	1
Academic (out of 11)	8	9	8	10	7	6	6	7	5
Case Studies (out of 7)	5	3	5	7	6	6	2	5	4
Total (out of 34)	20	24	18	31	20	18	13	23	19

Table 6.1 Comparison of USDs based on general literature review

6.4. STAGE 2: USDs IN OMAN TOWN PLANNING KEY CONCERNS

This section is the outcome of an analysis of 19 resources that correspond to the forty years (1970-2010) period relevant to the present study. Figure 6.1 illustrates the resources employed for this stage of the analysis whereas Table 6.2 shows the comparative analysis.

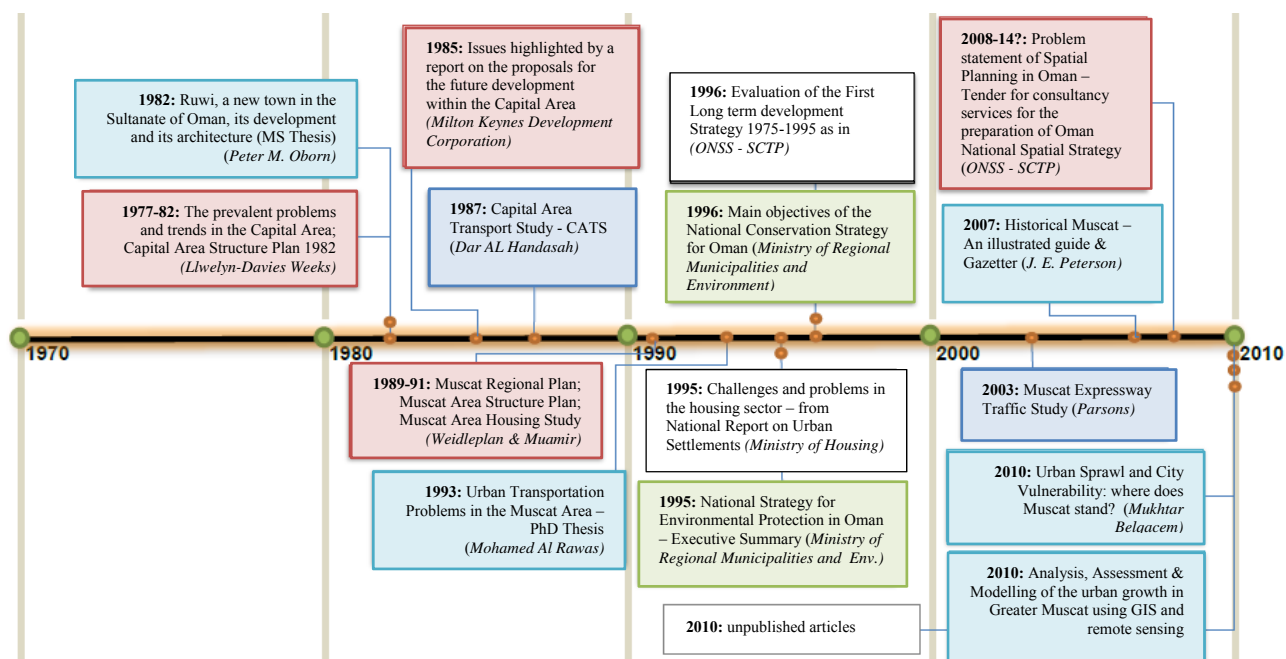


Figure 6.1 References for Oman Urban Planning key concerns

Resource (out of number of references used)	Urban Planning	Urban Services	Urban Economy	Urban Environment	Urban society	Urban Mobility	Urban Management	Urban Quality	Urban Resources
Key Concerns (out of 19)	16	7	11	6	13	10	11	0	10

Table 6.2 Comparison of USDs based on Oman Urban Planning key concerns

6.5. STAGE 3: USDs IN OMAN TOWN PLANNING AIMS AND OBJECTIVES

Figure 6.2, below, illustrates the 20 resources in more details along with the indication of the year when they were developed.

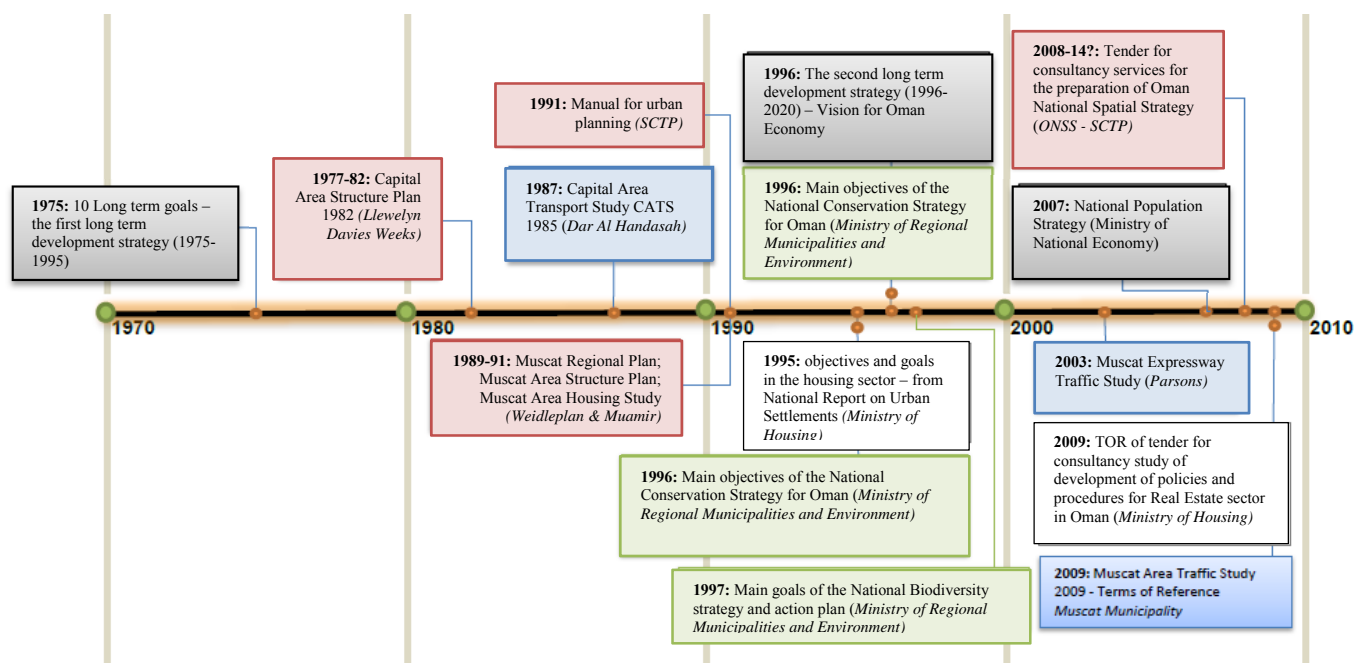


Figure 6.2 References for Oman Urban Planning aims and objectives

Table 6.3, below, shows the comparative analysis.

Resource (out number references used)	Urban Planning	Urban Services	Urban Economy	Urban Environment	Urban society	Urban Mobility	Urban Management	Urban Quality	Urban Resources
Aims & Objectives (out of 20)	10	11	14	9	15	5	11	4	10

Table 6.3 Comparison of USDs based on Oman urban planning aims and objectives

6.6. STAGE 4: USD MATRIX ANALYSIS AND SELECTION OF USD

Table 6.4, below, provides a complete summary of the analysis obtained for USDs across the three stages of analysis. When comparing the analysis between the global context and the local context, the order of importance of these USDs is clearly different. However, there is relatively equal importance for the first five USDs: *urban planning*, *urban services*, *urban economy*, *urban environment* and *urban society*. The least emphasized USD in the local context is *urban quality*.

Resource (out of number of references used)	Urban Planning	Urban Services	Urban Economy	Urban Environment	Urban society	Urban Mobility	Urban Management	Urban Quality	Urban Resources
1. Literature (out of 34)	20	24	18	31	20	18	13	23	19
2. Key Concerns (out of 19)	16	7	11	6	13	10	11	0	10
3. Aims & Objectives (out of 20)	10	11	14	9	15	5	11	4	10
Total (1+2+3) (out of 73)	46	42	43	46	48	33	35	27	39

Table 6.4 Summary of matrix analysis of USDs across the 3 stages

The following sections will address, in further details, the analysis for each USD, and the provision of additional sub-USDs in some cases.

6.6.1. USD 1: Urban Planning

The following Table 6.5 outlines the outcome of this matrix analysis for all three stages. It is clear that *Settlement Pattern*, *Urban Design* and *Land Use* are recurring themes that should be utilized to represent this USD in the agenda for urban sustainability in Oman.

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	total
1	Built Environment	6 architecture, respect for site, buildings, site & setting, context, Building construction practices	0	1 improving the policies/legislation continuously to enable housing strategies implementation, along with building regulations and codes	7
2	Public Open Space	6 Open Space & leisure, public realm, green space, green urbanism,	0	0	6
3	Settlement Patterns	3 Urban Territory & settlement patterns, urban sprawl, compact cities and regions,	10 dispersed population; linear urban development; dispersal of urban functions; ribbon development; Urban Sprawl, growth & physical expansion, scattered development, dissolving traditional urban centres, non-homogenous urban development; lack of hierarchical distinction of centres; dispersal of	7 to establish size, distance & functional relationships; development of new communities; Development of a distinct centrality pattern; Connecting urban settlements; provision of sufficient and unproblematic urban expansion possibilities; balanced urban growth	20

				settlements			
4	Urban Informality	2	Unplanned Settlements, urban informality	0		0	2
5	Urban Design	8	Urban Planning, Density, mixed-use, physical structure, urban form, Spatial Development, character, morphological dimension, urban design, urban Structure	8	inappropriate and unsympathetic application of Western design; design guide; The outdated of the existing spatial plans; Low density urban form, excess of commercial open space	5	urban expansion possibilities; strategic development; formulate planning standards and design criteria; sustainable spatial development; balanced urban growth
6	Land Use	7	Land distribution optimizing land use, sustainable land use, counter measures to urban sprawl,	11	unsuitable location; land use conflicts; distribution system; isolated development , land use restrictions, undeveloped areas; unsuitable intermix of land use; land distribution is not in accordance with economic value; imbalance in land distribution; inadequate or absence of land use and zoning plans; ineffective utilization of land	6	support of land use plans; Organization of the land use structure; to provide a solid framework for land use strategy; achieve optimization in land allocation; physical plan to define major land-use; zoning: separation of functions and use based on the geographical and natural state of the location
7	Waterfront management	1	Waterfront management			0	1

Table 6.5 Detailed analysis of Urban Planning USD

Stage 2: Oman Town Planning Key Concerns:

Muscat is characterized with a linear urban development along the coastal strip from Muscat to Seeb (Llewelyn-Davies, 1982). This is reaffirmed in *Muscat Regional Plan* (Weidleplan and Muamir, 1989b) whereby a coastal linear and ribbon development characterized Muscat urban planning, which lends itself to dispersal of urban functions, dissolving traditional urban centres, non-homogenous urban development (non-structural and unorganized), division of urban areas by highway, land ownership issues and land use conflicts.

(Peterson, 2004) reported this progress of ribbon development as “relentless, half planned and half-accidental in origin, Muscat's ribbon development continues to evince numerous problems”. (Belqacem, 2010) narrated that “dispersed population distribution of Muscat grew at the annual rate of 7.6% and that the built-up area of about 200 km² looks currently like a ribbon meandering throughout the narrow coastal prone areas as well as across slopes and *wadi* valleys”. It is asserted that Muscat suffers from urban sprawl, growth and physical expansion, as well as low density urban form (Housing, 2009c, Housing, 2009b).

There are issues associated with *land use* that have been recurring since early stages in urban development in Muscat. The following list of key concerns testifies to this critical USD:

- Existence of large undeveloped areas in the centre of the whole agglomeration (Adheiba) (Llewelyn-Davies, 1982).
- Location of industry along the Sultan Qaboos highway both in existing areas and areas yet to be developed is questioned (Milton-Keynes and Corporation, 1985) (Weidleplan and Muamir, 1989a).
- Land use conflicts between Seeb airport and residential areas; flood prone areas; mis-location of light industries (Ruwi, Muttrah, Wadi Kabir); unfavourable location of MOD area in Ruwi; unpredicted development of Adheiba zone; scattered development (Bausher along highway); Unorganized development (Seeb) (Weidleplan and Muamir, 1989a).
- The gradual dissolving of formerly defined land use functions, land use conflicts, mis-location of land uses, isolated development, non-utilization of land, under-utilization of land, unorganized development, up-grading areas, availability of land (Weidleplan and Muamir, 1989a).
- The change of land use from residential to commercial and the invariable mix-up, and the increasing number of multi-storey buildings around the commercial areas, particularly in Ruwi without providing car parks within the legal boundaries of the plots, create considerable pressure on the parking places and traffic movement (Al-Rawas, 1996).
- Land Distribution is not in accordance with its economic value (for example: Agricultural land not valued according to soil fertility or water availability) (MRMWR, 2005).
- Land conflicts and increase in land ownership conflicts among nationals which impact the progress of planning and development of new areas. This is coupled with frequent imbalance in land distribution (Housing, 1995).
- Inadequate or absence of land use and zoning plans, regulations and enforcement that meet sustainable development principles (SCTP, 2008b).
- The outdated of the existing spatial plans which resulted in inability to deal with the increasing demand for land from various sectors (SCTP, 2008b).

- Ineffective utilization of land and services due to low density and urban sprawl with pockets of land within towns in absence of clear vision for urban growth directions (SCTP, 2008b).

Stage 3: Oman Town Planning Aims and Objectives:

CASP 1982 (Llewelyn-Davies, 1982) was one of the first strategies that addressed objectives relating to urban planning as it aimed to establish size, distance and functional relationships among all old and current development areas, in addition to examining all available land for its development potentials. A few years later, *CATS 1985* (DarAl-Handasah, 1987) tackled this dimension and identified within its aim and objectives the development of new communities and support of land use plans. In contrast, *Muscat Regional Plan 1989* (Weidleplan and Muamir, 1989c) yielded towards existing centres, wherein the objective was towards supporting and development of existing population centres and communities as well as the organization of the land use structure.

Moreover, the aim of *Muscat Area Structure Plan 1989* (Weidleplan and Muamir, 1989a) was a strategic development guide for the planning area over the long term, as a physical plan to define major land-use areas, roads and utility corridors, town, district and local centres, and other public facilities, and to review the existing plans and current development trends with a perspective to formulate planning standards and design criteria for the preparation of alternative strategies. Subsequently, the objectives of the selected development concept for *Muscat Regional Plan* (Weidleplan and Muamir, 1990b), as part of its phase 3 report, were to achieve the development of a distinct centrality pattern in order to optimize the supply of goods and services to the population and to provide suitable conditions for economic development, as well as the provision of sufficient and unproblematic urban expansion possibilities for the time beyond 2010.

More recently, the aims of urban development in Oman, relevant to the *urban planning* USD have been written in accordance with more contemporary themes, one of which is sustainability. They were devised within *ONSS* (SCTP, 2008b) as discussed earlier in section 5.5.9.

6.6.2. USD 2: Urban Services

The following table 6.6 outlines the outcome of this matrix analysis for all three stages. The researcher opted to select four out of the six sub-USDs in this category as part of the agenda for addressing urban sustainability in Oman: *housing, energy (electricity), water service, and municipal services*.

	Sub-USD	Stage 1 Literature review (out of 34)		Stage 2 Oman Key concerns (out of 19)		Stage 3 Oman Aims (out of 20)		Total
1	Health Facilities	6	public health	1	Health facilities	2		9
2	Education Facilities	2	proactive education, social services	4	insufficient school and vocational training facilities	3		9
3	Housing	2	Shelter	5	housing demands, public housing, housing market, unsuitable housing conditions	4	enable housing strategies implementation; adequate housing	11
4	Energy (Electricity)	12	conserving energy, performance, resourceful energy, efficiency	2	power quality; Insufficient power supply	1		15
5	Water Service	8	Water use, efficiency	3	criteria used for consumption and water main dimensions; water network efficiency	1		12
6	Municipal Services	8	Urban Services, local community services, basic human needs, amenities, waste and waste management	5	large part of the population is still inadequately supplied with development infrastructure; deficiency in provision of infrastructure and basic services	7	Identify the strategic needs of the country in terms of infrastructure and services; completion of the infrastructure; necessary basic services.	20

Table 6.6 Detailed analysis of Urban Services USD

Stage 2: Oman Town Planning Key Concerns:

(Milton-Keynes and Corporation, 1985) report provides some glimpses of the issues associated with *urban services* in the earlier periods of development. With respect to housing demands, demand and supply were at that period better balanced and the challenge was for the government to ensure there will not be a considerable surplus of middle priced housing. The consultants also advised that housing should be located close to employment and that development of large numbers of public houses of the same or very similar design should be avoided for better environment. Other issues included inadequate sewage treatment and sewerage, different criteria used for water consumption and water main dimensions, inconsistent parameters used for surface water, and that the power quality could be improved by installing power cables underground.

In the early 1990s, the survey report for phase 1 of *Muscat Regional Plan* (Weidleplan and Muamir, 1989b) recorded the following issues associated with *urban services* USD:

- Lack of certain social infra-structure.
- Unsatisfactory water supply situation: high water losses in the supply system, and high domestic water consumption.
- Water network efficiency: "it is assumed that approx. 30% of the water fed into the network is lost".
- Insufficient power supply.
- Insufficient waste water disposal system and waste water dumping.
- Unsuitable housing conditions (location in flood prone areas, negative visual impact).
- Increasing demand for housing and preference of independent and modern housing units resulting in higher demand for land.
- Large part of the population is still inadequately supplied with development infrastructure.

The geographical nature and dispersal of settlements throughout Oman lead to deficiency in provision of infrastructure and basic services (Housing, 1995). Because of the insufficient social infrastructure: "social utilities and services will be put under pressure" (Al-Awadhi, 2007).

In terms of energy use, (Oborn, 1982) states that "with the advent of oil came the new ubiquitous air-conditioner and this has undoubtedly done more to influence the style of building since that time than any other single factor as it has relieved the designer from what would otherwise have been his first consideration; namely climate control".

Stage 3: Oman Town Planning Aims and Objectives:

The sixth goal contained within the 10 long term goals for *The First long term development strategy (1975-1995)* (SCTP, 2008b) clearly stipulates the government commitment to the completion of the infrastructure. Almost 15 years afterwards, the provision of basic needs supply was still a target, as specified in *Muscat Regional Plan (Weidleplan and Muamir, 1989b)*. It goes further to declare that one of the objectives of the selected development concept is to optimize the supply of goods and services to the population.

The National Report on Urban Settlements (Housing, 1995) makes allowance for provision of the general services and facilities (infrastructure for housing) in line with the plans and project of housing and to enable housing strategies implementation.

The sixth goal of the *Second long term development strategy (1996-2020)* (Economy, 1996) (SCTP, 2008b) addresses this issue as discussed earlier in section 5.1.2. More recently, *ONSS* aims to improve and upgrade the social services and infrastructure in both urban and rural areas including housing, water and electricity services, cultural and recreational facilities, and define indicators for sustainable urban and rural development in an integrated manner (SCTP, 2008b).

One of the main objectives for *Real Estate Sector consultancy (Housing, 2009a)* is developing the practices and legislation required to provide adequate housing with low cost for the low and medium-wage sections of the society based on a joint partnership between the public and private sector. In terms of planning criteria and policies, the Ministry of Housing sets out to develop settlements with basic services and infrastructure that is sufficient for the population forecasted and to ensure harmony in planning of residential settlements with the overall structural plan of the city (Housing, 2009b).

Finally, in its second goal, the *Eighth Five-Year Development Plan (2011-2015)* clearly demonstrate the government obligation with regards to *urban services* USD by declaring the priority of improving the infrastructure and basic social needs through upgrading of education quality, expansion in higher education, improvement in the quality of health services and its close vicinity to citizens (Ministry of Finance, 2010).

6.6.3. USD 3: Urban Economy

The following Table 6.7 outlines the outcome of this matrix analysis for all three stages. For simplicity, holistic and focused approach, the researcher finds it justified to proceed with the selection of *economic development* as the main sub-dimension in this USD category.

	Sub-USD	Stage 1 Literature review (out of 34)		Stage 2 Oman Key concerns (out of 19)		Stage 3 Oman Aims (out of 20)		Total
1	Economic Diversification	1	diversity, mix	4	One sided socio-economic development	5	Emphasizing a diversification of the economy	10
2	Local Economy	5	Urban Economy, local economic development	1	Concentration of economic activities in Muscat	2	domestic trading activities, balanced regional development	8
3	Production	1	Productivity	2	Consumption patterns, low level of private savings, poor productivity	0		3
4	Tourism	1	tourism	3	lack of tourist infrastructure	2	establishing a high quality structure for nature tourism and recreational facilities	6
5	Economic Development	11	Economy, vitality, growth, efficiency, performance, public investment	7	Limited national market, small market	8	provide suitable conditions for economic development, Reinforcement of economic sectors with high growth potentials, stable macro-economic climate, achieving a balance between government revenues and expenditures	26
6	Employment	4	employment creation, local labour market	5	employment opportunities, Unemployment	2	create job opportunities for Omanis, better spread of job opportunities	11
7	Long term stability	3	Long term stability	1	economic set back	0		4
8	Regional & International Economic Cooperation	0		1	insufficient development of inter-regional linkages	4	Intensification of regional economic cooperation among G.C.C. member, economic efficiency and global competition	5
9	Private Sector	0		3	limited growth and diversity of private sector activities	5	private sector activity, encouraging the private sector to participate in the housing sector, competitive private sector, Organizing the real estate sector	8

Table 6.7 Detailed analysis of Urban Economy USD

Stage 2: Oman Town Planning Key Concerns:

(Llewelyn-Davies, 1982) reported an apparent excess of commercial floor space in the Eastern Capital Area compared to demand and location and that the implementation of Ruwi CBD to be reconsidered. In addition, there was rapid residential development in Seeb without support by employment opportunities.

(Weidleplan and Muamir, 1990b), and (Weidleplan and Muamir, 1991c) outlined the following concerns associated with *urban economy* USD:

1. Limited national market.
2. Economic stagnation of 1985: the number of foreign labour was reduced by approximately 40,000 "when the booming economy started to calm down since the oil

revenues, affected by the sharp breakdown of crude oil prices on the world market, went down dramatically".

3. One-sided socio-economic development: economy is highly dependent on oil revenues; hence high correlations between world oil market and the country's development.
4. Competitive disadvantage of the local industry compared to neighbouring countries.
5. Over supply of commercial facilities.
6. Insufficient development of inter-regional linkages.
7. Unemployment, economic pressures, dependence on government subsidies.
8. Concentration of economic activities in Muscat.
9. Limited industrial expansion potential, hence, high government input necessary to boost the economy.
10. Rapid residential development in Seeb without support by employment opportunities (same words used in CASP 1982 (Llewelyn-Davies, 1982), as stated above).
11. Excess demand and speculation pushed the prices on the rental market to an extremely high level.
12. Lack of tourist infrastructure: beaches and beach development neglected, restricting attractive beach areas for the public, limitation of international tourism.

(Al-Rawas, 1996) attributed some of the transportation problems to employment: "the expansion of the Muscat Area was accompanied by changes in the employment and residential pattern".

The National Conservation Strategy for Oman attributes some of the environmental issues to economy as well (MRMWR, 1995):

- Small market leads to poor scale of economy and profitability.
- Subsidy and investment in agriculture did not lead to growth and productivity.
- In the early stage of national development, priority was given to expenditure in the army and national security sector at the expense of other crucial development priorities.
- Consumption patterns yield excess of waste.

The evaluation of *The First long term development strategy* (1975-1995) (SCTP, 2008b) confirms some of the above symptoms and attempts to identify the main reasons behind these concerns:

1. Increasing deficit in the general budget.
2. The dependence of the national economy on a single non-renewable resource (oil).
3. The weak integration between the oil sector and other production and services sector.
4. The dominance of the government role in the goods and service production fields, which limit the opportunities available for the private sector.
5. The lack of certain laws and systems for provision of a suitable environment for the growth and diversity of private sector activities.
6. Low level of private savings and investment rates and increasing consumption tendencies.
7. The poor productivity of human resources, the low status of some professions and handicrafts, in addition to their insignificant contribution to the national economy.

Stage 3: Oman Town Planning Aims and Objectives:

Both *The First long term development strategy (1975-1995)* (SCTP, 2008b) and *The Second long term development strategy (1996-2020)* (Economy, 1996) (SCTP, 2008b) has set out certain economic objectives as discussed earlier in section 5.1.2. Almost fifteen years after, (Weidleplan and Muamir, 1989b) identified the following economic goals:

1. Emphasizing diversification of the economy.
2. Reinforcement of economic sectors with high growth potentials.
3. Intensification of regional economic cooperation among G.C.C. member states.

The following goals and objectives associated with urban economy USD were incorporated into *ONSS* (SCTP, 2008b):

- Achieving more balanced regional development by enabling all urban and rural areas to reach their potential regardless of its size and location.
- Better spread of job opportunities.
- Diversification of the national economy by optimum utilization of human and natural resources.
- Facilitating the development of various enterprises including industries, services, fisheries and tourism activities so as to assist balanced and sustainable development and even maintain competitive positions in the global market.

6.6.4. USD 4: Urban Environment

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	Total
1	Air Pollution	5 clean air, pollution, smog, Ecological Toxicity	2 crowding & pollution		7
2	Noise Pollution	2			2
3	Biodiversity	3 living systems, biodiversity		3 protecting wildlife habitats, conserving wildlife habitats and biodiversity of fauna and flora	6
4	Environment Protection	23 Urban environment, environment, sustainability, planning, justice, protection, quality, closed loop systems, restoration, ecology	3 Poor response to environmental protection, tree cutting, crowding leads to pollution	9 Maintenance and rehabilitation of the environment, ecological balance, protection, nature conservation, harmony, secure spatial environmental quality and diversity	35
5	Climate Change	7 atmosphere, make carbon history, Ozone depletion, reducing CO2 omission	5 desertification, soil erosion, coastal erosion, flash flooding, severe water shortage,		12

Table 6.8 Detailed analysis of Urban Environment USD

The above Table 6.8 outlines the outcome of this matrix analysis for all three stages. The main sub-dimension in this category by far is *environment protection* followed by *climate change*.

Stage 2: Oman Town Planning Key Concerns:

The climate in Oman is characterized as arid, hot, humid, dry, and severe. Moreover, with no need of further elaboration, Oman suffers from water degradation and draught which leads to consequences of severe water shortage. *The National Conservation Strategy for Oman (MRMWR, 1995)* identifies, furthermore, the following key challenges associated with the environment: desertification, soil erosion, coastal erosion, growth in animal grazing, tree cutting which leads to degradation in quality and quantity of plant cover and the loss of its nutritional value, which was exaggerated by government subsidy to meat production.

(Belqacem, 2010) attributes some of the environmental challenges to climate change events, especially when analyzing flash flooding and surface water. (Al-Awadhi, 2007) elaborates that "crowding and pollution will have a negative impact on the endeavours to develop tourism sector".

Stage 3: Oman Town Planning Aims and Objectives:

CATS 1985 (DarAl-Handasah, 1987) addressed the improvement of the environment, whereas Muscat Regional Plan (Weidleplan and Muamir, 1989b) addressed the maintenance and rehabilitation of the ecological balance in order to secure the viability of specific economic sectors and to provide a healthy environment. The following supplements this approach, and clarifies the extent of devoted efforts towards this main USD throughout the period of urban development identified as part of this research project.

1. *Manual for Urban Planning* (SCTP, 1996): “The general policy for urban planning aims specifically to create the necessary elements for the natural environment and its protection so that it may be attractive and functional in the long term”.
2. Main Objectives of *The National Conservation Strategy* (MRMWR, 1995):
 - a. Monitor the Sultanate's achievements in the field of nature conservation and protection of the environment.
 - b. Suggest the most convenient and successful solutions towards negative effects and define the best ways or methods towards compatibility and harmony between nature resources and sustainable development.
3. Main Goals of *The National Biodiversity Strategy and Action Plan* (MRMWR, 1997):
 - a. Protecting wildlife habitats and productive renewable resources for sound and sustainable use.
 - b. Conserving wildlife habitats and biodiversity of fauna and flora, particularly those of special significance.
 - c. Improving knowledge on eco-systems and elevating resource management capacities.
 - d. Spreading awareness on the importance of biodiversity conservation and the sustainable use of biological resources.
4. *ONSS* (SCTP, 2008b): Secure spatial environmental quality and diversity for a high quality of life through a comprehensive development of environmental management strategy.

6.6.5. USD 5: Urban Society

The following Table 6.9 outlines the outcome of this matrix analysis for all three stages. The researcher finds it justified to select both *social equity* and *public participation* in the list of USDs that should form the agenda of urban sustainability in Oman.

	Sub-USD	Stage 1 Literature review (out of 34)		Stage 2 Oman Key concerns (out of 19)		Stage 3 Oman Aims (out of 20)		Total
1	Urban Identity	4	identity & imaginability, memorialization	0		0		4
2	Culture & Heritage	4	evolving cultures, cultural needs, arts	2	Limitation of leisure and entertainment facilities, loss of historical & cultural legacy	3	conformity with the Islamic and Cultural heritage, cultural and recreational facilities, respecting the social/cultural norms	9
3	Diversity	3	diversity	1	social mix	0		4
4	Community	9	community making, self-reliance, mixing activities, mixing tenures, sociability, sustainable urban society	0		2	community interconnection, family bond	11
5	Public Participation	8	self-determination & inclusion, respect for users, opportunities, good governance, democracy	2	Limited Public participation in the planning process	2	enhancing the participation of all resources, enhancing public participation in planning	12
6	Social Equity	10	social benefits, equal access, attention to deprived neighbourhoods	1	lack of equality and balance in distribution of loans	10	Equitable distribution of National Investment among the geographic regions, Reduction of intra- and inter-regional disparities, fair distribution of revenue	21
7	Human Resources	0		6	High share of non-Omanis in industrial labour, Lack of local skilled workers	9	to emphasize on the development of national human resources, Mobilization of human resources	15
8	Population Growth	0		6	Population growth, immigration and foreign labour, rapid demographic growth	2	maintenance against the mass migration	8

Table 6.9 Detailed analysis of Urban Society USD

Stage 2: Oman Town Planning Key Concerns:

CASP 1982 has explicitly stated that there was a rapid demographic growth from about 56,000 to 222,000 (1970-1980), and that the concentration of more than half of the population was in the Eastern Capital Area (Muscat, Muttrah, Ruwi) covering only 5% of the usable land (Llewelyn-Davies, 1982).

(Weidleplan and Muamir, 1990b), and (Weidleplan and Muamir, 1991c) reported more extensive concerns relating to *urban society* USD:

- High natural population growth rate: hence, large recurring investment necessary towards the infrastructure.
- Lack of local skilled workers resulting in high share of expatriate workers.
- High share of young children: hence, in near future, large share of population will enter the labour market and seek for suitable jobs.

(Housing, 1995) contained similar concerns: “lack of local skilled workers in housing and construction sector and lack of equality and balance in distribution of loans by Oman Housing Bank between the various regions, along with bias in distribution of loans to low-income groups which constituted only 3.9% of overall loans in 1993.”

Likewise, the evaluation of *The First long term development strategy (1975-1995)* (SCTP, 2008b) contained similar conclusions as reported earlier in section 6.6.3. Furthermore, the problem statement of spatial planning in Oman as in *ONSS* (SCTP, 2008b) clearly stated the “limited *public participation* in the planning process”.

Stage 3: Oman Town Planning Aims and Objectives:

Undoubtedly, since the early 1970s, the government acknowledged the importance of initiating the future infrastructure and social development with this key USD, *urban society*, at the core of its strategy. This is evident amongst the ten long term goals for *The First long term development strategy (1975-1995)* (SCTP, 2008b) and *The Second long term development strategy (1996-2020)* (Economy, 1996) (SCTP, 2008b) as reported earlier in section 5.1.2.

(Weidleplan and Muamir, 1990b) and (Weidleplan and Muamir, 1991c) outlined the following aims and objectives associated with *urban society* USD:

- Equitable distribution of national investment among the geographic regions.
- On-going development activities and growth in new areas in conformity with the Islamic and Cultural heritage.
- Mobilization of human resources.
- Reduction of inter-regional disparities by directing the physical and socio-economic development towards the neighbouring regions.

The National Report on Urban Settlements (Housing, 1995) identified the following objectives and goals which are associated with this USD:

- Construction on the residential plot and provision of adequate housing for the Omani family (with respect to privacy, space, security, lighting, ventilation, infrastructure and workplace) taking into consideration the community interconnection, family bond and basic housing needs of the Omani family.
- Enhancing the participation of all resources (human and physical) in development for provision of adequate housing.
- Equitable distribution of national investment among the geographic regions.
- Developing the human resources to manage and implement the housing policies and projects.

(MRMWR, 1995) confirmed the role and position of the Omani people as an integral part of the means and objectives of development. Comparably, (MRMWR, 1997) targeted the fair distribution of revenue from the sustainable use of resources, including genetic resources, on both national and regional levels.

ONSS (SCTP, 2008b) has also identified similar objectives:

- Improve the standard of living of citizens, reduce disparities among regions and ensure that all citizens will benefit from development outcomes.
- Fostering geographical balance through equitable distribution of development programs among the various Governorates/regions of the Sultanate and utilize the comparative advantages of each Governorate/region and to sustain intra- and inter-regional integration.
- Achieve higher level of participation of national workforce in economic activities through generating employment opportunities, well developed education system and training facilities, highly qualified skilled workforce, social and cultural services.

Finally, *The Eighth Five-Year Development Plan (2011-2015)* reflects the trend stated above (Ministry of Finance, 2010): maximizing the social return of development in a way that positively reflects on citizens' life.

6.6.6. USD 6: Urban Mobility

The following table 6.10 outlines the outcome of this matrix analysis for all three stages. It is clear that *Transport Infrastructure* and *Traffic and Congestion* are the most prominent recurring themes that can be utilized to represent this USD in the agenda for urban sustainability in Oman. *Public Transport* is surprisingly not mentioned within the selected resources for stage 3 that addressed Oman town planning aims and objectives, although it is obviously the second most important sub-dimension within the general literature. Since this USD is drastically important for any urban setting, and since plenty of other research projects and studies have been delivered in this regards, the researcher opted to select *urban transport* as the main sub-dimension that will be included in the agenda of US.

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	Total
1	Public Transport	6 passenger transportation, public transport, transit	3 insufficient public passenger transport	0	9
2	Transport Infrastructure	11 Transportation,, efficient transportation, infrastructure	9 highway network has certain structural weaknesses, limited roads	4 developing a hierarchy of road network within the urban settlement, to establish an overall regional road network	24
3	Accessibility & connectivity	5 local mobility, access & permeability, connectivity	1 restricted accessibility	1	7
4	Walkability	3	1 absence of pedestrian segregation	0	4
5	Cycling	2	0	0	2
6	Traffic & Congestion	1	10 traffic problems, slow-moving traffic onto the roads with heavy congestion	2 to develop a strategic traffic model	13
7	Parking	1	3 major problems of parking facilities, car parking prevailing inadequacies	1	5

Table 6.10 Detailed analysis of Urban Mobility USD

Stage 2: Oman Town Planning Key Concerns:

(Llewelyn-Davies, 1982) reported the undesirable conditions in Muttrah due to traffic problems and commercial activities. (Milton-Keynes and Corporation, 1985) highlighted that there was a lack of accurate traffic forecasts, that there were no standards for street lighting and that the authority for its management was not known, and that there was absence of pedestrian segregation.

CATS 1985 reported that the existing highway network has certain structural weaknesses which cause traffic to take indirect routes or use low capacity roads resulting in serious congestion. In particular, “there are a number of missing links and bottlenecks. The main strategic weakness of the existing highway network is the existence of only a single corridor in the middle of the Capital Area” (DarAl-Handasah, 1987).

(Weidleplan and Muamir, 1990b) reported the following major transportation issues: a clear, readily recognizable road network hierarchy does not exist; urban road network dominated by the east-west traffic corridor; roundabouts are traffic bottlenecks; existing highway network has certain structural weaknesses which cause traffic congestion; traffic lights are not coordinated; very little consideration given to pedestrians and cyclists; public transport operate in competition rather than complementary; very limited buses; and major problems of parking facilities.

Stage 3: Oman Town Planning Aims and Objectives:

One of the main objectives of the *CASP 1982* (Llewelyn-Davies, 1982) was to establish an overall regional road network. In their final report for *CATS 1985*, (DarAl-Handasah, 1987) identified the following clear targets:

- Alleviation of traffic congestion.
- Improvement of road safety.
- Improvement of accessibility.
- Control of parking.
- Efficiency of transport infrastructure.

(Housing, 2009b) identified the policy associated with urban mobility: developing a hierarchy of road network within the urban settlement and linking it with the work and production/economical hubs.

6.6.7. USD 7: Urban Management

The following table 6.11 outlines the outcome of this matrix analysis for all three stages. It is clear that *Urban Development Management* is the main recurring theme that can be utilized to represent this USD.

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	Total
1	Administration	3 Management, decentralization	6 Bureaucratic administrative & financial systems, poor efficiency	2 promotion of the efficiency of the state administrative apparatus	11
2	Local Authority	2 Sustainable management of local authority, performing local tasks in responsible manner	0	0	2
3	Urban Development Management	7 holism, managing urban flows, official planning activities & policies	8 execution problems: expediency, planning control, Uncontrolled & unorganized development, authorities consumed by legal issues/conflicts, lack of an organization capable of undertaking transport planning functions, lack of appropriate and strategic plans/procedures, unknown procedures/organization responsible for compensation, weak urban planning and urban management capacities, Urban plan proposals are shelved/not implemented	8 to suggest an integrated development policy and implementation programme, basis for coordination and decision making, define the main features and priorities of a realistic program to implement, define the way to improve the planning system, achieve a balanced urban growth, achieve integration between planning activities and policies	23
4	Data Management	0	5 poor forecasts, population forecasts, Lack of information database strategy, Inadequate maps and information	3 road and traffic data collection, developing an information management system, quality of information	8
5	Legislation and Policy	2 policies	7 highway standards, lack of enforcement measures for regulations and legislations, lack of certain laws and systems	5 completion of the constituents, propose political, institutional, legislative and coordination frameworks, improving the policies/legislation	14

Table 6.11 Detailed analysis of Urban Management USD

Stage 2: Oman Town Planning Key Concerns:

One of the earlier town developments in Muscat, Ruwi, had amongst its execution problems: expediency, and the failure to implement legislation to control development (Oborn, 1982).

In subsequent years, urban development management was scarred with more issues of the same nature. (Weidleplan and Muamir, 1989b) reported that development was uncontrolled and unorganized, and that housing and planning authorities were consumed by legal issues and conflicts on land ownership and compensation. These same concerns were reaffirmed by (Housing, 2009c).

(Al-Rawas, 1996) attributed the transport problem in Muscat to the lack of an organization capable of undertaking transport planning functions. He proclaims that “the authorities that share

the responsibility have their own priorities, and the problem is exacerbated by inadequate co-ordination and general lack of clarity as to who does what”.

In addition to the above key concerns, the following were and continue to be chronic to the urban development management in Oman, as evidenced by various resources:

- Poor coordination between different governmental planning tiers and agencies that deal with spatial and physical planning which resulted in improper locations of development sites and conflicting land uses (SCTP, 2008b) (MRMWR, 2005).
- Weak enforcement (or absence) of regulations of planning standards, policies and development control due to absence of executive enforcement tools (MRMWR, 2005).
- Speed of development and utilization of inappropriate technologies, inadequate management of natural resources (MRMWR, 2005).
- Lack of appropriate and strategic plans and procedures in management of natural resources (MRMWR, 2005).
- Poor production efficiency in the government system (SCTP, 2008b).
- Weak urban planning and urban management capacities, particularly outside Muscat area.
- Bureaucratic administrative and financial systems within government slows and undermines planning development projects (Housing, 1995, Housing, 2009b).
- Lack of information database strategy and inadequate information on various planning levels in addition to inefficient data management systems (SCTP, 2008b, Housing, 1995)

Stage 3: Oman Town Planning Aims and Objectives:

To address urban development management, at various periods of development, the government identified the following aims and objectives:

1. Promotion of the efficiency of the state administrative apparatus (SCTP, 2008b).
2. To suggest an integrated development policy and implementation programme (Llewelyn-Davies, 1982).
3. The structure plan will form the basis for coordination and decision making which relates directly to physical development (Weidleplan and Muamir, 1989a).
4. Goals and objectives of ONSS (SCTP, 2008b):

- a) Define the way to improve the planning system and to bring people together in the planning process, and to structure and feed their debate on the environment, social, economic and other issues of strategic decisions.
- b) To improve the planning process and the quality of information used in the process (data management strategy).
- c) Implementation of the proposed strategy.
- d) Setting adequate policies and adopting planning standards that provide solutions for factors affecting rural urban-migration and guarantee integration and linkages between urban and rural areas.
- e) Achieve integration between planning activities and policies and availing required data for planning purposes and decision.

6.6.8. USD 8: Urban Quality

The following Table 6.12 outlines the outcome of this matrix analysis for all three stages. It is clear that *urban quality* as a main USD is not mentioned as a key concern in any of the resources used for this stage. Hence, for the sake of comprehensiveness and simplicity, for this USD, the researcher resolved to retain the main USD of *urban quality* to be included in this agenda of urban sustainability in Oman.

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	Total
1	Well Being	4 individual well-being			4
2	Liveability	4 liveability, liveable cities			4
3	Safety	1			1
4	Public Realm	4 place making, public realm			4
5	Aesthetics	2 appearance, visual		2 attractive, aesthetics and visual appearance of the urban setting	4
6	Innovation & Creative design	7 adaptability, complexity, uniqueness, innovation, quality design, technology			7
7	Urban Quality	1 urban quality		2 better quality of life, for a high quality of life	3
8	Daylight & Air Quality	4 daylight, outdoor air quality			4
9	Balance & sustainable urban life	4 balance, sustainable urban life			4

Table 6.12 Detailed analysis of Urban Quality USD

Stage 2: Oman Town Planning Key Concerns:

The researcher has not come across any specific or explicit key concern in Oman urban development relating to urban quality within the references reviewed as part of this analysis.

Stage 3: Oman Town Planning Aims and Objectives:

The most recent publication of this USD can be located within SCTP *Urban Planning Criteria manual* (SCTP, 1996): “The general policy of urban planning aims specifically to create the necessary elements of the natural environment and conservation so as to be attractive and effective in the long run”.

More recently, the objectives of a *better quality of life* and for a *high quality of life* were identified as part of the goals and objectives of ONSS (SCTP, 2008b).

6.6.9. USD 9: Urban Resources

The following Table 6.13 outlines the outcome of this matrix analysis for all three stages. It is clear that *Land Resources* and *Resource Consumption* are recurring themes. However, the researcher opted to tackle this USD under its main title *urban resources* rather than utilizing its sub-dimensions.

	Sub-USD	Stage 1 Literature review (out of 34)	Stage 2 Oman Key concerns (out of 19)	Stage 3 Oman Aims (out of 20)	Total
1	Water Resources	0	4 limited water supply, Salination of groundwater, Water degradation	2 water resources as it is vital element for the continuation of the economic activity	6
2	Renewables & Non-Renewable Resources	4 minimal use of non-renewable resources, Fossil Fuel Depletion, renewable energy and closed-loop cities	1 expected gradual decrease in oil reserves in the coming 25 years	5 focus on renewable resources, increasing the average production rates of crude oil, productive renewable resources	10
3	Land Resources	1 consumption of space, Geographical nature	8 Government organizations reserve large volume of land, shortage in land, land-use restrictions, Reserving land for speculative purposes; the geographical nature lead to deficiency in provision of infrastructure and basic services	3 to examine all available land, optimize utilization of land	12
4	Materials	5 stewarding materials, materials	0	0	5
5	Agriculture	1 food hinterland	2 Poor agricultural sector (insecurity of food supplies), Agricultural sector is dominated by traditional methods	0	3
6	Resource	1 sustainability, resource	2 the development surge was	5 working towards	18

consumption	1	efficiency, use, minimizing new resources, resources consumption should be minimized	accompanied by a misconception of unlimited resources; poor production efficiency in the government system and inefficient utilization of available resources	development of new resources, safeguarding of scarce resources, Rational utilization of scarce natural resources, public-private partnership in managing and utilization of natural resources
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Table 6.13 Detailed analysis of Urban Resources USD

Stage 2: Oman Town Planning Key Concerns:

It is with no doubt that the constraint to growth, in Oman, has and will always be limited by water supply, and this has been clear even to the foreign consultants working in Oman (Oborn, 1982). (MRMWR, 1995) has also declared that water resources are in critical shortage condition with no foreseeable improvement in the future.

Land resources have also been a key concern. As part of their survey report for *Muscat Area Structure Plan 1989*, Weidleplan and Muamir have identified a trend of reserving land for speculative purposes and economic gain: "those that wish to use allocated land for speculative purposes instead of for residential development and thus avail themselves of public funds for personal gain should be required to compensate society with costs incurred on their behalf".

Another key concern is the inefficient utilization of resources. This probably emanates from misconception of unlimited resources which has accompanied the development surge (MRMWR, 1995). SCTP has identified a recurring concern with urban development in the poor production efficiency in the government system and inefficient utilization of available resources (SCTP, 2008b). This situation is further compounded with the expected gradual decrease in oil reserves in the coming 25 years.

Stage 3: Oman Town Planning Aims and Objectives:

From the onset of development, the government identified the importance of working towards development of new resources for the national income beside the income from oil resources and replacing it in the future. Moreover, attention shall be given to water resources as it is vital element for the continuation of the economic activity and its development (SCTP, 2008b).

The plans developed by Weidleplan and Muamir had the following aims that were specific to this USD: safeguarding of scarce resources (including water resources, land resources, and

mineral and non-mineral resources) (Weidleplan and Muamir, 1989b); identifying linkages between resources and activities (Weidleplan and Muamir, 1989a); and rational utilization of scarce natural resources (Weidleplan and Muamir, 1989c).

(MRMWR, 2005) addressed this USD more specifically. Amongst its objectives is “the focus on renewable resources by means of monitoring and analyzing factors defining or affecting their productivity plus conducting accounts of renewable resources to determine the relation between supply and demand for each, together with measuring and determining their availability and ability to meet the current and future development and life requirements in Oman”. (MRMWR, 1997) shared a similar objective: “protecting wildlife habitats and productive renewable resources for sound and sustainable use”.

More recently, *ONSS* (SCTP, 2008b) identified the following aims and objectives in relation to *the urban resources* USD:

- Confirm the importance of sectorized integration methodology of national cooperation for the use of resource management.
- Optimize utilization of land and natural resources by proper allocation of land for development of economic sectors, social and physical infrastructure while protecting the environment including natural and cultural heritage.
- Achieve public-private partnership in managing and utilization of natural resources and implementation of development programs to serve the national goal.

6.7. STAGE 5: USD DEFINITION

The following table 6.14 contains the researcher’s definition of the selected USDs that form the agenda for urban sustainability in Oman. These definitions were developed using the various resources within the three stages of this analysis, as outlined in earlier sections of this chapter. The words were carefully selected based on the frequency of their use in all of these resources, with more emphasis on identifying the elements more relevant for Oman.

No.	USD	Sub-USD	Definition
1	Urban Planning	1.1. Settlement Patterns	The spatial distribution and growth of urban functions across a territory at a given moment in time with emphasis on sprawl and the issue of centrality.
		1.2. Urban Design	The art of designing places for people which concerns the density, form and functionality of space
		1.3. Land Use	The dominant activity taking place on an area of land and concerning its allocation, distribution and management
2	Urban Services	2.1. Housing	The provision of accommodation and shelter meeting social demands and ensuring adequate housing conditions
		2.2. Energy (Electricity)	Provision of power service, with the aim of improving its efficiency and conservation
		2.3. Water	Provision of water, with the aim of improving its efficiency and conservation
		2.4. Municipal Services	Provision of basic services such as waste management and sewage
3	Urban Economy	3.1. Economic Development	Sustained increase in the economic standard of living of a country's population, with the aim of balanced growth and stability
4	Urban Environment	4.1. Environmental Protection	The sustainable environment planning and protection that restores spatial ecological quality and diversity
		4.2. Climate Change	The change in global climate patterns with emphasis on its affects such as desertification, soil erosion and flooding
5	Urban Society	5.1. Public Participation	A process involving the public in urban planning, to enhance their self-determination and respect, and capture opportunities for better governance
		5.2. Social Equity	Ensuring equal access and benefits to all, and enhancing equality and balance investment among all the geographic regions
6	Urban Mobility	6.1. Urban Transport	Provision of various means for public transport, ensuring efficiency and availability for transport networks that enhance accessibility and connectivity
7	Urban Management	7.1. Urban Development Management	The systematic approach to integrated decision making in urban development policy, planning control and management of urban flows.
8	Urban Quality	8.1. Urban Quality	The art of excellence in building an urban setting that is attractive, liveable, adaptable, enhancing the individual well-being.
9	Urban Resources	9.1. Urban Resources	Efficient resource management and safeguarding natural resources

Table 6.14 Summary of selected USDs and sub-USDs definitions

6.8. INTERPRETATION AND CRITICAL REFLECTION

Chapter 4 identified, among many, the following gap in knowledge: **The gap of scope – which urban sustainability dimensions?** It was clear from the literature review that there is a wide debate on what sustainability constitutes, and that it definitely is not limited within the traditional triangular approach of society, economy and environment. What should be addressed in the quest for urban sustainability and what should be left out? What is the threshold or scale between what can be claimed urban (city) and what is definitely architectural (building)?

This chapter has adopted the concept of urban sustainability dimensions as opposed to indicators. The indicators are somewhat more mature since they provide a quantitative measurement, whereas the dimensions provide a wider selection of topics that can be encompassed within the topic of urban sustainability. Since this research embarks upon a territory that is somewhat new and lacks earlier research into the performance measurement of sustainability, the researcher opted to the choice of using urban sustainability dimensions. There were nine USDs that were identified which include a total 16 sub-USDs that are applicable to the research context. They were derived through a scientific process which includes the employment of a wider global literature base, and specific concerns and objectives of the local context urban development. Such a process was not specifically available within the global literature investigated, and may become a useful process for definition of a sustainable agenda for other contexts in the future.

This research framework phase has shown that Oman has considered various sustainable objectives throughout the last forty years of development, and many of these objectives are still valid and sought after in the current scenario. A significant example of this is available within the economic dimension. The following are key objectives that government has embarked on since *The First long term development strategy (1975-1995)*, and they are still upheld as objectives not fulfilled and still in need of execution:

1. Working towards development of new resources for the national income beside the income from oil resources and replace it in the future
2. Achieving more balanced regional development by enabling all urban and rural areas to reach their potential regardless of its size and location

3. Enhancing the private sector role in the development process especially after setting favourable macroeconomic environment, upgrading laws and legislations related to investment and provision of various incentives

Moreover, some of the sustainability objectives of Oman's urban development will continue to be key objectives for the future urban development as it seems there is a challenge in fulfilling them over the previous period of development. In terms of urban development, the completion of the basic infrastructure is still the focus for government investment, and an evidence of that is that this particular goal constitutes more than 60% of the investment in the current five year plan, especially in relation to logistics infrastructure such as roads, airports, sea ports, etc.

The identification of these USDs will enforce a sustainability agenda for the decision makers should they become selected or employed in the future. They present a comprehensive list of dimensions that are specific, applicable and suitable for Oman's sustainable development, in general, and for Muscat specifically. It is questionable whether the current decision making environment in Oman have taken consideration of a similar agenda or framework during their sustainability initiatives and this will most probably be visible in the results shown in later chapters.

The illustration throughout this chapter of the urban development key concerns will be very useful in comparing the progress of development (obtained through the various research methods employed and with the participation of various groups) and how likely some of these concerns were resolved or whether they are still recurring. Section 7.13 will address this particular trend, specifically in relation to the following USDs: *land use*, *settlement pattern*, and *urban transport*. Nevertheless, this particular chapter has clearly demonstrated that there was a thorough assessment of urban development in Oman throughout the various strategies put forward.

The consultants have employed an appropriate approach in their production of the strategies which may be summarized as follows:

- Setting out objectives and aims for the urban strategy development
- Context evaluation and identification of key concerns
- Quantification of various factors influencing development and setting out parameters as targets or for measuring the success in performance

- Proposing various alternatives for the strategy
- Providing a comprehensive comparative analysis of the strategy alternatives, along with their benefits and consequences
- Supporting the decision makers in selecting the most appropriate strategy
- Developing an action plan including budgets, projects and timeline for implementation

The researcher adopts a similar approach in his investigation and, to a certain extent, examines the strategy development and their implementation.

6.9. SUMMARY

In this chapter, the researcher presented a framework for identifying key USDs that are relevant for the urban sustainability research in Oman. Using over 34 different types of literature references, including specific resources from Oman's history of urban development, and employing five stages for this purpose, the outcome selection includes 9 USDs which translate to total 16 sub-USDs that should be included within any research that embarks on addressing the urban sustainability issues in Oman.

By accomplishing this task, the framework and agenda has been set for carrying out the remaining research work. The chapter that follows will utilize the set of USDs identified in this chapter to conduct the *problem analysis phase* associated with urban development, which summarizes the problems, challenges, constraints and drivers associated with each selected USD.

7.CHAPTER 7: PROBLEM ANALYSIS PHASE – RESULTS AND INTERPRETATION

7.1. OVERVIEW

The main purpose of this chapter is to act as the appraisal of the current state of play and to report the results and their interpretation for the data that were obtained from various research methods, with the aim to respond to objective 3 and question 5 and 6, outlined earlier in section 1.4.

The chapter starts with a discussion on the methods utilized along with more details about the participants and the tools developed to conduct this phase of the research. It also provides a matrix showing the content of this research method, and the results collected.

The sections that follow are designed to reflect the content of this problem analysis phase for the particular USDs that were selected in Chapter 6. Most of the sections are divided into sub-sections which illustrate the following elements of this analysis: *problems, challenges, drivers and barriers (constraints)*. The content of these sections are carefully selected from the collected data (from within the historical literature, interviews, focus groups or the public questionnaires) and are presented here along with the interpretation of their significance and their association with the other USDs. The chapter ends with a summary which sets the stage for the following Chapter 8 on *process analysis phase*.

7.2. RESEARCH METHODOLOGY

The *problem analysis phase* is informed by the outcome of research methods 2 to 5 described earlier in chapter 4.

7.2.1. RESEARCH METHOD 2 & 3: SEMI-STRUCTURED INTERVIEWS & FOCUS GROUPS (QUALITATIVE)

Table 7.1 below illustrates details about different category of participants along with their experience in urban development of Muscat. **38 interviews** were conducted, and only 6 of them

were not fully analyzed and considered in this research analysis, mainly due to the researcher's opinion of lack of knowledge or that the interview was not properly documented or completed.

Category	Total Interviewed	Not Analyzed	Total years of experience (excluding not analyzed)	Years of experience per period (number of participants per period) excluding not analyzed			
				1970-1979	1980-1989	1990-1999	2000-2010
Muscat Municipality	6	0	82	0	0	38 (5)	44 (6)
Ministry of Housing	10	1	113	1 (1)	31 (5)	33 (7)	48 (5)
SCTP	4	1	45	0	1 (1)	20 (2)	24 (3)
Academic	3	1	21	0	0	7 (2)	14 (2)
Expatriate Consultants	5	0	101	10 (1)	16 (2)	31 (4)	44 (5)
Local Consultants	4	3	15	0	0	5 (1)	10 (1)
Local Environmentalist	3	0	44	0	4 (1)	25 (3)	15 (3)
Real Estate Developers	3	0	53	7 (1)	10 (1)	10 (1)	26 (3)
Total	38	6	474	18 (3)	62 (10)	169 (25)	225 (28)

Table 7.1 Analysis of Participants in semi-structured interviews

The following matrix, shown in table 7.2, illustrates the responses gathered from the semi-structured interviews and the focus groups. Six USDs have not been included in this analysis as the response gathered from the participants was not satisfactory and therefore couldn't be used to reflect any comprehensive benefit. The justification behind the lack of response was due to any of the following reasons:

1. Some questions have not been asked by the researcher to the participants as some of the participants lacked such knowledge, or did not shown interest in these topics.
2. There was not enough time to include all the questions as planned.
3. The participants spent more time in answering some of the questions that they were more interested in.

This matrix has more extended details, especially in relation to each participants responses and his organization, and can be reviewed in Appendix L.

Urban Dimension (USD)			Sustainability	Ques. No.	Interviewed (out of 32)	Focus Group (out of 3)	Inclusion in Analysis
1.1	Urban planning	Settlement Pattern	1	27	3	Section 7.3	
			2	27	3		
			3	19	3		
1.2		Urban Design	4	22	1	Section 7.4	
			5	17	1		
			6	18	3		
1.3		Land Use	7	28	3	Section 7.5	
			8	26	3		
			9	21	3		
2.1	Urban Services	Housing	10	11	1	Section 7.6	
			11	20	2		
			12	7	2		
2.2		Energy (Electricity)	13	2	0	Not included	
			14	2	0		
			15	7	1		
2.3		Water	16	2	0	Not included	
			17	1	0		
			18	5	1		
2.4		Municipal Services	19	6	0	Not included	
			20	3	0		
			21	6	0		
3.1	Economic Development	22	2	0	Not included		
		23	1	0			
		24	1	0			
4.1	Urban Environment	Environment Protection	25	20	0	Section 7.7	
			26	5	0		
			27	6	0		
4.2		Climate Change	28	18	0	Section 7.8	
			29	6	0		
			30	6	0		
5.1	Urban Society	Public Participation	31	12	3	Section 7.9	
			32	8	1		
			33	8	2		
5.2		Social Equity	34	3	0	Not included	
			35	1	0		
			36	1	0		
6.1	Urban Transport	37	10	0	Section 7.10		
		38	16	2			
		39	15	2			

7.1	Urban Development Management	40	19	0	Section 7.11
		41	18	3	
		42	18	2	
8.1	Urban Quality	43	24	3	Section 7.12
		44	2	3	
		45	19	3	
9.1	Urban Resources		0	0	Not included

Table 7.2 Matrix showing USDs vs. responses from interviews and focus groups

As with any new task, the researcher carried this data transcription stage in two methods. The first was the manual hand-written transcription, which was carried out for 10 interviews. In total, there were 374 sheets of A4 size used for this transcription. After careful consideration, the researcher opted to transcribe the audio data immediately into electronic MS Word format, which was carried out for 20 interviews and 3 focus groups. The total volume of this second method for transcription was 205,851 words, contained in approximately 449 pages in MS Word. As stated earlier, 6 interviews and 1 focus group were not analyzed.

As explained earlier in Chapter 4, the researcher employed NVivo software, developed by QSR for qualitative analysis. Both NVivo 9 and NVivo 10 were used during this research project. This software has capabilities for coding (snapshot shown in figure 7.1), analysing (snapshot shown in figure 7.2), queries, reports and models.

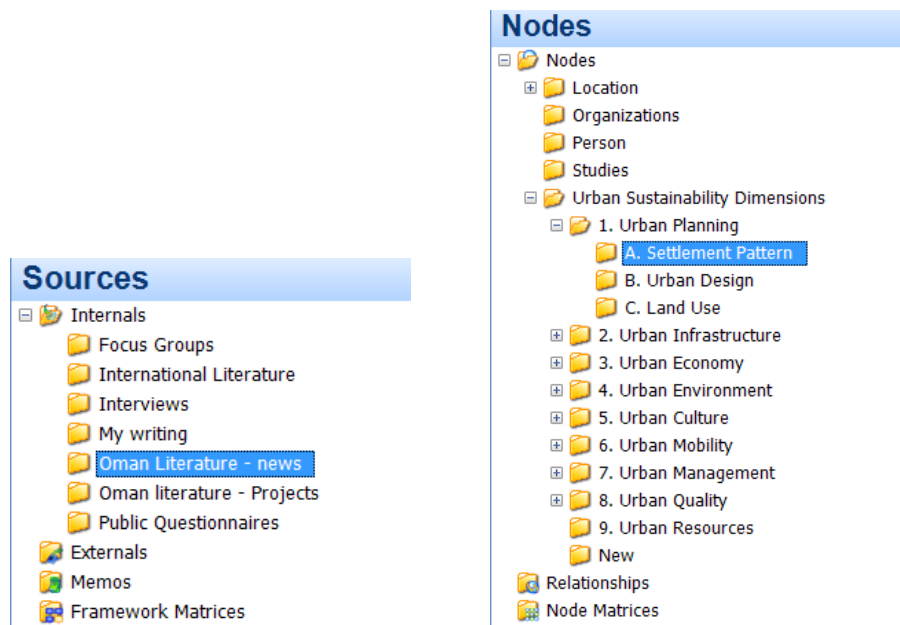


Figure 7.1 Snapshots from NVivo showing sources and nodes

Name	Sources	References	Created On	Created By	Modified On	Modified By
1. Settlement Pattern (Problem)	0	0	26/04/2011 14:58	KS	11/05/2011 11:37	KS
A. Problems	11	27	26/04/2011 14:58	KS	09/05/2012 12:00	KS
B. Challenges (Q2)	14	23	26/04/2011 14:58	KS	11/05/2011 11:21	KS
C. Driver	10	23	27/04/2011 18:08	KS	09/05/2012 17:55	KS
D. Barrier (Constraints)	12	16	26/04/2011 14:58	KS	10/05/2012 11:18	KS
E. Opportunities (Q3)	8	14	26/04/2011 14:58	KS	10/05/2012 16:35	KS
2. Settlement Pattern (Process)	0	0	26/04/2011 14:58	KS	10/05/2012 11:42	KS
A. Strategy (Q1)	0	0	26/04/2011 14:58	KS	11/05/2011 10:56	KS
1. Oman National Level	0	0	10/05/2011 13:38	KS	11/05/2011 10:51	KS
Oman National Strategy (Q.52) SCTP framework	0	0	10/05/2011 11:13	KS	10/05/2012 12:04	KS
ONSS (Q.48)	20	26	10/05/2011 11:41	KS	10/05/2012 12:47	KS
Strategic Approaches	0	0	11/05/2011 10:48	KS	11/05/2011 10:54	KS
2. Regional - others	2	3	10/05/2011 11:13	KS	10/05/2011 15:50	KS
3. Regional - Muscat	11	17	10/05/2011 11:13	KS	10/05/2012 16:35	KS
Downtown (Q51)	13	31	10/05/2011 11:15	KS	11/05/2012 11:23	KS
Muscat Regional Plan (Q.49)	19	31	10/05/2011 11:45	KS	11/05/2011 14:03	KS
Previous studies	7	11	10/05/2011 12:28	KS	10/05/2012 17:50	KS
4. Other towns structural plans	3	9	10/05/2011 11:14	KS	10/05/2011 15:47	KS
5. Muscat Structural	11	21	10/05/2011 11:14	KS	11/05/2011 14:12	KS
B. Implementation	14	46	26/04/2011 14:58	KS	11/05/2012 13:31	KS
C. Attitudes	1	1	26/04/2011 14:58	KS	11/05/2011 11:20	KS
D. Recommendations	7	10	26/04/2011 14:58	KS	11/05/2012 12:41	KS
E. Questions	3	8	10/05/2011 10:08	KS	10/05/2011 16:16	KS
3. Settlement Pattern (case Studies)	6	8	26/04/2011 14:58	KS	11/05/2011 10:23	KS
4. Misc.	2	2	11/05/2011 10:55	KS	11/05/2011 10:56	KS

Figure 7.2 Snapshots from NVivo showing an example of coding for settlement pattern USD

As a summary, there will be a repository of 45 questions that will be utilized for the semi-structured interviews, which can be reviewed in Appendix E. On the other hand, only 19 of these questions have been selected to utilize as guidance for the focus group interviews, which can be reviewed in Appendix H.

7.2.2. RESEARCH METHOD 4 & 5: QUICK SURVEYS AND PUBLIC QUESTIONNAIRES (QUANTITATIVE)

These included the same participants as in the semi-structured interviews and the focus groups. Their characteristics have been outlined in the previous section. The following details illustrate the analysis of the characteristics of the participants in the public questionnaires as obtained from SPSS.

		Frequency	Percent	Valid Percent
Valid	Male	163	62.5	67.1
	Female	80	30.7	32.9
	Total	243	93.1	100.0
Missing	System	18	6.9	
Total		261	100.0	

Table 7.3 Statistical details of public questionnaire participants' gender

		2. What is your gender?		Total
		male	female	
1. How old are you?	less than 20	9	4	13
	21-29	63	35	98
	30-39	61	35	96
	40-55	25	6	31
	over 55	5	0	5
Total		163	80	243

Table 7.4 Statistical details of public questionnaire participants' age * gender crosstabulation

3. What is your employment status?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	29	11.1	11.2	11.2
	government employed	136	52.1	52.3	63.5
	privately employed	89	34.1	34.2	97.7
	self employed	3	1.1	1.2	98.8
	Unemployed	3	1.1	1.2	100.0
	Total	260	99.6	100.0	
Missing	System	1	.4		
Total		261	100.0		

Table 7.5 Statistical details of public questionnaire participants' employment status

4. What is the highest level of education that you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no qualification	1	.4	.4	.4
	elementary and preparatory school	8	3.1	3.1	3.4
	secondary school	49	18.8	18.8	22.2
	technical college diploma	52	19.9	19.9	42.1
	university and above	151	57.9	57.9	100.0
	Total	261	100.0	100.0	

Table 7.6 Statistical details of public questionnaire participants' qualification

5. What is your total household monthly income?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 199 rials	15	5.7	6.0	6.0
	200-399	20	7.7	8.0	14.0
	400-599	37	14.2	14.8	28.8
	600-799	45	17.2	18.0	46.8
	800 or more	133	51.0	53.2	100.0
	Total	250	95.8	100.0	
Missing	System	11	4.2		
Total		261	100.0		

Table 7.7 Statistical details of public questionnaire participants' total household monthly income

7.2.3. ANALYSIS REPORTING FORMAT

This chapter will revolve around the following four selected components associated with the *problem analysis phase*:

1. **Problems**: are development factors which have negative effects on the present urban development which imply foreseeable negative development trends in the short to medium term which, however, can be changed or at least strongly influenced.
2. **Challenges**: are development factors which provide stress effects to the present urban development and may be confined or eliminated if the right decisions and programs are developed to counter them.
3. **Drivers**: are development factors which encourage a certain positive or negative effect on the present urban development which may be identified as the root cause of a trend and can be viewed as the target or focus for influencing a particular situation.
4. **Barriers (constraints)**: are development factors which have negative or limiting implications on the development of the region and which are not likely to change. From this it follows that future planning has to consider and to cope with the identified constraints.

The following sections are divided based on the selected USDs for the *problem analysis phase*. Some of these sections will contain results from various research methods employed in this *phase*, as well as excerpts from literature where appropriate. In some cases, the researcher included photos to illustrate certain issues for reference.

Throughout the content of Chapters 7, 8 and 9, the following nomenclature { } is used to denote the reference to a particular participant and his/her interview number. For example,

{SCTP 2} reflects the organization, Supreme Committee for Town Planning, and 2 reflect that this was the second in the order of conducted interviews.

7.2.4. EXAMPLE 1 – TRIANGULATION FOR SETTLEMENT PATTERN USD

This section will provide narrative of the data captured and analysed for *settlement pattern* USD. Table 7.8 below shows three questions extracted from the interview questions that relate to settlement pattern. Only Q2 shown with (*) was used during the focus groups.

Qu.	USD	Type of Questions	Questions
1	Settlement Patterns	Strategy / Implementation (Past)	What are the main strategies that control urban settlement patterns in Muscat?
2*		Barriers / Drivers (Current)	What are the key challenges with the current urban settlement pattern in Muscat?
3		Recommendations (Future)	Is it possible for ribbon development in Muscat to become an opportunity for sustainability in the future? If so, how? If not, why not?

Table 7.8 List of interview questions that relate to settlement pattern USD

The matrix shown in table 7.9 below illustrates the interview participants (with their code number – for e.g. MH1, SCTP2) along the questions (Q1, Q2, and Q3) indicating which questions were answered by the participant (■). In total, 27 participants provided answers to Q1 and Q2, whereas only 19 participants provided answers to Q3.

USD	Questions	MH	SCTP	MH	Exp	MM	MH	MM	MH	MH	MM	AC	EXP	MM	MM	MH	MM	MH	ELEC	LOC
		1	2	3	4	5	6	7	8	8	9	10	12	13	14	15	16	20	21	22
Settlement pattern	Q1	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■		
	Q2	■	■	■	■	■	■	■	■	■	■		■		■	■	■	■		■
	Q3		■	■	■	■	■	■	■	■	■		■			■	■	■		
USD	Questions	EXP	LOC	EXP	LOC	ENV	MH	MH	ACA	LOC	MH	ENV	MH	SCTP	SCTP	EXP	ACA	LOC	LOC	total
		23	24	25	26	27	28	29	30	31	40	41	42	43	48	49	50	51-52	57	
Settlement pattern	Q1	■				■	■	■	■		■			■	■	■	■	■	■	27
	Q2		■	■		■	■	■	■		■	■		■	■	■	■			27
	Q3	■	■			■			■						■		■	■		19

Table 7.9 Matrix showing list of questions vs. interview participants who provided answers

In terms of the public questionnaire, table 7.10 shows the questions that relate to *settlement pattern* USD. The responses from these questionnaires were used as secondary resources to support particular outcomes derived from other research methods, such as the interviews. For

example, Q10 and 11 were used in section 7.3.1 to support the finding that the single villa is the dominant building typology. Q44 was also used in section 7.3.3 supporting the argument that rapid development is a dominant driver for *settlement pattern*.

8	Please indicate the name of area (city in Muscat) where your current dwelling is located					
9	Please indicate the name of area (city) where your current workplace is located					
10	Which category best describes your current dwelling type?	Single house / Villa	Attached house / Twin Villa	Flat / Apartment	single room	other (please specify)
11	Which of these types best describes your dwelling?	Owned by the household	Rented	Provided by employer	Student hostel	other (please specify)
20	Which criteria is the most important to you when considering the location of your dwelling?	Affordability (price)	Availability	Size of plot or House Area	Accessibility to major transport links	Neighbourhood (community)
21	Which of these do you consider to be most important to be close to when considering the location of your dwelling?	Proximity to workplace	Proximity to major public facilities	Proximity to other family members	Proximity to schools	Proximity to Public parks
44	Do you think that Muscat is growing too quickly?	yes	no	I don't know		

Table 7.10 List of public questionnaire questions that relate to settlement pattern USD

Figure 7.3 below is an actual extract from Nvivo, the software used for qualitative analysis. This is divided into 4 sections: 1. Settlement Pattern (Problem); 2. Settlement Pattern (Process); 3. Settlement Pattern (case studies); and 4. Misc.

Settlement Pattern		
Name	Sources	References
1. Settlement Pattern (Problem)	0	0
A. Problems	11	27
B. Challenges (Q2)	14	23
C. Driver	10	23
D. Barrier (Constraints)	12	16
E. Opportunities (Q3)	8	14
2. Settlement Pattern (Process)	0	0
A. Strategy (Q1)	0	0
1. Oman National Level	0	0
Oman National Strategy (Q.52) SCTP framework	0	0
ONSS (Q.48)	20	36
Strategic Approaches	0	0
2. Regional - others	2	3
3. Regional - Muscat	11	17
Downtown (Q51)	13	31
Muscat Regional Plan (Q.49)	19	31
Previous studies	7	11
4. Other towns structural plans	3	9
5. Muscat Structural	11	21
B. Implementation	14	46
C. Attitudes	1	1
D. Recommendations	7	10
E. Questions	3	8
3. Settlement Pattern (case Studies)	6	8
4. Misc.	2	2

Figure 7.3 Extract from Nvivo coding results relating to settlement pattern USD

The first section relates to *problem analysis phase*, which is the subject for Chapter 7. Section 7.2.3. Identified 4 elements for the problem analysis phase: problem, challenge, driver and barriers. In this particular exercise Q2 relates to challenges. The figure shows the number of sources for each node (representing the number of interviewees who were coded at this node) and references (indicating the number of records obtained in total). This process for the data analysis, as described in chapter 4, consists of the following steps: *Transcription*, *Quantification*, *Coding* and *Reporting interview results*. This lengthy process of coding through Nvivo helped the researcher to sieve through the data and filter the references that will appear in the final text as indicative or evidence for the particular component (e.g. problem) of the analysis phase (e.g. problem analysis phase). It is only through this process that a meaningful outcome is possible especially when it has to correlate to particular USD.

Furthermore, the second section in figure 7.3 above relates to the *process analysis phase*, which is the subject for Chapter 8. This is further extended to include particular strategies relating to *settlement pattern* (national, regional, structural and local). These are followed by additional

nodes relating to process analysis: implementation, attitudes, recommendation and questions. In fact, at a later stage in the project, the researcher identified 2 of these components for the recommendation phase, discussed in Chapter 9: opportunities (representing Q3 in this case) and recommendations. The third section, case studies, was segregated in this Nvivo exercise to collate examples or case studies identified by the participants in relation to various questions and discussion relating to *settlement pattern* USD. For example, the current trend of relocating major Ministries' buildings and headquarters to Airport Heights which was considered a mistake that has already been committed in the Ministries complex in Al Khuwair, was captured under this node and reported as illustrated in Figure 7.4.

7.2.5. EXAMPLE 2 – TRIANGULATION FOR LAND USE

This section will provide narrative of the data captured and analysed for *land use* USD. Table 7.11 below shows three questions extracted from the interview questions that relate to settlement pattern. Only Q8 and Q9 shown with (*) were used during the focus groups.

Qu.	USD	Type of Questions	Questions
7	Land Use	Strategy / Implementation (Past)	What is the existing land use strategy in Oman and how is it implemented?
8*		Barriers / Drivers (Current)	What are the major disadvantages of the current land use system in Oman?
9*		Recommendations (Future)	What would you change about the current land use system in order to achieve optimization in land allocation?

Table 7.11 List of interview questions that relate to land use USD

The matrix shown in table 7.12 below illustrates the interview participants along the questions indicating which questions were answered by the participant. In total, 28 participants provided answers to Q7, 26 for Q8 and Q2, whereas only 21 participants provided answers to Q9.

USD	Questions	MH	SCTP	MH	Exp	MM	MH	MM	MH	MH	MM	AC	EXP	MM	MM	MH	MM	MH	ELEC	LOC
		1	2	3	4	5	6	7	8	8	9	10	12	13	14	15	16	20	21	22
Land use	Q7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Q8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Q9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

USD	Questions	EXP	LOC	EXP	LOC	ENV	MH	MH	ACA	LOC	MH	ENV	MH	SCTP	SCTP	EXP	ACA	LOC	LOC	total
		23	24	25	26	27	28	29	30	31	40	41	42	43	48	49	50	51-52	57	
Land Use	Q7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	28
	Q8		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	26
	Q9					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		21

Table 7.12 Matrix showing list of questions vs. interview participants who provided answers

In terms of the public questionnaire, table 7.13 shows the questions that relate to *land use* USD. The responses from these questionnaires were used as secondary resources to support particular outcomes derived from other research methods, such as the interviews. For example, Q13 to Q16 were considered when addressing the plot distribution system as a land use problem. Table 7.21 shows that less than 9% of the participants have obtained the plot through government grant and approximately 48% have bought their plots. Q45, 54 and 65 were used to gather the public attitude towards land distribution system and their consideration towards embracing sustainable approach to this USD. Q45 and Q65 were included in the quick survey method which was used to cross tabulate the results obtained from the public questionnaires, and those from the interviewees and focus groups. Both of these questions' results were utilized in section 9.6: the plot distribution as a prominent factor.

13	What is the approximate area of your current dwelling residential plot (land area)?	Less than 200 square meters أقل	200 to 399 square meters	400 to 599 square meters	600 to 799 square meters	800 square meters or more
14	When was your current dwelling residential plot obtained?	Less than 2 years ago	3 to 5 years ago	6 to 10 years ago	11 to 14 years ago	15 years ago or more don't Know
15	When was your current dwelling built?	2 years ago or less	3 to 5 years ago	6 to 10 years ago	11 to 14 years ago	15 years ago or more don't Know
16	Regarding your current dwelling residential plot, how was it obtained?	Government grant	it was bought	Inheritance / gift	I don't own the plot don't Know	other (please specify)
45 *	How satisfied are you with the current land distribution system in Muscat?	Very satisfied	satisfied	neither	unsatisfied	Very unsatisfied
54	I would consider living in a smaller size residential plot in order to improve the sustainability of Muscat	Yes	Perhaps	No		
65 *	To what extent do you agree that living in a smaller size residential plot has an impact on the sustainability of Muscat?	Strongly agree	agree	not sure	disagree	strongly disagree

Table 7.13 List of public questionnaire questions that relate to land use USD

Figure 7.4 below shows a few word files as exported files from Nvivo containing all the references to the particular node and analysis phase, as discussed before in the previous section.

Name	Date modified	Type	Size
1. Land Use (Problem)	2013/05/15 9:21	Microsoft Word D...	47 KB
2. Land Use (Process)	2013/05/15 9:23	Microsoft Word D...	99 KB
3. Land Use (case Studies)	2013/05/15 9:24	Microsoft Word D...	16 KB
A. Problems (Q8)	2013/05/15 9:22	Microsoft Word D...	22 KB
A. Strategy (Q7)	2013/05/15 9:23	Microsoft Word D...	7 KB
B. Challenges	2013/05/15 9:23	Microsoft Word D...	8 KB
B. Implementation	2013/05/15 9:23	Microsoft Word D...	25 KB
C. Drivers	2013/05/15 9:23	Microsoft Word D...	9 KB
D. Barriers - constraints	2013/05/15 9:22	Microsoft Word D...	11 KB
D. Recommendations (Q9)	2013/05/15 9:23	Microsoft Word Document	8 KB
E. Opportunities	2013/05/15 9:23	Microsoft Word D...	6 KB
E. Questions	2013/05/15 9:24	Microsoft Word D...	5 KB
Q57. ITC	2013/05/15 9:24	Microsoft Word D...	9 KB

Figure 7.4 Exported files from Nvivo coding results relating to land use USD

7.3. USD 1.1: SETTLEMENT PATTERN

7.3.1. Settlement Pattern Problems

Table 7.14 below summarizes the settlement pattern problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Linear Ribbon development as a dominant settlement pattern	☑	☑	☑	☑	☑	
2	Lack of control	☑	☑	☑	☑		☑
3	The logic behind population distribution						☑
4	Lack of centrality	☑	☑	☑	☑	☑	☑
5	Urban Sprawl	☑	☑		☑	☑	
6	Scattered development imposes challenges on infrastructure provision	☑	☑	☑	☑		
7	Development in high risk flood zone	☑	☑	☑	☑	☑	☑
8	Single villa as the dominant building typology				☑		
9	Inadequate mix of use	☑		☑	☑	☑	☑
10	Repeating the same mistakes of piling up ministries in one zone		☑			☑	☑

Table 7.14 Summary of settlement pattern problems obtained from interviews and focus groups

{Ministry of Housing 3} has identified **The Linear Ribbon development as a dominant settlement pattern** as a long standing problem in urban settlement pattern: “we worked on a

condition that is very old, and we became tired from it, which is the commercial strips (ribbons). We were taking a full road front to be a commercial strip”.

{Focus group 1} poses the legitimate question about **lack of centrality**: “if I was a foreigner visiting your country and I ask you to take me to downtown or if I ask you about a city centre - where will you take me?” {Local environmentalist 27} warns about **urban sprawl**: “unless some daring actions are taken then the chances are that we will end up in a situation whereby we have Muscat extending its border over and beyond its neighbouring *wilayats*”.

In association with the logic behind the **population distribution** identified by {focus group 2}, (Weidleplan and Muamir, 1989c) suggest that “the actual population distribution is to be a function of the proposed model for future urban structure and not vice versa”.

{Muscat Municipality 9} believes that **scattered development imposes challenges on infrastructure provision** as the government had to return to these areas to improve the infrastructure and services continuously because of continuous construction of new housing units. {Ministry of Housing 3} argues that *Al Amerat*, for example, suffered because the pace of construction was slow, and as such there is still shortage of services and public facilities.

{Academic 30} is adamant that the **single villa as the dominant building typology** dominates the settlement pattern: “it does not reflect mixed use. For example, our university was in a villa in the beginning. This leads to an enormous waste of space and resources”. Figure 7.5 provides an aerial photo showing this.



Figure 7.5 Aerial photo of Qurm showing the dominant villa typology

The following statistical information represents the cross-tabulation of income and nationality versus current dwelling type. It is evident in table 7.15 that the single house/villa dwelling type represent 54% of the dwelling types for the respondents in the public questionnaire. It is also evident in table 7.16 that 57% of Omanis live in single house/villa compared to only 32% of non-Omanis.

		dwelling type					Total
		single house/villa	attached house/twin villa	flat / apartment	single room	other	
total household monthly income	less than 199 rials	5	2	3	5	0	15
	200-399	4	2	11	3	0	20
	400-599	21	2	9	5	0	37
	600-799	27	1	11	6	0	45
	800 or more	78	11	39	4	1	133
Total		135	18	73	23	1	250

Table 7.15 Statistical results from questionnaires of total household monthly income * dwelling type Crosstabulation

		dwelling type					Total
		single house/villa	attached house/twin villa	flat / apartment	single room	other	
nationality	Omani	130	17	55	23	1	226
	Non-Omani	11	4	19	0	0	34
Total		141	21	74	23	1	260

Table 7.16 Statistical results from questionnaires of nationality * dwelling type Crosstabulation

The current trend of relocating major Ministries' buildings and headquarters to Airport Heights is considered a mistake that has already been committed in the Ministries complex in Al

Khuwair, as illustrated in Figure 7.6. In addition, the approach to locate most of the private universities and colleges in Halban is considered marred with the same issues.



Figure 7.6 Aerial photo showing part of Ministries complex in Al Khuwair

7.3.2. Settlement Pattern Challenges

Table 7.17 below summarizes the settlement pattern challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Job creation in the right place and its impact on traffic problems				☐	☐	
2	Typology of Muscat	☐	☐		☐	☐	☐
3	Morphology of Muscat						☐
4	Segregation by income may become a challenge				☐		

Table 7.17 Summary of settlement pattern challenges obtained from interviews and focus groups

Job creation in the right place was identified by {Expatriate consultant 12} who thinks that “the biggest challenge is always going to be about how to create jobs in the right places”. Table 7.18 below shows that over 25% of participants in the public questionnaires travel around 11-25 km away from their dwelling, and over 34% travel more than 25 km to work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 1 km	11	4.2	4.4	4.4
	1-5 km	40	15.3	15.9	20.3
	6-10 km	44	16.9	17.5	37.8
	11-25 km	67	25.7	26.7	64.5
	more than 25 km	89	34.1	35.5	100.0
	Total	251	96.2	100.0	
Missing	System	10	3.8		
Total		261	100.0		

Table 7.18 Statistical results from questionnaires of distance between dwelling and workplace frequency

{Focus group 1} highlighted that “the **typography of Muscat** holds various types of natural aspects such as mountains, valleys, dunes, beaches, sea sides; I think that has an impact on the urban settlement and the urban form itself”. The **linear morphology of Muscat** was highlighted by {focus group 1}: “it is not radial or any other kind of form, but it is only linear and obviously being linear it has challenges”. Regarding **segregation by income**, {Expatriate consultant 4} determined that: “more polarized distribution of wealth within any particular district could easily become a major issue”.

7.3.3. Settlement Pattern Drivers

Table 7.19 below summarizes the settlement pattern drivers that were conveyed by the participants from the interviews and focus groups.

	Drivers	SCTP	MH	MM	Expat	Others	Focus
1	Rapid development	☐	☐	☐	☐	☐	☐
2	Linear pattern for commercial development is driven by people desire	☐	☐	☐	☐	☐	☐
3	Typography drives the Morphology of Muscat						☐
4	Migration to Muscat from other regions		☐				☐
5	The cost of property and land				☐	☐	
6	The comfortable cost of petrol					☐	
7	Urban growth is mainly dependent on government investment					☐	
8	Private ownership of land				☐		

Table 7.19 Summary of settlement pattern drivers obtained from interviews and focus groups

{SCTP 43} recognized **rapid development** as a dominant factor for the pattern of urban settlement: “Rapid pace of development which included 70s, 80s, and even 90s had a major role in identifying development trends and pathways”. (Belqacem, 2010) concluded that “compared to a national demographic growth rate of 4% per year during the last 33 years (1970 to 2003), the

population of Muscat grew at the annual rate of 7.6%” On the other hand, (Al-Awadhi, 2007) concluded that “urban expansion of 650% between 1960 to 2003 and annual growth rate of 20%. The UN predicts that the total population of Oman will reach 5 million by 2050. The percentage of urban population in Oman is predicted by the UN to rise to 86% by 2030”. 70.5% of the respondents thought that Muscat was growing too quickly, as illustrated in table 7.20 below.

		44. Do you think that Muscat is growing too quickly?			Total
		yes	no	I don't know	
Questionnaire	Count	173	45	31	249
	%	69.5%	18.1%	12.4%	100.0%
Quick Survey	Count	28	6	1	35
	%	80.0%	17.1%	2.9%	100.0%
Focus Groups	Count	9	5	0	14
	%	64.3%	35.7%	0.0%	100.0%
Total	Count	210	56	32	298
	%	70.5%	18.8%	10.7%	100.0%

Table 7.20 Statistical results from various methods of Muscat growth frequency

{SCTP 43} settled to this argument: “what **imposed itself in the commercial development**, for example, as an urban pattern, is strip development, ribbon development, longitudinal development, and it is still prevalent, still exists, and it is still people’s desire”. {Academic 50} responded to this statement: “the desire to build along the road is a social desire. You can see the development on the main roads is faster”.

{Academic 50} identified two main drivers: “first, the mountains, and the second factor is Sultan Qaboos Road. When you see Muscat, it is longitudinal and extends along the road. When you see a new road, it expands along it”. (Peterson, 2007) identified this same factor: “once again, the path of urbanization was determined principally by geography”.

Many participants identified **migration to Muscat from other regions** as one of the drivers for *urban settlement pattern* in Muscat and {Ministry of Housing 8} supported this argument: “migration to the capital created congestion and everybody wants to live in the capital because all government services are available there. There was no control from the government for this migration”. Table 7.21 below shows that over 53% of the respondents to the public questionnaire stated that they were not original residents in Muscat.

7. Are you an original resident in Muscat?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	120	46.0	46.5	46.5
	No	138	52.9	53.5	100.0
	Total	258	98.9	100.0	
Missing	System	3	1.1		
Total		261	100.0		

Table 7.21 Statistical results from questionnaires showing original residency in Muscat frequency

{Academic 30} suggested that: “an urban structure with a large majority of **private ownership of land** will be very difficult to restructure as opposed to other cities where there is a lot of public ownership of land”.

As illustrated in table 7.22 below, (Al-Awadhi, 2007) identified a different set of factors that influence urban expansion which may be viewed here in contrast to those suggested by the participants in the interviews and focus groups.

Human factors	Physical factors
1. the number of population increasing	1. the coastal plain
2. increase of urban population	2. the mountain area
3. internal migration	3. the valleys
4. economic development	4. sand dunes
5. the government policy	5. the climate
6. the development of economic activities	
7. the welfare situation	
8. the employment opportunities	

Table 7.22 Factors influencing urban expansion (Al-Awadhi, 2007)

7.3.4. Settlement Pattern Barriers (Constraints)

1. **Scarcity of land available for development:** {Muscat Municipality 9} warned that this was becoming a critical issue: “we are at the junction where we don’t have enough land left in Muscat area and we have to look outside if we have to continue with the same mentality”.
2. **Isolated development is a constraint for infrastructure provision:** {Muscat Municipality 16} believed that the “government cannot meet the demand for services because it is all isolated areas”. As such, the provision of infrastructure was not moving parallel with the development, and this was becoming a constraint to sustainable urban development.

7.4. USD 1.2: URBAN DESIGN

7.4.1. Urban Design Problems

Table 7.23 below summarizes the urban design problems that were conveyed by the participants from the interviews and focus groups.

	Problem	SCTP	MH	MM	Expat	Others	Focus
1	Adopted detailed plans are “easy plans”		☐				
2	Detailed plans are “dry”	☐					
3	Detailed plans are designed to make housing density low				☐		
4	Weak urban design criteria	☐			☐		☐
5	Bad examples of urban design	☐			☐	☐	☐

Table 7.23 Summary of urban design problems obtained from interviews and focus groups

7.4.2. Urban Design Challenges

Table 7.24 below summarizes the urban design challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Defining urban design and who is responsible for it			☐	☐	☐	☐
2	Implementation of future unknown initiatives				☐		
3	People cannot wait until national strategies are developed				☐		
4	Increasing density creates challenges for infrastructure				☐		

Table 7.24 Summary of urban design challenges obtained from interviews and focus groups

In terms of **defining urban design and who is responsible for it**, {Focus group 1}, who have engineering background, attempted to identify this term: “it is the space which is between the architects (who design the buildings) and the engineers (who design the roads and the infrastructure, the highways, the bridges) which is unfortunately not known in Muscat. The interface between these two is obviously urban design and its elements are known. In Muscat, obviously the land use is not a mixed land use; is not very well identified as mix-use”.

Another architect, {Muscat Municipality 5} struggled with this and argued that “urban design is a vague concept in Oman and that it has not matured for many reasons: necessity for fast urban nation, modern state and government, and speed to accommodate people and their needs”. He

also explained the difficulty in differentiating between *density* and *congestion* to other decision makers. {Muscat Municipality 9} also struggled with this issue: “that’s one of the difficult questions that I have to answer. I think I am one of the people who are really still confused about this particular issue: who does it belong to?”

Finally, **increasing density creates challenges for infrastructure** as explained by {Expatriate consultant 4} who has seen the predicament in translating higher density in existing developments and sorting out the excessive repair that has to take place for the basic services and infrastructure. High urban population density was also identified by the participants in the public questionnaires as the third most important problem after the problems associated with *urban transport* and *urban quality* USDs.

7.4.3. Urban Design Drivers

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.4.4. Urban Design Barriers (Constraints)

Table 7.25 below summarizes the urban design barriers that were conveyed by the participants from the interviews and focus groups.

	Constraints	SCTP	MH	MM	Expat	Others	Focus
1	People resist change		☐				
2	Cultural issues against higher density		☐				
3	Land is already distributed and there may be lack of available land for future urban design		☐				
4	Significant investment and time required		☐				
5	Some decision makers are detached from urban design			☐			

Table 7.25 Summary of urban design barriers obtained from interviews and focus groups

{Ministry of Housing 3} argued that **cultural issues against higher density** is a potential constraint in increasing urban density: “Plot size, housing or built up area is an issue – I don’t think a lot of people will be interested in reducing that so that will put an upper limit or lower limit on the density that can be achieved”.

Land is already distributed and there may be lack of available land for future urban design: again, {Ministry of Housing 3}, who is very close to the technicalities in this regards: “It is true that we have exhausted over 50% of Muscat area; tomorrow we will not find anything to plan. It’s not a blank piece of paper so we can’t plan everything from first principles; the existing situation presents some constraints already”. He adds, “in practice: the kind of changes that might be required might require **very significant investment**, therefore **financial constraints and timing**. Potentially, the sequence of events and investments may determine the effectiveness of these interventions. Getting those timings right in order with sufficient investment going in appropriately may be a difficult thing to achieve”.

7.5. USD 1.3: LAND USE

7.5.1. Land Use Problems

Table 7.26 below summarizes the land use problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Land use change	☐	☐	☐	☐	☐	☐
2	Change in height restrictions without a study	☐	☐	☐	☐	☐	☐
3	Plots are distributed for people who don't need them			☐	☐	☐	
4	Plots are distributed but not used for development by those who get them		☐	☐	☐		
5	Plots are given to influential people				☐		☐
6	Size of the plot				☐	☐	
7	Rezoning of agricultural land that is still viable for agriculture	☐	☐		☐	☐	☐
8	Lack of zoning plans	☐	☐	☐	☐	☐	☐
9	Problems with location of industrial areas			☐	☐		
10	Major development proposals in high risk flood zones	☐	☐	☐	☐	☐	☐
11	Tourism residential projects in the wrong place	☐			☐		
12	Plots are distributed in difficult terrain:		☐	☐			☐
13	Plot distribution does not correlate to urban growth	☐	☐	☐		☐	

Table 7.26 Summary of land use problems obtained from interviews and focus groups

With regards to **Land use change**, this is probably one of the biggest problems in the current domain of land use. One of the participants stated: “You are sitting here at the moment in a building which is in a 100% residential area. Every way you look around you, it is residential and yet the building is a training institute”.

As for the **change in height restrictions without any study**, this problem was common between various participants from the government organizations and continuously the blame is on the other organization. Various focus groups considered this one of the most apparent problems in land use today. Figure 7.7 illustrates this issue in Al Ghubra.



Figure 7.7 Aerial photo from Al Ghubra showing extent of change in height restrictions

Table 7.27 shows that less than 9% of the participants have obtained the plot through government grant and approximately 48% have bought their plots. This trend is actually not new and it is visible as per the statistics in table that for some of the plots that have been built over 15 years ago, around 54% were actually bought by their owner. In essence, these statistics show that majority of plots granted by the government are eventually not developed by those they are granted to, and more likely they have been sold.

		15. When was your current dwelling built?						Total
		2 years or less	3-5	6-10	11-14	15 or more		
16. Regarding your current dwelling residential plot, how was it obtained?	Government grant	2	2	2	4	9	1	20
	it was bought	18	15	17	17	43	6	116
	inheritance/gift	1	0	1	1	4	3	10
	i dont own the plot	4	8	9	3	9	9	42
	i dont know	0	3	5	1	11	25	45
	other (please specify)	1	1	0	0	4	1	7
Total		26	29	34	26	80	45	240

Table 7.27 Statistical crosstabulation from questionnaires between how the current plot was obtained and when the dwelling unit was built

		14. When was your current dwelling residential plot obtained?						Total
		2 years or less	3-5	6-10	11-14	15 or more	i dont know	
16. Regarding your current dwelling residential plot, how was it obtained?	Government grant	0	3	3	2	12	1	21
	it was bought	11	22	20	15	40	7	115
	inheritance/gift	1	1	1	0	4	3	10
	i don't own the plot	9	6	4	2	4	15	40
	i don't know	5	5	0	2	7	24	43
	other (please specify)	0	0	1	0	3	1	5
Total		26	37	29	21	70	51	234

Table 7.28 Statistical crosstabulation from questionnaires between how the current plot was obtained and when the plot was obtained

As for the problem associated with the **size of the plot**, {Academic 30} pointed out that this problem is not sustainable within the plot distribution system: “I don’t think that the lottery is such a problem. The problem is more the size of the plots and the shape of the plots because if you give out 600 m² on a usual dimension of 20x30m that leads to high need of infrastructure per plot”. Table 7.29 below illustrates the frequency of approximate area of the residential plots amongst the participants in the questionnaires. Over 46% of the plots have an area of 600 m² and above whereas less than 27% are below 400 m².

13. What is the approximate area of your dwelling residential plot (land area)?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 200	28	10.7	11.5	11.5
	200-399	43	16.5	17.7	29.2
	400-599	57	21.8	23.5	52.7
	600-799	84	32.2	34.6	87.2
	800 or more	31	11.9	12.8	100.0
	Total	243	93.1	100.0	
Missing	System	18	6.9		
Total		261	100.0		

Table 7.29 Statistical frequency of approximate area of the residential plot from questionnaires

Regarding **rezoning of agricultural land that is still viable for agriculture**, {Expatriate consultant 25} talked about various examples in this regards: “One of the best examples is Sohar area where very good land has been wasted for residential developments that could be moved in land onto infertile plains where there is no flood risk. Flood risk to farmers is minimal; flood risk for a high cost residential with a life risk association as well is a very different issue. I see a total lack of planning”. **Lack of zoning plans** was highlighted by {Ministry of Housing 29}: “The problem is discrepancy with land use, there is no zoning”. An example of the **problem with location of industrial areas** as highlighted by {Ministry of Housing 28} is the location of industrial area in Wadi Kabir and Ghala, as shown in figure 7.8. Hence, there are initiatives to replace the industrial area in Ghala with new commercial and multi-storey residential land use. He is convinced that this was “from the past and at that time it was far away from other settlements”.



Figure 7.8 Aerial photo from Ghala Industrial Area

With regards to the issue of **major development proposals in high risk flood zones**, this problem is clear to many, especially after the massive flooding in the aftermath of cyclone *Gunu* in 2006. Unfortunately, there are still some buildings being erected in flood zones. Figure 7.9 shows an example of this problem.



Figure 7.9 Aerial photo from Al Ghubra showing development in flood zone

One of the highlights in these problems is that **plot distribution does not correlate to urban growth**. {Academic 50} has studied this pattern and concluded that urban growth is not driven by plot distribution. The problem is that the plot distribution, as a solution, was adopted by decision makers to encourage or cap urban growth and this has not been an effective tool in this regards. {SCTP 43} confirmed this statement: “the demand on land was governing therefore there was distribution of land with large pace and frequency and on the other side we have construction level that was low and dispersed”. This conclusion has already been reached and discussed with statistics of both plot distribution and building permits in section 5.1.4.

Based on *Muscat Regional Plan* analysis of the land resources situation in 1989, "it can be expected that all readily available land within the overall Muscat Area will have been distributed by the year 2010; i.e. there will then be no flexibility of land uses to accommodate and adapt any future development". Moreover, they have clearly alerted the government that "it is already clear at this stage that in not too distant future a situation will prevail, where indeed all the land in Muscat Area has been taken up for development" (Weidleplan and Muamir, 1989b).

7.5.2. Land Use Challenges

Table 7.30 below summarizes the land use challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Typography of Muscat	☐	☐	☐	☐	☐	☐
2	Planners are busy with daily routine of solving people's issues and not planning	☐	☐		☐		
3	Land use planning is centrally controlled	☐			☐		

Table 7.30 Summary of land use challenges obtained from interviews and focus groups

Various participants from Ministry of Housing believe that over 90% of their time is spent on resolving problems and issues with the public regarding plot configurations and land use, and almost no time is spent on actual planning or design. This is all at the expense of the future planning.

One of the expatriate consultants working in the field of urban planning and architecture was very critical about this topic: “The Ministry of Housing is focused and busy with allocating land; all what they are busy with is giving Omanis a plot to build on. There is no planning. There is no understanding of the urban context, and the Ministry of Housing has caused sprawl”.

Another expert from SCTP stated: “they don’t look to the area in terms of what is the best use of land”.

Land use planning is centrally controlled which was identified by {Expatriate consultant 4} since Ministry of Housing is the only key stakeholder that controls and determines the size and location of housing plots.

7.5.3. Land Use Drivers

Table 7.31 below summarizes the land use drivers that were conveyed by the participants from the interviews and focus groups.

	Drivers	SCTP	MH	MM	Expat	Others	Focus
1	Continuous demand from people to be granted their own plots		☐	☐	☐		☐
2	Preferred areas attract more development		☐			☐	
3	Plot distribution as a source of income for authorities					☐	
4	Plot distribution as wealth distribution for citizens			☐	☐	☐	
5	Land speculation and unprecedented increase in land price		☐		☐	☐	☐

Table 7.31 Summary of land use drivers obtained from interviews and focus groups

Continuous demand from people to be granted their own plots is a driver described by {Expatriate consultant 12}: “the given development pattern that we have is going to be very difficult to change because of people’s traditional perception”. {Muscat Municipality 9} posed this as a fundamental driver in land use in Muscat: “need to accommodate everybody to have a single house. You don’t find a lot of people living in flats, for example. But it may change now because we are at the junction where we are saying we don’t have enough land left in Muscat area and we have to look outside if we have to continue at the same mentality”.

7.5.4. Land Use Barriers (Constraints)

Table 7.32 below summarizes the land use barriers that were conveyed by the participants from the interviews and focus groups.

	Constraints	SCTP	MH	MM	Expat	Others	Focus
1	Land is a limited resource and most of the land has been distributed	☐	☐				☐
2	Availability of land for various land uses						☐
3	Natural typographical constraints				☐	☐	
4	Land occupied by government organizations	☐	☐			☐	

Table 7.32 Summary of land use barriers obtained from interviews and focus groups

(Weidleplan and Muamir, 1989b) identified the first barrier as well: “the tendency of the population to reserve a plot in the Muscat Area led to a serious shortage of land... is hampering considerably the functional, social and economic development of the capital”.

The last barrier has also been identified in the past by (Weidleplan and Muamir, 1989b): “there is a tendency that government and semi-governmental institutions reserve coastal areas for own

purposes with restrictions to the public... it reduces the number of attractions and restricts the free access to the public”.

7.6. USD 2.1: HOUSING

7.6.1. Housing Problems

Table 7.33 below summarizes the housing problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Shortage vs. oversupply of housing for rent				☐		☐
2	Residential areas invaded by commercial use			☐			
3	Not adequate provision for parking				☐		
4	Affordability – rents are overpriced	☐			☐	☐	☐
5	Quality issue with the housing stock				☐		

Table 7.33 Summary of housing problems obtained from interviews and focus groups

7.6.2. Housing Challenges

Table 7.34 below summarizes the housing challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Mixed inhabitants			☐			☐
2	Lack of infrastructure to supplement housing		☐				
3	Large need for social housing		☐				
4	Not enough variety of housing				☐		

Table 7.34 Summary of housing challenges obtained from interviews and focus groups

{Ministry of Housing 3} identified the issue of **large need for social housing**: “I have looked into the question of social housing a bit and I think there is a large need for social housing. It is in a way hidden away in the city”. Figure 7.10 below shows an example of a social housing development in Bousher.



Figure 7.10 Aerial photo from Bousher social housing area

In terms of the social impact of urban housing in Muscat, (Peterson, 2007) identified two patterns that have emerged post 1970 in terms of the dispersion of the Omani population in Muscat:

1. When the wealthier of Muscat and Muttrah inhabitants moved to new homes in the initial new development, such as Ruwi and Bait Al Falaj;
2. The influx of inhabitants.

(Peterson, 2007) added that “the striking impression left by residential patterns is the complete mingling of Omani and expatriates. Rather than the result of deliberate government policy, this pattern appears to have developed naturally”.

7.6.3. Housing Drivers

Cultural preferences drive housing typology was explained by {Expatriate consultant 12}: “that was designed and built like that to meet cultural requirements. Perception of big is better and that’s not always the case”. {Expatriate consultant 25} added his view on this issue: “not so much the appealing front, but the waste in the space of a typical Arabic house”.

7.6.4. Housing Barriers (Constraints)

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.7. USD 4.1: ENVIRONMENTAL PROTECTION

7.7.1. Environmental Protection Problems

Table 7.35 below summarizes the environmental protection problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Construction of wadi channels at the expense of wild habitats				☐		☐
2	Poor management of landscape				☐		
3	Litter as an obvious problem	☐		☐			☐
4	Landfills and waste disposed in water pathways				☐		
5	Contamination from fuel stations				☐		
6	Pest control (insects, cats, rats and invasive bird species)				☐	☐	
7	Oman does not have one single protected landscape				☐		
8	The “Love Road” behind Qurm Natural Park				☐	☐	☐

Table 7.35 Summary of environmental protection problems obtained from interviews and focus groups

Regarding the **construction of wadi channels at the expense of wild habitats**, {Expatriate consultant 25} was not happy with the way that flood pathways are managed: “these are natural corridors that allow wild life and birds to coexist in the urban environment which is desirable from a quality of life perspective. My understanding is that they are all going to be canalized to reduce the risk of flooding in extreme events which I think would be a major loss. I think that doesn’t provide us with a diversity of different habitat type”. (Hough, 2004) supported this argument: “the benefit of well-drained streets and civic spaces is paid for by the environmental costs of eroded streams, flooding and impairment of water quality in downstream watercourses, a condition that is akin to environmental degradation by design”.

(Oborn, 1982) wrote that “litter is probably one of the town’s most obvious problems. In 1981, public litter bins were introduced into the main towns of Muttrah, Muscat and Ruwi. An

advertising campaign was launched in the local newspapers in order to try and make the public more aware of their own responsibilities”.

{Local environmentalist 27} added his views on the “*coastal Road*” behind **Qurm Natural Park**: “look at the plight of the Mangrove in Qurm! It fell short of being protected by a Royal Decree, but you look at it and you would see the kind of development that is taking place, engulfing this beautiful stretch of mangrove that if you have capitalized and used in a manner that would transform this city of yours, Muscat, into a major attraction. This tells you that thinking in the conservation and environment concerns were missing”. Figure 7.11 below shows an aerial photo of this particular road and how it interferes with the natural park besides it.



Figure 7.11 Aerial photo of the coastal road in Qurm

7.7.2. Environmental Protection Challenges

1. **Environmental protection is not seriously considered in urban planning:** This is an unfortunate reality, but {Ministry of Housing 3} was showing integrity in acknowledging this: “to be honest with you, it is not considered. We only propose locations for parks, children play grounds; only this. Not as environment in the notion that you are talking about; it does not exist”. {Expatriate consultant 4} added: “I think any environmental gains are coincidental rather than planned”.

2. **Ignorance by some government organizations towards the environment:** one of the Local environmentalists has ample examples of such ignorance in his past role within the environmental protection organizations: “this is what prevails in the government side and this also has to do a lot with the way that each and every ministry apply the law. At some stage, there was someone with a business project where he complained that the environmental law is putting lots of restrictions on the business development so it needs to be relaxed as it is hindering the development. We always heard these complaints”.

7.7.3. Environmental Protection Drivers

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.7.4. Environmental Protection Barriers (Constraints)

Decision makers pressure to process EIA for various projects: one of the local environmentalists recollected this pressure: “we got clear instructions that you cannot refuse or reject any projects: “you issue the environmental permit and put your conditions”. So there was an understanding that each and every project can be mitigated regardless of the impact and a typical example of this one is the construction of this coastal road in Qurm behind Qurm national reserve”.

7.8. USD 4.2: CLIMATE CHANGE

7.8.1. Climate Change Problems

Table 7.36 below summarizes the environmental protection problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Most of the development is along the coast				☐	☐	
2	Continuous development on flood zones	☐	☐		☐		☐
3	Improper planning causes havoc during massive flooding	☐				☐	
4	Atheiba development is a bad example				☐		
5	Massive flooding during Gunu 2006			☐			

Table 7.36 Summary of climate change problems obtained from interviews and focus groups

{Muscat Municipality 9} had witnessed the **Massive flooding during *Gunu* 2006**: “I think we have really failed to provide the right flood alleviation scheme for Muscat and some of it is due to planning mistakes that allowed people to build on *wadi* areas and some of it is due to the lack of information (like what is 50 years, 100 years climatic events? And when is that frequency going to happen?)”. Figure 7.12 below illustrates some of the damage caused during this catastrophe. As for the literature review, the alarm was raised in the past:

A problem concerning the entire Muscat Area and, to a lesser extent also the Wilayat Quriyat, is the flood prone areas. Since especially flash floods are unpredictable in occurrence and magnitude, several areas may be seriously affected when major floods appear. Those large floods which definitely will damage seriously several built-up areas in the vicinity of the wadi courses, are calculated to occur every 100 years. (Weidleplan and Muamir, 1989b, p. 68)



Figure 7.12 Images from tropical cyclone Gunu

(Oborn, 1982) highlighted that it is “particularly ironic, in a country where water is such a scarce resource, that flash flooding presents one of the greatest natural dangers”.

7.8.2. Climate Change Challenges

1. **No clear link between cyclone *Gunu* and climate change:** {Expatriate consultant 4} identified this as one of the challenges: “as a rational question, I would say there is no evidence to suggest that it was. The atmosphere and the climate is such a fuzzy

phenomenon that standard science and clear thinking is not really easily applied to it. It's chaotic, unpredictable – so the noise to signal ratio is very high so detecting a signal like climate change against this massively variable phenomenon is impossible and very difficult”.

2. **The government has been slow in decision making after *Gunu*:** {Ministry of Housing 28} was convinced that the response after *Gunu* towards climate change is not satisfactory: “the government has been very slow after *Gunu*. Even if they learn, to take a decision, it takes a very long time and so many entities”.
3. **Some people are not convinced about climate change:** {Local real estate developer 57} was not sure about this theory of climate change: “I honestly don’t know whether there is any climate change. Personally, I am not convinced there is a climate change. I think what we are seeing is something cyclical”.
4. **Planners are not sure how to consider climate change:** {Ministry of Housing 3} acknowledged this aspect: “well, we don’t have anything about the climate change and nobody mentioned it and it wasn’t considered”.

7.8.3. Climate Change Drivers

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.8.4. Climate Change Barriers (Constraints)

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.9. USD 5.1: PUBLIC PARTICIPATION

7.9.1. Public Participation Problems

1. **No genuine opportunities for public participation in planning:** {Focus group 1, 2 and 3} all confirmed that they do not believe there was any public participation in urban planning so far. {Ministry of Housing 29} acknowledged this fact: “There was no public participation and not even today; the local committees are for ownership issues not for planning”. Table 7.37 shows that 30.6% of the participants were either satisfied or very

satisfied with the current level of public participation in the urban planning process whereas 29.1% were either unsatisfied or very unsatisfied, and 34.5% were neither.

49. How satisfied are you with the current level of public participation (involvement) in the urban planning process?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very satisfied	9	3.4	3.6	3.6
	satisfied	77	29.5	30.6	34.1
	neither	90	34.5	35.7	69.8
	unsatisfied	46	17.6	18.3	88.1
	very unsatisfied	30	11.5	11.9	100.0
	Total	252	96.6	100.0	
Missing	System	9	3.4		
Total		261	100.0		

Table 7.37 Statistical frequency of the participants' satisfaction with the current level of public participation in urban planning process - from questionnaires

2. **Municipal Council does not contain technical expertise:** this was voiced by a participant in {focus group 3} who was previously a member of the Municipal Council.
3. **Municipal Council does not have legislative power:** {Local environmentalist 27} identified this as a problem for public participation: "I think although there are bodies like Municipal Council that is mandated with the matters of reflecting or commenting, they don't have a legislative mandate".
4. **Many court cases due to lack of public participation:** {Ministry of Housing 3} testified to this: "we are now in a big problem in the court and the reason for it is the lack of public participation. I expect that if participation was there, then 50% of what is in the court could be solved by participation".

7.9.2. Public Participation challenges

Planning would not be able to cater for various people's need through participation: {Ministry of Housing 3} identified this as one of the challenges: "the resources are very simple either from land or financial, it is not that much, and if you wanted to cater for all of people's demand, you will never finish".

7.9.3. Public Participation Drivers

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.9.4. Public Participation barriers (constraints)

Level of public awareness towards planning: {Local environmentalist 41} was not optimistic about the benefit of public participation due to “the level of awareness amongst the public is not that high where they can contribute positively to any proposed development and so on with their vision, views, or inputs or whatever”.

7.10. USD 6.1: URBAN TRANSPORT

7.10.1. Urban Transport Problems

Table 7.38 below summarizes the urban transport problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Serious traffic accidents				☐	☐	☐
2	Absence of public transport currently				☐		☐
3	Transport studies are disconnected from land use				☐		
4	Ill-disciplined taxis					☐	
5	Big parking problem	☐	☐	☐	☐	☐	☐
6	Extreme congestion and traffic	☐	☐	☐	☐	☐	☐

Table 7.38 Summary of urban transport problems obtained from interviews and focus groups

Regarding the **big parking problem**, nobody would doubt the existence of this problem, and, in fact, there is no need for any evidence to it. {Local real estate developer 57} cannot live with this problem anymore: “one of the biggest problems we have in the CBD area is the parking problem - why? At the time when it was designed, the government could have easily made it a condition to provide car parking. It doesn’t matter what the cost of it is, because long term there would have been a much better solution than what we have today”. (Al-Rawas, 1996) highlighted this issue more than twenty years ago: “the change of land use from residential to commercial and the invariable mix-up, and the increasing number of multi-story buildings around the commercial

areas, particularly in Ruwi without providing car parks within the legal boundaries of the plots, create considerable pressure on the parking places and traffic movement”.

In terms of the public perception, urban transport was identified as the leading USD for problems. Figure 7.13 illustrates the analysis of transport problems identified by the public.

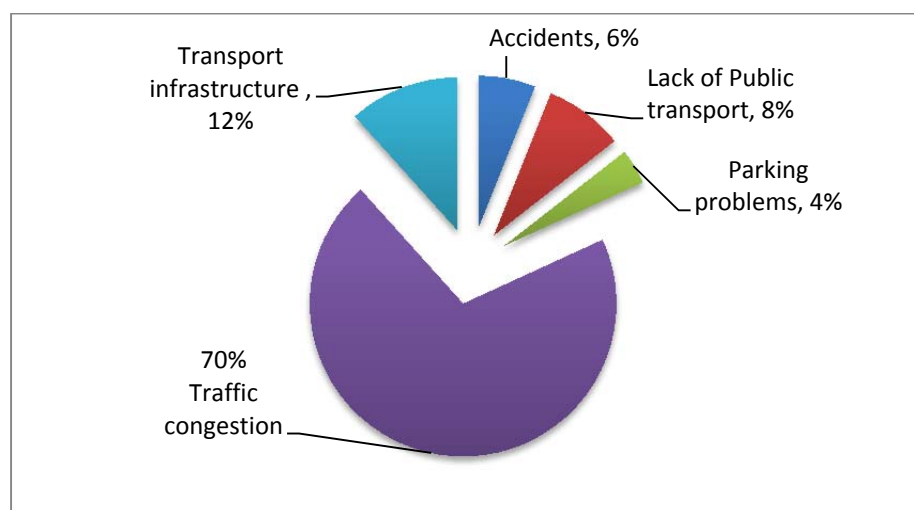


Figure 7.13 Analysis of transport problems identified through public questionnaires

7.10.2. Urban Transport Challenges

Table 7.39 below summarizes the urban transport challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Finding alternatives for public mass transport					☐	
2	New roads free traffic, but create new bottlenecks			☐	☐		
3	Difficulty to resolve bottlenecks today			☐		☐	
4	Reconfiguring the existing infrastructure for future alternatives of public transport			☐	☐	☐	
5	Difficulty to expand infrastructure	☐				☐	
6	Transport projects are only short term fixes	☐					
7	Lack of corridors for future public transport		☐	☐			
8	Difficult terrain for new transport corridors			☐	☐	☐	☐

Table 7.39 Summary of urban transport challenges obtained from interviews and focus groups

7.10.3. Urban Transport Drivers

Table 7.40 below summarizes the urban transport drivers that were conveyed by the participants from the interviews and focus groups.

	Drivers	SCTP	MH	MM	Expat	Others	Focus
1	Fuel is cheap and car ownership is easy	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Everyone wants a car	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
3	Everyone wants a big car				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4	Housing typology impacts transport	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		
5	High quality public transport will change the attitude	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Table 7.40 Summary of urban transport drivers obtained from interviews and focus groups

In terms of the statistical data gathered from public participants in the questionnaires, table 7.41 shows a cross tabulation of number of individuals and number of cars within a dwelling. Table 7.42 shows a similar cross tabulation but based on the category of dwelling type.

		22. How many cars are owned within your dwelling?					Total
		0	1	2	3	4 or more	
18. How many individuals are living in your dwelling (including yourself)?	1-3	1	31	15	8	1	56
	4-6	4	30	29	12	15	90
	7-9	0	11	16	13	23	63
	10-12	1	1	6	10	9	27
	13 or more	2	0	1	4	12	19
Total		8	73	67	47	60	255

Table 7.41 Statistical cross tabulation showing number of individuals living in dwelling vs. number of cars owned - from questionnaires

		22. How many cars are owned within your dwelling?					Total
		0	1	2	3	4 or more	
10. Which category best describes your current dwelling type?	single house/villa	4	22	43	30	40	139
	attached house/twin villa	1	7	3	3	7	21
	flat / apartment	1	33	20	11	9	74
	single room	2	12	2	2	5	23
	Other	0	1	0	0	0	1
Total		8	75	68	46	61	258

Table 7.42 Statistical cross tabulation showing category of dwelling vs. number of cars owned - from questionnaires

In terms of current use of public transport, table 7.43 below shows that over 91% of participants use their cars to get to their workplace, and this trend is similar for various distances from their dwelling to their workplace.

		27. How far from your dwelling is your workplace (or school if you are a student)?					Total
		less than 1 km	1-5 km	6-10 km	11-25 km	more than 25 km	
24. Which mode of transport do you mainly use to reach your workplace (or school if you are a student)?	Walking	4	1	0	0	0	5
	Car	4	35	39	66	83	227
	public bus	1	2	1	1	3	8
	Taxi	0	2	4	0	3	9
	Total	9	40	44	67	89	249

Table 7.43 Statistical crosstabulation showing mode of transport to reach the workplace vs. the distance of the workplace from the dwelling - from questionnaires

Table 7.44 shows the main reasons why participants are not using public transport: 34.5% because public transport is not available; 29.5% because it is not comfortable; 9.2% because the climate is too hot, and only 4.2% because of the cost.

30. What is the main reason that you are not using the public transport?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	public transport is not available	90	34.5	35.6	35.6
	public transport is too expensive	11	4.2	4.3	39.9
	the climate is too hot	24	9.2	9.5	49.4
	public transport is not comfortable	77	29.5	30.4	79.8
	other (please specify)	51	19.5	20.2	100.0
	Total	253	96.9	100.0	
Missing	System	8	3.1		
Total		261	100.0		

Table 7.44 Statistical frequency of the main reasons why the participants are not using public transport - from questionnaires

7.10.4. Urban Transport Barriers (Constraints)

Table 7.45 below summarizes the urban transport challenges that were conveyed by the participants from the interviews and focus groups.

	Constraints	SCTP	MH	MM	Expat	Others	Focus
1	No incentive for using any public transport				☐		
2	Addiction to automobile			☐	☐		
3	Misconception that public transport is for the poor				☐		
4	The existing reality is too strong	☐					

Table 7.45 Summary of urban transport challenges obtained from interviews and focus groups

If these transportation problems have been recurring through various periods of development, then most probably the constraints behind these problems were the same. (Al-Rawas, 1996) documented some of the causes from which these problems stemmed:

Many new roads in the Muscat Area, which were initially planned to function as efficient traffic arteries, failed to achieve this purpose because they attracted new building and commercial activities to their sides. This unforeseen land use pattern tends to unload various slow-moving traffic onto the roads with the result that the new roads normally end up with heavy congestion. The resulting competition for space has as one of its consequences that insufficient land is allocated for car parking in the major activity centres. The topographical features make it difficult to provide sufficient transportation facilities. (Al-Rawas, 1996, p.237)

7.11. USD 7.1: URBAN DEVELOPMENT MANAGEMENT

7.11.1. Urban Development Management Problems

Table 7.46 below summarizes the urban development management problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Lack of coordination between the organizations				☐	☐	☐
2	Lack of development control	☐			☐	☐	
3	Lack of planning legislation		☐				☐
4	Absence of organized planning		☐				
5	SCTP became busy with execution and projects	☐	☐	☐	☐	☐	
6	Lack of planning assessment				☐		
7	Lack of written policies				☐		

Table 7.46 Summary of urban development management problems obtained from interviews and focus groups

7.11.2. Urban Development Management Challenges

Table 7.47 below summarizes the urban development management challenges that were conveyed by the participants from the interviews and focus groups.

	Challenges	SCTP	MH	MM	Expat	Others	Focus
1	Different organizations working on planning and implementation	☐	☐	☐			
2	Multiple conflicting responsibilities amongst organizations	☐	☐	☐	☐	☐	☐
3	Lack of control on private sector					☐	
4	Very difficult to have very strict codes				☐		☐

Table 7.47 Summary of urban development management challenges obtained from interviews and focus groups

The second challenge has been identified by (Housing, 1995): “because of the existence of several organizations responsible for detailed planning policies, this led to multiple policies which caused multiple responsibilities and conflicts in these policies”.

7.11.3. Urban Development Management Drivers

There were no documented responses in this regards from participants in either the interviews or the focus groups.

7.11.4. Urban Development Management Barriers (Constraints)

1. **The courts will only consider laws that are issued in the Official Gazette:** {Focus group 3} argued that: “as lawyers we don't take in consideration except those laws that are issued in the Official Gazette. When I talk about planning, in Oman we don't have law for planning. We have principles, we have criteria, but we don't have a law”.
2. **Absence of centralized planning entity:** {Local environmentalist 41} thought that: “what's happening is that each and every ministry seems to be driving their projects independently and regardless of the priorities and the concerns and the objectives of the other ministries”.
3. **Some decision makers are detached from urban management:** {Muscat Municipality 5} argued that “some officials are detached from the real process of building cities: long term, competitiveness and identity”.

7.12. USD 8.1: URBAN QUALITY

7.12.1. Urban Quality Problems

Table 7.48 below summarizes the urban quality problems that were conveyed by the participants from the interviews and focus groups.

	Problems	SCTP	MH	MM	Expat	Others	Focus
1	Lack of public recreation amenities					☑	
2	Gardens and public parks were converted into residential or commercial plots	☑	☑				☑
3	Lack of good urban quality at neighbourhood level						☑
4	Lack of vibrancy in the city	☑			☑		

Table 7.48 Summary of urban quality problems obtained from interviews and focus groups

Table 7.49 below compared the participant's response towards the adequacy of public parks and gardens in Muscat. 64.6% stated that they were not enough, while only 25.9% stated that there were enough parks.

		53. Are there enough public parks and gardens in Muscat?			Total
		yes	no	I don't know	
Questionnaire	Count	71	159	26	256
	%	27.7%	62.1%	10.2%	100.0%
Quick Survey	Count	8	26	1	35
	%	22.9%	74.3%	2.9%	100.0%
Focus Groups	Count	0	12	2	14
	%	0.0%	85.7%	14.3%	100.0%
Total	Count	79	197	29	305
	%	25.9%	64.6%	9.5%	100.0%

Table 7.49 Statistical frequency of participant's view of the adequacy of public parks and gardens in Muscat - from questionnaires

7.12.2. Urban Quality Challenges

1. **Ethnic diversity not managed properly:** although some participants within {focus group 1} believe this is a positive characteristic in Muscat, others identify problems associated to it: "By bringing these people they are living in their own community; they bring other problems. It can be attributed to the society balance. We have different plans, different things happening and it becomes a challenge for the security as well as the safety".
2. **Land distribution is affecting spaces for urban quality:** {Muscat Municipality 9} believed there was large investment by the government on infrastructure, but still not enough because of land distribution: "If we have the proper land distribution, the city will grow in rational way. You will have parks for everybody. Now you build a park there and there which is not totally occupied".

According to the participants in the public questionnaires, the problems associated with quality revolve around the following:

- Shortage in recreational and entertainment facilities,
- Lack of public gardens and parks,
- Lack of facilities for children and the youth, and
- Not enough green areas.

7.12.3. Urban Quality Drivers

1. **Is urban quality driven by people?** {Academic 30} questioned whether people really care about this: "I don't think these factors of quality are so visible. I don't know if they

are sought after. It would be interesting to know: how do the majority of people here define quality?”

2. **Diversity means richness:** {Expatriate consultant 49} outlined his views in this regards: “It’s the diversity that gives it its richness. If it was all planned in the same way, it would have killed it. There are centres of interest. Those anchors are different from one place to another so you can experience different types of environment. I personally feel that it has maintained or safeguarded its cultural integrity and values so anybody notices that as a foreigner. This makes the place unique”.
3. **Choice is an important quality:** {Expatriate consultant 49} added another driver: “It’s the choice that is given to the people and that choice dictates the distribution of what happens and that is the essence of the city”.
4. **Place making matures over time:** {Expatriate consultant 49} continued to highlight the drivers behind urban quality: “I will say place making is an art and the attractiveness of a place actually matures over time. You cannot create it instantly and you can start the process and let it incrementally develop and do not try to over kill it by over controlling it. So there is a flexibility and adaptability – a key element in the planning process”.

7.12.4. Urban Quality Barriers (Constraints)

Lack of urban quality understanding: {Focus group 2} argued there is a critical question to ask in this regards: “before saying that quality should come from the society, does the government have the quality people to implement this type of quality that the population demands?”

7.13. INTERPRETATION AND CRITICAL REFLECTION

After outlining the results obtained for the *problem analysis phase*, as shown in above sections, and correlating the new knowledge obtained from the key decision makers and consultants with the knowledge already documented in various historical studies and documents, the researcher goes further in this interpretation by identifying a few critical issues that are deciphered from this result analysis. This section will highlight some of the important messages that are hidden in this data.

7.13.1. Summary of problem analysis phase

Table 7.50 summarizes the quantitative outcome of this *problem analysis phase* for the selected USDs. It tabulates the results obtained for 3 research methods: interviews, focus groups and public questionnaires. It is clear that the emphasis amongst the participants to certain USDs yielded the following ranking of importance:

- Interviews and focus groups: first was *land use*; second was *settlement pattern*; and third was *urban transport*. In total, there were 62 problems, 43 challenges, 23 drivers and 28 constraints that were conveyed by the participants.
- Public questionnaire: first was *urban transport*; second was *urban quality*; and third was *urban design*.

Problem Analysis Phase – Results Comparison										
No	SUB-USD	Interviews & Focus Groups							Public Questionnaires	
		Problems	Challenges	Drivers	Constraints	Total	%	Rank	Sources	Rank
1.1	Settlement Patterns	8	6	8	4	26	16.7	2 nd	19	
1.2	Urban Design	5	5	0	5	15	9.6		38	3 rd
1.3	Land Use	12	6	5	7	30	19.2	1 st	24	
2.1	Housing	5	5	1	0	11	7.1		21	
4.1	Environmental Protection	7	2	0	1	10	6.4		15	
4.2	Climate Change	4	4	0	0	8	5.1		3	
5.1	Public Participation	4	1	0	1	6	3.8		8	
6.1	Urban Transport	6	7	5	6	24	15.4	3 rd	178	1 st
7.1	Urban Development Management	7	5	0	3	15	9.6		5	
8.1	Urban Quality	4	2	4	1	11	7.1		45	2 nd
	Total	62	43	23	28	156	100			

Table 7.50 Summary of problem analysis components for selected USDs

7.13.2. Trends of problems over periods of development

This section provides a matrix analysis of problems obtained through participants in this research and those problems identified in the early historical studies and documents. Furthermore, this analysis includes the recurrence of problems throughout the different periods of development incorporated in this research. This detailed analysis is only reported here for the three USDs that have gained more importance, as shown in the table 7.47 above.

Land Use USD Detailed Trend Analysis:

Table 7.51 below illustrates the trends analysis of the *land use* USD, which included the problems, challenges and constraints identified in the *problem analysis phase* above. These are divided into four trends:

1. **Recurring issues**: identified by participants in this research and evidenced in earlier historical literature of Oman urban development (total 10 issues).
2. **New issues**: identified by participants and are likely to have emerged in the last ten years, especially that there is no record of them within the historical literature (total 8 issues).
3. **Forgotten issues**: these were recorded in the historical literature, but the participants in this research failed to identify them (total 4 issues).
4. **Resolved issues**: these were issues previously recorded in the historical literature, but apparently they cease to exist (none).

Trend Analysis of <i>Land Use</i> USD		Occurrence		
A Issues identified by Interview and focus group participants	B Issues identified in Omani Literature review	1980 to 1989	1990 to 1999	2000 to 2010
1. Recurring Issues: identified by A and B				
Land use change	Change of land use from residential to commercial and the invariable mix-up	✓	✓	✓
Plots are given to influential people	Imbalance in land distribution	✓	✓	✓
Lack of zoning plans	Inadequate or absence of land use and zoning plans, regulations and enforcement that meet sustainable development principles	✓	✓	✓
Problems with location of industrial areas	unsuitable location of industrial areas (Ghala, Ruwi, Wadi Kabir)	✓	✓	✓
Land occupied by government organizations	land use restrictions: physical restrictions; environmental restrictions; institutional	✓	✓	✓

	restrictions			
Planners are busy with daily routine of solving people's issues and not planning	Land use conflicts; Increase in land ownership conflicts among nationals which impact the progress of planning and development of new areas	✓	✓	✓
Land is a limited resource and most of the land has been distributed; Availability of land for various land uses	Availability of Land	✓	✓	✓
Rezoning of agricultural land that is still viable for agriculture	Land Distribution is not in accordance with its economic value (eg. Agricultural land not valued according to soil fertility or water availability)	✓	✓	✓
Tourism residential projects in the wrong place	Mis-location of land use, (uneconomical use of land)	✓	✓	✓
Land distribution system: Plots are distributed for people who don't need them; Plots are distributed but not used for development by those who get them; Size of the plot	It is understood that the land distribution as such is not a subject of change!	✓	✓	✓
2. New Issues: identified only by A				
Change in height restrictions without a study				✓
Land speculation and unprecedented increase in land price				✓
Land use planning is centrally controlled				✓
Plots are distributed in difficult terrain				✓
Plot distribution as wealth distribution for citizens				✓
Plot distribution as a source of income for authorities				✓
Continuous demand from people to be granted their own plots				✓
Plot distribution does not correlate to urban growth				✓
3. Forgotten Issues: identified only by B				
	Existence of large undeveloped areas in the centre of the whole agglomeration (Airport and MOD area)	✓	✓	✓
	Non-utilization of land	✓	✓	✓
	Underutilization of land: Ineffective utilization of land and services due to low density and urban sprawl with pockets of land within towns in absence of clear vision for urban growth directions.	✓	✓	✓
	Gradual dissolving of formerly defined land use functions	✓	✓	✓
4. Resolved Issues: identified only by B				

Table 7.51 Trend analysis for problems associated with land use USD

Settlement Pattern USD Detailed Trend Analysis

Table 7.52 below illustrates the trends analysis of the *settlement pattern* USD, which included the problems, challenges and constraints identified in the *problem analysis phase* above. These are divided into four trends:

1. **Recurring issues**: (total 11 issues)
2. **New issues**: (total 6 issues)
3. **Forgotten issues**: (total 4 issues)
4. **Resolved issues**: (none)

Trend Analysis of <i>Settlement Pattern</i> USD		Occurrence		
A Issues identified by Interview and focus group participants	B Issues identified in Omani Literature review	1980 to 1989	1990 to 1999	2000 to 2010
1. Recurring Issues: identified by A and B				
Linear Ribbon development as a dominant pattern; Linear pattern for commercial development is driven by people desire	Linear urban development along the coastal strip from Muscat to Seeb; ribbon development; coastal linear development; "half planned & half-accidental in origin, Muscat's ribbon development continues to evince numerous problems"	✓	✓	✓
The logic behind population distribution	dispersed population distribution		✓	✓
Urban Sprawl	Urban Sprawl		✓	✓
Scattered development imposes challenges on infrastructure provision	scattered development; inequitable supply of the population; isolated developments (high costs of infrastructure); dispersal of settlements; unorganized development; non-structural		✓	✓
Lack of centrality	chain of district centres, without any hierarchical distinction		✓	✓
Isolated developments is constraint to provision of infrastructure	Isolated development (high costs of infrastructure)	✓	✓	✓
Rapid development	urban expansion of 650% between 1960-2003 - annual growth rate of 20%; growth & physical expansion	✓	✓	✓
Migration to Muscat from other regions	Migration to Muscat from other regions	✓	✓	✓
Urban growth is mainly dependent on government investment	Development is heavily subsidized by the government	✓	✓	✓
Job creation in the right place and its impact on traffic problems	The development planning neglected the importance of arranging urban activities which would greatly reduce the need for vehicle movements	✓	✓	✓
Typography drives the Morphology of Muscat	the geographical nature and dispersal of settlements throughout Oman lead to deficiency in provision of infrastructure and basic services	✓	✓	✓

2. New Issues: identified only by A				
Development in high risk flood zone	Urban physical structure will encroach on unsuitable areas such as <i>wadi</i> bottoms and mountain slopes increasing vulnerability to flood and mass movement hazards			✓
Single villa as the dominant building typology				✓
Inadequate mix of use				✓
Repeating the same mistakes of piling up ministries in one zone				✓
Private ownership of land				✓
Lack of control				✓
3. Forgotten Issues: identified only by B				
	dispersal of urban functions	✓	✓	✓
	non-homogenous urban development	✓	✓	✓
	dissolving traditional urban centres	✓	✓	✓
	division of urban areas by highway	✓	✓	✓
4. Resolved Issues: identified only by B				

Table 7.52 Trend analysis for problems associated with settlement pattern USD

Urban Transport USD Detailed Trend Analysis

Table 7.53 below illustrates the trends analysis of the *urban transport* USD, which included the problems, challenges and constraints identified in the *problem analysis phase* above. These are divided into four trends:

1. **Recurring issues**: (total 11 issues)
2. **New issues**: (total 6 issues)
3. **Forgotten issues**: (total 4 issues)
4. **Resolved issues**: (total 4 issues)

Trend Analysis of <i>Urban Transport</i> USD				Occurrence		
A	Issues identified by Interview and focus group participants	B	Issues identified in Omani Literature review	1980 to 1989	1990 to 1999	2000 to 2010
1. Recurring Issues: identified by A and B						
	Absence of public transport currently		insufficient public passenger transport; the existing public transport system is inefficient & of little relevance; public transport operate in competition rather than complementary; v limited buses	✓	✓	✓
	Big parking problem		car parking prevailing inadequacies:	✓	✓	✓

	indiscriminate roadside parking, undefined roadside parking spaces			
Extreme congestion and traffic	undesirable conditions in Muttrah due to traffic problems and commercial activities; Transport & Congestion	✓	✓	✓
Transport studies are disconnected from land use	failed to predict and control urban development and to provide acceptable solutions for transport demand to match the existing and future development	✓	✓	✓
New roads free traffic, but create new bottlenecks	unforeseen land use pattern tends to unload various slow-moving traffic onto the roads with the result that the new roads normally end up with heavy congestion;	✓	✓	✓
Difficulty to resolve bottlenecks today	there are a number of missing links and bottlenecks; traffic competition points; roundabouts are traffic bottlenecks	✓	✓	✓
Difficulty to expand infrastructure; Lack of corridors for future public transport; Reconfiguring the existing infrastructure for future alternatives of public transport	limited extension and expansion potential of Mina Qaboos port		✓	✓
Transport projects are only short term fixes	Physical planning in the Muscat Area has been undertaken in the context of extremely rapid change as in most of the developing cities at an early stage of urbanization	✓	✓	✓
Difficult terrain for new transport corridors	The topographical features make it difficult to provide sufficient transportation facilities.	✓	✓	✓
Addiction to automobile	very high reliance on privately owned passenger cars		✓	✓
2. New Issues: identified only by A				
Ill-disciplined taxis				✓
No incentive for using any public transport				✓
Fuel is cheap and car ownership is easy				✓
Serious traffic accidents				✓
3. Forgotten Issues: identified only by B				
	absence of pedestrian segregation; very little consideration given to pedestrians and cyclists;	✓	✓	✓
	A clear, readily recognizable road network hierarchy does not exist; urban road network dominated by the east-west traffic corridor; existing highway network has certain structural weaknesses which cause traffic congestion;	✓	✓	✓
	Many new roads in the Muscat Area, which were initially planned to function as efficient traffic arteries, failed to achieve this purpose because they attracted new building and commercial activities to their sides	✓	✓	✓
4. Resolved Issues: identified only by B				
	The main strategic weakness of the existing highway network is the existence of only a single corridor in the middle of the Capital Area	✓	✓	

	lack of inter-regional road links, restricted accessibility to south-eastern coastal areas (Yiti, Bandar Jissah);	✓	✓	
	undesirable conditions in Muttrah due to traffic problems & commercial activities	✓	✓	
	traffic lights are not coordinated	✓	✓	

Table 7.53 Trend analysis for problems associated with urban transport USD

Summary of trend analysis

Table 7.54 below illustrates the comparison between the recurring, new, forgotten and resolved issues for the three USDs that were selected for the trend analysis. It is clear that there were more recurring issues over the period of this study, and only very few resolved issues, mainly in the urban transport.

No.	USD	Recurring issues	New issues	Forgotten issues	Resolved issues	Total
1.1	Settlement Patterns	11	6	4	0	21
1.3	Land Use	10	8	4	0	22
6.1	Urban Transport	10	4	3	4	21
	Total	31	18	11	4	44

Table 7.54 Summary for Trend analysis for problems associated with land use, settlement pattern and urban transport USDs

7.13.3. Critical reflection

I strongly believe that having designed the framework for the USDs enabled a comprehensive problem analysis phase as reported in this particular chapter. There is an element of triangulation of this data obtained through interviews and focus groups and the previously established literature review of the Omani historical records in urban development. Whilst the USDs enabled this far-reaching analysis, it also enabled to establish interconnections between them especially when debating certain topics such as land use and plot distribution. In other words, although the USDs are clearly categorized, they are not without interconnectivity.

The establishment of the trend analysis reported in the earlier section clearly articulate that Muscat's urban development problems are not new, and many have been recurring throughout the period of the study. It is possible to extract those problems and issues that are more challenging for planning and the decision makers. However, understanding the drivers or the

barriers associated with each USD should enable to think of them from a different perspective and hopefully aid the decision maker in adopting better approaches and practices.

There are certain highlights within this problem analysis phase which shows the emphasis by decision making on certain USDs. On the other side, it is evident that other USDs showed weaknesses on the part of decision making or planning approaches in general. The best example of emphasis occurred on the *land use* USD, whereas *urban quality* can easily be recognized as a USD which gathered less attention throughout the period of the study. The framework approach identified in this research managed this issue by establishing these categories or USDs and setting aside sufficient attention to each of them within the overall urban development decision making. It is acceptable to argue that such a wide array of USDs is never within the direct responsibility or accountability of a single entity, but that's the whole point behind this exercise: urban development is a teamwork effort and requires a comprehensive, collective and shared responsibility.

Lastly, the problems identified within this chapter are plenty, but more importantly they are captured through fresh and current players in various fields of urban development. They present a reasonable appraisal of the current state of play which paved the way for a strong comparison against urban development status over the period of the study. The triangulation approach provided an evidenced conclusion especially when linking the current views obtained from interviews against those gathered from the historical references.

7.14. CHAPTER SUMMARY

This chapter presented the methods associated with the *problem analysis phase*, and justified the approach towards focusing further on certain USDs, and omitting 6 USDs that were included in the agenda of urban sustainability in Oman. The researcher presented the results and the interpretation of the *problem analysis phase* for each USD using the following components: *problems, challenges, drivers and barriers (constraints)*. This was followed by a detailed interpretation of this analysis, which provided a quantitative summary of the problem analysis phase, trend analysis for three USDs, and other detailed interpretation.

It is clear that the emphasis amongst the participants to certain USDs yielded the following ranking of importance: first was *land use*; second was *settlement pattern*; and third was *urban transport*. In total, there were 62 problems, 43 challenges, 23 drivers and 28 constraints that were conveyed by the participants. In contrast, the Public questionnaires yielded the following ranking of problems: first was *urban transport*; second was *urban quality*; and third was *urban design*.

Regarding the comparison between the recurring, new, forgotten and resolved issues for the three USDs that were selected for the trend analysis, it was clear that over the period of this study, there were more recurring issues (total 31), new issues (18), forgotten (11) and only very few resolved issues (4), mainly in the urban transport.

This logically leads to the next phase of analysis, *process analysis phase*, which will be addressed in more details, including analysis of the gap between strategy and implementation, and its interpretation and trends analysis, in chapter 8.

CHAPTER 8: PROCESS ANALYSIS PHASE- THE GAP BETWEEN STRATEGY AND IMPLEMENTATION

8.1. OVERVIEW

Following the *problem analysis* phase that was illustrated in Chapter 7, this chapter discusses the next phase, *process analysis*. The main purpose is to report the analysis and the interpretation of the results that were obtained from various research methods, with the aim to respond to the following aims, objectives and research questions identified in section 1.4.

This chapter continues by summarising the analysis of the feedback obtained on the implementation of key strategies, in section 8.2. Section 8.3 describes some contemporary planning approaches in urban development of Oman. Section 8.4 reports the shortcomings associated with strategy development that were obtained from various participants, and section 8.5 is a similar evaluation for the implementation shortcomings. This is followed by detailed interpretation of these results, including evaluation of the gap between strategy and implementation and reflection on the current ONSS. Section 8.7 is a chapter summary.

8.2. ANALYSIS OF THE IMPLEMENTATION OF KEY STRATEGIES

This section describes the feedback obtained from the participants regarding key strategies that were discussed earlier in Chapter 5. It focuses mainly on their opinion about these strategies and what they know about their implementation.

8.2.1. KEY TOWN STRATEGY ALTERNATIVE FOR NATIONAL LEVEL

(SCTP, 2008b) stated that the outcome of the regional studies that were conducted in the late 1980s, which were discussed extensively in Chapter 5, proposed the following three alternatives in terms of the national spatial strategy:

1. **Regional Growth Strategy:** seeks concentrated investment in the regional centres within each region.
2. **Rural Development strategy:** focuses on the district centres and villages and is designed to stimulate the rural economy.
3. **Key town strategy:** promotes development within designated towns/secondary centres and encourages the economic integration of urban and rural areas.

It was clear that the third alternative, *key town strategy*, illustrated previously in figure 5.6, was the selected approach (SCTP, 2008b). Since it was such an important milestone in Oman's urban and economic development, it was decided to present this to the participants in the semi-structured interviews, and seek their feedback about it. There appears to be little knowledge about the existence of such framework, and the thoughts shared by the participants, both technical (interviews) and public audience (focus groups), were different.

{Focus group 3} realizes that “all the main strategic towns are all on the coast, but Nizwa is not there”. Furthermore, they believe that this approach is good, and practical and it serves many goals: first, it spreads the development outside of the capital Muscat; and secondly, it improves the economic conditions of the residents within these areas, by creating jobs, influencing other benefits like investment of citizen's assets, and ownership of land which together results in added value for the original residents in these areas.

{Local consultant 22} thinks that this is the right approach for the current demographic distribution of people. He also appreciates the linkage, especially with the transport network that includes sea ports, airports, major roads and the proposed regional railway. He further elaborates on the benefits of this approach: “the key driver for development is industry and it requires distribution points and this requires access to the coastal routes, so by default it becomes the right solution”. He and {Ministry of Housing 20} agree with the focus group {3} that Nizwa is missing from this key town strategy, and they also believe that Buraimi is an appropriate key town.

A prominent decision maker, {Muscat Municipality 5}, is also supportive of this framework: “it is the right approach considering the demographic spread and low density as well as the geographical terrain”. He continues to characterize this as a “holistic approach wherein all

villages end up having the basic infrastructure”. These key towns are focal points of economies and they are “economic generating forces”. To him, it is an appropriate strategy mainly for the following reasons: first, the terrain of Oman; second, the cultural and historical trajectory of settlement; and, thirdly, because it is a natural growth of cities.

{Muscat Municipality 9} believes that this goes along with some sort of sustainable development: “you have to make sure the influx of people coming from the interiors to Muscat or big cities needs to be looked at within the strategic level”. {Local real estate developer 57} shares the same thoughts, and believes that this is commercially sustainable. It is a good solution to the problems committed earlier in the development, as per {Ministry of Housing 28} thoughts: “the mistake done in Oman long time ago is that concentration of planning was done in Muscat. When they started distribution in the interior, there was no proper plan. So, when we came, we had to do re-planning of the area which could have been avoided”.

What I believe is so obvious throughout all of these interviews and focus groups is that none of the participants had any idea that such a strategy existed, or that there was a strategy of this nature. It is unfortunate that such an important strategy used as the framework for development, whether it is economic or social, which affects all citizens within this country, is unknown to majority of them. I am convinced that, out of all of the strategies identified within this research, this particular strategy would stand out as the most important of all, and the one that is most worthy of an extensive public debate or attention.

To reflect on the selected alternative for this strategy, *key town strategy*, I believe it is logical and appropriate for the last forty years of development. I also share the opinion presented by some participants that some interior towns, such as Nizwa, should be selected as a key town as well. It is probably one of the reasons why migration from the interior is still continuing due to the fact that there is not much government investment in this town, or any real economic power that will support the social development. Furthermore, this is in line with the *Social Equity USD*, which caters for the equitable distribution of national investment among the geographic regions, reduction of intra- and inter-regional disparities, and fair distribution of revenue. In this regards, I believe this aim was not necessarily achieved during these forty years of development and that’s why the government included this amongst the aims for ONSS (SCTP, 2008b): fostering

geographical balance through equitable distribution of development programs among the various governorates/regions of the Sultanate and utilize the comparative advantages of each governorate/region and to sustain intra- and inter-regional integration.

8.2.2. MUSCAT REGIONAL PLAN (1989)

(Weidleplan and Muamir, 1991c) proposed three alternative strategies: *poly-central development*, *mono-central development* and *densified ribbon development*. The comparison of these three alternatives is available for review in appendix M. SCTP decision (no. 9/90) identified the approved alternative and the amendments made. It stated that “SCTP has discussed the three alternatives and has decided to approve the first alternative, the *poly-central development*, after some modifications” (SCTP, 1998).

This was identified as a major strategy in urban development, which should have shaped the city for its development between 1990 and 2010, but what emerged during the interviews was not in line with the way the strategy was envisioned.

The first question would be: which alternative do the participants believe is in existence today? Table 8.1 summarizes the results.

Alt	Alternative title	Participants selection	
Alt 1	Poly-central development	6	{Focus group 1}, {SCTP 43}, {SCTP 2}, {Muscat Municipality 14} and {expatriate consultant 12}.
Alt 2	Mono-central development	2	{Ministry of Housing 3} and {SCTP 43}
Alt 3	Densified ribbon development	6	{Focus group 1}, {focus group 3}, {Academic 50}, {local real estate developer 57}, and {Ministry of Housing 8 and 15}.

Table 8.1 Participants selection of alternatives implemented from Muscat Regional Plan

Those that selected the first alternative (poly-central development) thought that it was a practical approach, and that it was feasible for the short, medium and long term. Similarly, {local real estate developer 57} believes this is more sympathetic to the character of Oman.

As for the third alternative (densified ribbon development), there were different justifications. {SCTP 43}, who is a prominent urban planner and has seen this strategy before, attributes this outcome to how the commercial development imposed itself: “as an urban pattern, it is strip development, ribbon development, longitudinal development, and it is still prevalent, still exists, and it is still people’s desire”.

However, there were other participants who opted to think alternatively. {Academic 30} thought that: “as a theme of how Muscat is today, I think all these elements lead to a city structure where more or less everything is everywhere”.

Although {Ministry of Housing 3} eventually resorted to selecting the first alternative, he earlier thought that “honestly, if you come to reality, it is hub hazard, mixed”. A prominent architect and decision maker, {Muscat Municipality 5}, is very reluctant to identify the alternative that is most visible today, and his justification was that he doesn’t “subscribe to this dogmatic approach to town planning. A town should be able to contain hybridity which caters for all influences. Technological development is a major influence in building cities which does not go in line with the above concepts”.

{Expatriate consultant 49} provides another alternative perspective of the city today: “what happened probably is not to the same extent of what they thought will happen. Let’s be frank in here; it is the outcome of an unplanned process”. A local architect within {focus group 1} shares similar thoughts: “I think they were not successful in terms of urban design and urban planning, but there are some attempts which tell me there were some thoughts about it”.

8.2.3. ENVIRONMENTAL STRATEGIES

At least five participants have had some sort of association with environmental studies, and therefore brought to the discussion some feedback on the fate of some key environmental studies and how they were implemented.

- 1. Proposals for a system of Nature Conservation Areas by International Union for Conservation of Nature and Natural Resources (1986):** {Expatriate consultant 23} narrates that the spatial plan for a large part of Oman was done at great government expense in 1985-1986 by the IUCN. It proposed a system of nature conservation areas,

originally 94 areas for protection. He declares that “hardly anything is being done. There were arguments between ministries about protecting minerals and so on”.

2. **Coastal Zone Management Plan (IUCN 1986):** {Expatriate consultant 23} has participated in its development: “it's there, it's been done. It modified the IUCN”. However, {Local environmentalist 27} knows its fate: “they did not see the light of the day”.
3. **National Conservation Strategy (MRMWR, 1995):** {Expatriate consultant 23} describes the fate of this strategy: “another huge document that was approved by the Cabinet in its final Arabic form and it is full of good stuff and it costs a lot to produce like the IUCN report, but it is not being implemented”. {Local environmentalist 41} knows also about its destiny: “by the time I joined, it was already there so we were supposed to start the implementation, but resources were never allocated to implement this strategy”.
4. **National Scenic Reserve Strategy:** {Expatriate consultant 23} talks about this as well: “the difficulty is the barriers between ministries. If one project such as the National Scenic Reserve affects several Ministries, people are afraid of pushing it forward in case it might cause a disagreement with another ministry. And this is really the main constraint in getting on and implementing it”. He continues to identify the reason for its lack of implementation: “not possible for implementation not because of its academic or theoretical nature; it was because of the competition in land use. It's because you cannot dedicate all of this land as protected areas”.
5. **National Biodiversity Strategy and Action Plan (2000):** {Local environmentalist 27} stated that “more than 18 Government entities were represented in the committee that was working on that strategy and the strategy now is a glossy product that is basically shelved. People are talking of what objectives of the Conventional Biodiversity were met? Oman was amongst the first 60 nations to sign the Rio 1992. But if you asked me whether we have done justice to our signature to that treaty, I would definitely say no”. {Local environmentalist 41} has been involved in its development, but does not know whether its implementation has started or not: “I think it is complicated why these are not getting implemented. It could be because of lack of involvement, lack of support from the

cabinet or, in the end, the environmental issues become less of priority compared to education, health and other pressing needs”.

6. **National Water Resources Plan (2000):** In terms of looking at high, low, and immediate risk zones, the Ministry of Water Resource produced in 92-93-94 A2 Atlases and over 20 A2 sheets just for Muscat in addition to Sohar, Salalah, Sur, and all high risk areas. {Expatriate consultant 25} shows his devotion to this major study: “it is still the best work in terms of the state of Oman’s water resources at that point in time and even now. There is nothing that has been done since of that nature, of a national integrated agriculture, water, commercial, domestic – all these uses we looked at; and management to try to restore the balance because we are using up much more than is being replenished even with the desalination programs”. His other colleague, {Expatriate consultant 23}, narrates his experience with these plans: “these maps all have been completely ignored. They were never taken up seriously by Ministry of Housing which is a great shame because that is where they end up logically”.
7. **The National Plan of Action to combat desertification in Oman (UNEP/ROWA, 1993):** {Local environmentalist 41} believes this is triggered by the desertification convention which was conducted upon the instructions of His Majesty: “whether the recommendation of that conference is implemented or not, I have my own doubts!”

8.3. CONTEMPORARY PLANNING APPROACHES

It is not only strategies or planning that shapes the urban development within the city. The following section outlines certain approaches that were revealed by various experts and decision makers. It is important to document these in this research as there has been no previous documentation of the same. This has only been possible because of the vast array of participants and their particular specialty in the domain of urban planning and development in Oman, spanning over the last forty years of development. Each concept will be described briefly to an extent that is clear enough for the reader to understand the notion behind it.

1. **Reality imposed itself differently:** regardless of how the planners had anticipated or planned for urban development, {Ministry of Housing 3} advocates, in a repetitive

manner throughout his interview, that reality has imposed itself strongly to an extent that is beyond the control of the planners. His thoughts are also replicated by another dominant urban planner {SCTP 43}: “what imposed itself in the commercial development, for example, as an urban pattern, is the strip development (ribbon, longitudinal) and it is still prevalent, and it is still people’s desire”.

2. **The strategy for planning emanates from extension of existing settlements:** {SCTP 43}, who has witnessed planning for over 30 years, clarifies that urban development has always been: “an extension of existing settlements and from this respect we should take in consideration the obstacles and the determinants when extending settlements that are actually existing”. He continues the justification of this: “from the early 1970s, the approved strategy was to conserve the existing settlements and this meant that we can’t move ahead in an empty and remote area and establish a new city, but only to extend existing settlements to reduce the risk of migration”. Both {Ministry of Housing 6 and 15} presented the same approach in their interviews.
3. **Private ownership governed planning in the early stages of development:** This was considered as one of the most important factors that determined the pattern of development.
4. **Urban Planning Criteria – the manual** (SCTP, 1996) (figure 8.1): {SCTP 43} narrates the importance of this manual and how urban development was influenced by its criteria. However, various participants in other organizations had no clue about its existence, significance or how it was employed in urban planning which meant that it had limited use.



Figure 8.1 SCTP Urban Planning Manual title cover (SCTP, 1996)

5. **30% of the detailed block plan was identified for commercial use:** In lieu of proper zoning plans and because of the huge demand on plots, “the engineers went for the use of pockets plans or detailed plans. Then something appeared, in the early 90s, that in every planned area, they made 30% commercial services”. This was clarified by {Ministry of Housing 3} who justified that this emerged due to the lack of a structural plan that could be used. His colleague, {Ministry of Housing 8}, who is also responsible for planning, but has to focus on delivering plots, summarizes this approach in simpler terms: “every 150 residential plots, there is a small local commercial area to serve them”. This approach resonates to the present day and it is becoming a doctrine in the planning departments which governs in the absence of a clear planning approach.

6. **Horizontal expansion and sprawl:** {Muscat Municipality 9} describes this prominent approach in the townscape until recently: “generally in Oman and more specifically in Muscat, the government has encouraged horizontal growth and spreading out of settlements at different nodes in different parts of the city. So if one looks at an area like Seeb, it has different urban nodes; not heavily or densely populated. It is a combination of low scale and high scale of buildings. Most of the time, the government has wanted to satisfy every citizen with a piece of land to make sure they are settled somewhere and you will find predominantly focus on single house”. It is actually true that the horizontal

focus of the city is more evident than the mixed use. He continues with his statement: “this has helped to reduce to a certain degree the traffic problems and despite the fact we are not talking about a comprehensive masterplan overall for Muscat, but this is the planning that was considered”.



Figure 8.2 Aerial photo from Ghubra showing extent of increase in building height

7. **Vertical expansion and building height increase:** this approach was one of the most recurring themes addressed by various participants, and it was recommended as one of the solutions to the *land use* USD. {Ministry of Housing 3, 6, 8, 15 and 40} all echoed this as one of the government contemporary thoughts. A good example of such approaches is the decision to extend the height restriction from five floors up-to 12 floors in some areas, like Mabeela. {Ministry of Housing 20} accepts this solution, but denounces the process of how it was taken: “you don’t just change the height without changing the plan itself. Because that scheme has been done for specific infrastructure; once you change that, you have increased the density. So when you increase the density, you have to change the infrastructure. All these have to change. You cannot change just the height and this has been exactly what was done: just changing the height”. Figure 8.2

illustrates one of the best examples of the extent of building height change and its consequence on infrastructure, mainly transport and parking.

8. **Land use change – converting residential land use into commercial land use:** various participants find this phenomena is so resonant in the current urban landscape to the extent that major roads, such as November 18th Road, has witnessed a change in its land use from pure residential to commercial use, albeit within the same housing fabric that has existed before. This has resulted in disturbance to the traffic flow and increase in congestion as well as severe parking problems around major government and private sector entities that have relocated along this corridor.
9. **Economic development axis:** while discussing the outcome of the national spatial strategy, and the *key town strategy* alternative, as discussed in section 8.3.1 earlier, one of the key decision makers, who doesn't want to be quoted, announced a crucial government principle for economic development, which to the researcher is radical and may be controversial if publicly known: “the development axis for economic, social and tourist related, is Muscat-Batinah axis and not Muscat-Dakhliya axis”. I believe this may actually be logical due to the population spread, but I wonder whether this conclusion has been reached after a robust strategic thinking or merely an outcome advocated and sponsored by a few key decision makers.
10. **Distribution of infrastructure amongst the regions, and diluting Muscat of its current functions:** {SCTP 48} argues that Muscat is overloaded with multiple functions as a capital: “it is our political capital, commercial capital, industrial capital, and educational capital. I think the best thing is to take some load out of Muscat and try to shift that to another city”. This approach is in harmony with the *key town strategy* alternative discussed in section 8.3.1 earlier. A key example of this is the decision to transfer the commercial port activities from Sultan Qaboos Port in Muttrah to Sohar Port, and to convert Sultan Qaboos Port for tourism activities, illustrated in figure 8.3 below.



Figure 8.3 artist impression for Sultan Qaboos Tourist port project

(reference: www.madhyamam.com)

11. **Barka city as a logistics centre and land port:** this is a direct result of the decision discussed in the previous item about the conversion of Sultan Qaboos Port into tourism port. With relocation of commercial port activities to Sohar, the mass of incoming shipment and cargo delivered to Muscat will have to be transported by road or rail when it is complete, and as such a logistics centre at the crossroads between rail and road, and connecting other regions, is being proposed at Barka. This will probably impact the urban development in Muscat and Batinah Governorate to a great extent. I have not been able to obtain any additional details about this important project that is available within the public domain and this is reminiscent of similar major developments where information is not disclosed, possibly for the fear of disturbing the market dynamics, especially in terms of fluctuating land values and speculation.

12. **Integrated Tourism Complex:** this approach is adopted by the Ministry of Tourism and other government organizations. Key examples of this approach are: The Wave Muscat (Wave Muscat, 2014) (Figure 8.4), Blue City (Blue City, 2014) (Figure 8.5), Saraya, Moriya, Sifah, Salalah Beach, Muscat Hills, Barr Al Jissa Resort, etc. This is a key driver for the tourism strategy in Oman, and it has become one of the initiatives that drive urban

planning, especially in attracting key investment into the city and to enhance its competitiveness in the region.

Figure 8.4 The Wave, Muscat Master Plan (Wave Muscat, 2014)

Figure 8.5 Al Madina A'Zarqa (Blue City) Master Plan (Blue City, 2014)

This section covers a list of strategy shortcomings that were identified through various interview sessions. It includes detailed description of the statements and where applicable excerpts were taken from other Omani literature resources to investigate these arguments furthermore.

to identify the government plots only”. (Al-Rawas, 1996) identified that for transport: “such a comprehensive transport study has not yet been carried out in Oman due to the fact that over the years the responsibility for transport planning, construction and maintenance has been divided between a number of government agencies”.

2. **Strategies were “short-sighted”:** An engineer within {focus group 1} assumed that there was, “unfortunately, no long vision”. {Ministry of Housing 3} shares his views along this line of thought: “we lack a plan. To be honest with you, there is no clear vision where we are going, but we are doing our best”. {Expatriate consultant 4} adds his own view to this argument: “there is no sufficient horizon planning or it was too short to really understand how Muscat would develop over the longer term. Massive changes have occurred here over a very short period of time (i.e. the early planners must have struggled to visualize the Muscat of today, 20-30 years ago). Without that vision, it would have been very difficult to understand what is required of a certain area that is being planned”.
3. **Lack of integration between studies:** {expatriate consultant 25} who had worked on similar strategies in the past knows for sure that “they all do their own studies and it is the integration of these studies that I think is the real issue”. “Lack of coordination” was also pointed out by participants in {focus group 2}.
4. **Lack of clarity about the ownership of a strategy:** {Ministry of Housing 40}, who should be responsible for development of strategies, was not actually clear about the organization that should be responsible for such strategies: “it is not the responsibility of Ministry of Housing to put strategies for urban development; that is SCTP role. We are an execution organization, but because there was no strategy, the Ministry is forced to develop strategies and execute them and evaluate them, and this is what is currently happening. SCTP is now working on a structural plan, but until that finishes, the Ministry of Housing should work because the country demands development. Obviously there are efforts and studies being done. We cannot guarantee these studies or their precision, but there should be work. It is not acceptable that we jeopardize the country’s interests because we don’t have a strategy”.

5. **Strategies contained poor statistics, estimates and forecasts:** (Al-Rawas, 1996) identified this as a limiting factor in the integrity of some strategies: “the lack of population census is exacerbated by the lack of compatibility and agreement in the population estimates, which confuses planning agencies”. In addition, (Oborn, 1982) narrated this particular issue: “lack of data results in more intuitive planning”. In table 8.2 below, (Al-Rawas, 1996) tabulated the different population statistics for the base year as well as the forecast for the design year for various studies conducted before 1990. It is clear in this table that there was a significant difference between these estimates and forecasts which in fact may have caused some issues in the implementation or in the outcome of these strategies.

Year	Consultant	Base Year		Design Year	
		Year	population	Year	population
1972	Whitehead ⁽¹¹⁾	1972	25,000*	---	---
1973	Brain Colquhoun ⁽¹²⁾	1973	30,000*	---	---
1973	Italconsult ⁽⁴⁾	1973	40,000	1995	150,000
1974	Sir Alexander Gribb ⁽¹³⁾	1974	60,000	1990	190,000
1976	The Middle Economic Digest ⁽¹⁴⁾	1976	80,000	---	---
1977	Llewelyn-Davies ⁽¹⁰⁾	1977	80,000 to 85,000	1985	116,300 to 157,200
1982	Llewelyn-Davies ⁽¹⁵⁾	1982	226,000	1990 2000	443,000 686,000
1989	Weidleplan ⁽¹⁶⁾	1989	405,278	1990 2010	417,000 730,300
* Muscat and Muttrah towns population					

Table 8.2. Population estimates of the Muscat Area identified by various consultants (Al-Rawas, 1996)

6. **Misinterpretation of the vision:** {Muscat Municipality 5} who has a strong connection with urban planning maintained that “the biggest challenge in city development and urban planning from 1970s till now is the single mind behind the vision and the misinterpretation of this vision which led to the wrong type of implementation”.
7. **Strategies were theoretical:** {Ministry of Housing 3}, who has not seen any previous study, complained that “the structural plan that was done was more theoretical. It did not understand the situation that was there in the country”.
8. **Lack of qualified staff behind these strategies:** a leading architect in {focus group 1} questioned the team behind these studies and stated: “if you are talking about urban design

and urban planning, I think you would definitely need urban designers to be among the team; not only architects and engineers”.

9. **A masterplan has only a certain period:** the architect within the {focus group 1} is determined about this: “it has the period of the discussion only and would change once you start implementing it as many actors would interfere with the plan”. {Expatriate researcher 30}, on the other hand, looks at this factor from a different dimension: “the chance of a masterplan to have a long life is related to the question of how horizontal they cut through the different disciplines and this gives them a longer life”. He meant that the more sectorial they are, the shorter their life is because they only address an engineering question or maybe a social question and so on.
10. **Some strategies are not known:** {Ministry of Housing 8} is being honest that “we didn’t see them because we were not specialists in those strategies, and there were other departments who were responsible about them. In the planning department, we only execute plans”. The same is echoed by his colleague, {Ministry of Housing 15}, who thinks that “these strategies may have been available, but not with us in planning. Maybe they are in a higher management office, either in the Minister’s or Undersecretary’s office. I have not seen them”. On a similar note, {Ministry of Housing 40} made an ironic statement about this situation: “A lot of the existing staff said they did not see these studies! Is it because they don’t want to, or because they don’t know they exist?” {Expatriate Consultant 25} confirms that regarding some environmental strategies that he doesn’t “think there will be many Omanis in government who even know they exist”.
11. **Production of strategies stopped:** {Ministry of Housing 15} who has been in this discipline for the past ten years and assumes a managerial role in planning has never seen strategies throughout his career: “production of strategies stopped! They were not implemented? Why? Because they depend on the urban development in Muscat and the strategies change”. An evidence of this statement is available in the historical analysis of urban development in Oman, covered in Chapter 5 and available also for review in the appendix B showing limited urban planning strategies after the mid-nineties.

12. **Poor planning techniques and study outcome:** (Al-Rawas, 1996) identified this as one of the factors for poor transport strategies: “the studies themselves were technically weak. They failed to predict and control the rapid urban development of the Muscat Area and to provide acceptable solutions for transport demand to match the existing and future development”.
13. **Ambitious schemes and outcomes:** (Al-Rawas, 1996) continued with his investigation of road improvement schemes and concluded that “some road improvement schemes were too ambitious, and cost-effective solutions were not considered; hence most of them have been rejected or ignored rather than implemented”. (Oborn, 1982) narrated in his review of the development of Ruwi: “a number of individuals who have been involved with the development of the town have suggested that VIAK’s plan (VIAK, 1972) was in fact too sophisticated for a country that was at such an early stage of development when it was implemented”.
14. **Poor phasing plans:** (Oborn, 1982) highlighted the “failure on the part of the planners proposals in that it did not allow for any phasing of the town’s development which could have been achieved by creating a series of smaller districts within the town, each one comprising a balanced-mixture of activities. As it is development has generally been piecemeal and no attempt has been made to coordinate the town’s rapid growth or to implement more than the crudest form of legislative control”.

8.5. IMPLEMENTATION SHORTCOMINGS

This section covers a list of implementation shortcomings that were identified through various interview sessions. It includes detailed description of the statements and where applicable excerpts were taken from other Omani literature resources to investigate these arguments furthermore.

1. **Strategies were not followed:** having looked at *Muscat Structural Plan* and used it for the road strategy and transport planning, {Muscat Municipality 16} states that: “unfortunately nothing of those had been followed during the pattern of land use or the

pattern of roads infrastructure and reserving corridors”. {Local environmentalist 27} is also angered by this reality: “I can state examples of a number of strategies that were done in the area of *Biodiversity* and *Coastal Zone Management* and that they did not see the light of the day”.

2. **Strategies were put on the shelf:** {SCTP 48} who has good knowledge of the history of strategy development in urban planning is convinced that “plans have been put on the shelf”. {Ministry of Housing 28} talks about this openly: “no, there are strategies – who said there weren’t any strategies? But they are put on the shelf because they are busy with their daily routines”. {Ministry of Housing 29}, working in the same period holds a lot of grudges towards this topic: “I was there, and after they received them, they shelved them. Maybe even the managers didn’t see them, and they are not encouraged to see them even. Why? I don’t know! Maybe they do not believe in planning, or maybe there is a structural issue with the planning organization”. {Ministry of Housing 40} adds: “the strategies are available; they are not lost. They are shelved. You have to ask the specialists why they are shelved!”
3. **Strategies were lost:** this unfortunate conclusion was recounted by an experienced consultant who has been in this domain for the past twenty years and has seen the fate of various strategies: “Reports have been lost and all we have are the references. Oman paid a lot of money over the last 20 years or actually since the mid-70s. There is some excellent work which hasn’t been improved upon and yet a mass of that work disappeared”.
4. **Strategies were destroyed:** A good example of this is recalled by one of the consultants who did not want to be referred to because there is much criticism in this story: “the new minister said “we don’t need two libraries, put everything into one office. If it doesn’t fit, throw it away”. That actually happened with the library. It didn’t fit and a lot of the books were dumped on a cement floor in the ministry’s store. I went out there; it was enough to make you cry. I personally managed to rescue a number of those documents, which form

an important part of my library. So the library now which had the best resources in the country six months before was almost criminally destroyed by very poor decision”.

5. **Strategies were not updated:** {SCTP 48} talks about early 90s strategies being used, but “unfortunately, after 1992, nobody updated this masterplan”. {Expatriate consultant 49} believes that “for any strategy, you have to update it every 10 years. It needs change, requirement is altered, there is fine tuning. That’s part of the planning system”. (Oborn, 1982) identified this issue thirty years back in his evaluation of the implementation of the Master Plan Report (VIAK, 1972): “perhaps the most curious fact to emerge from all of this is that at no time have the proposals contained within the Master Plan Report been adapted to cater for the changing needs of the community. Such a requirement had been identified by the authors of the report who recognized that: “the contrast between a developing civilisation and a traditional culture causes difficulties in defining and determining the needs of the people”. He concluded: “the Master Plan has never been formally revised since the day it was first published and no such studies have ever been commissioned” (Oborn, 1982).
6. **Implementation was a challenge:** a previous authority in the development of urban planning strategies, {Ministry of Housing 20}, resolves to this conclusion: “I think the study was not a challenge but to implement it was a challenge”.
7. **Masterplans are never implemented:** {Academic 30}, with his theoretical background, identifies a dimension in the implementation that is somewhat plausible: “we all know that masterplans are never implemented, but it is still helpful to produce them because it clarifies many questions. It might not solve them all, but thinking on that big level is very helpful. How exactly it will then trickle down into the lowest levels of planning is another question”. In this statement, he is questioning whether it is rules or regulations that trickle down? Or information and awareness that trickle down? Or both?
8. **Was there enough justification for implementation?** {Local real estate developer 57} is not bound by the objective for developing strategies, but questions its justification

before implementation: “one of my big concerns though is that once studies are made - is there enough justification to actually implement it?”

9. Reality is stronger than the plan: {Academic 30} attributes the weak implementation of previous studies to the reality factor: “because reality is stronger than the plan and people adjust their real estate buildings to what they actually need and push the limits of the law. It’s a natural trend, you find it everywhere”. {Ministry of Housing 3} continuously acknowledged that reality imposed itself: “you are obviously talking about an issue from 1991, and you are talking about it in 2010. People thoughts have improved, many things have been improved. A new reality has emerged for us”.

10. Investors were smarter than the planners: with worldwide experience in this field, and probably echoing similar scenarios in the urban development of various other cities, {Academic 30} thought this may be a probable attribution to the existing scenario: “I think it was not really consciously planned like this, but it’s coming up like this because investors are smarter than planners and they see what works and what does not work”. For example, (Weidleplan and Muamir, 1989b) identified that there was an unplanned development of a new central commercial centre in Qurm (figure 8.6) and Wattiyah that “draws a considerable share of the purchasing power in the Muscat Area from the established commercial areas, thus diluting the central functions of Ruwi in particular”.



Figure 8.6 Qurum Commercial Centre (right side of the highway) was unplanned

11. **The outcome is of unplanned process:** when confronted with the *Muscat Structural Plan*, (Weidleplan and Muamir, 1990a), as discussed previously in Chapter 5, {Expatriate consultant 49} could only point out to this controversial outcome: “what happened probably is not to the same extent of what they thought will happen. Let’s be frank in here, it is the outcome of an unplanned process”. Another {expatriate consultant 4} endorses this similar finding, but albeit for *environment protection* USD: “I think any environmental gains are coincidental rather than planned”.

12. **There was a different political agenda:** the engineers within {focus group 1} who were strongly affiliated with decision makers in other construction projects predicted that “there is a political agenda, political issues, pressures to the actors”. {Expatriate 25} had many stories of this nature: “I would interpret that the recommendation to that particular report conflicted with the objectives of people concerned, particularly their development objectives”.

13. **Short-term thinking:** {Local environmentalist 41} recollects scenarios associated with environmental permits where decision makers were thinking only short term: “it was clear instructions. Everyone has got his own agenda, he wants to do this within this

timeframe while he is in the position and they have this understanding. I remember when I was in the ministry, they told us several times: there is nothing that cannot be mitigated, so whenever you review it, you should just put your conditions”. In other occasions, he heard: “approve this; what happens later is not my problem!”

14. Lack of involvement by some people in the development of strategies: {Local environmentalist 27} knows “for sure there were efforts made by departments, agencies to put up strategies together. But the composition of a strategy and the underpinning to a strategy is to get people involved. And when you fail to do that, the chances are that you would not succeed”. He continues to say that “strategies are about human beings and individuals who will eventually end up implementing them. If you bring something that people had nothing to do with, the chances are that they will not be implemented”.

15. A new team became responsible for the implementation: the participants in {focus group 2} attributed failure to implement some of the strategies to changes in the team: “The original planner should have supervised the implementation stage”; or to a succession in leadership: “the previous leadership did not remain in its position”. {Expatriate consultant 25} has seen many similar stories: “at the time it came out, it was a change of Minister: *out with the old and in with the new*; so there is a lot of reinventing the wheel”.

16. The responsible teams are busy with daily routines: {Ministry of Housing 28} continuously repeated this argument as he is very much aware of the teams associated with planning since he has worked there for a long time. The daily routines include activities associated with plot distribution, change of land use, height restrictions, etc. It doesn’t, however, include planning or anything strategic.

17. Urban growth without improving the transport infrastructure: {Ministry of Housing 20} with experience that spans over thirty years in this field identified this as the main challenge for implementing the strategy: “the biggest challenge with this fast growth is that we are using the same structure plan without improving the infrastructure. And we

can see now the roads: with the changing of the plan, we cannot expand the roads because some areas have been taken as built-up area already. We cannot expand our main highway more than three lanes”. The new generation of planners in Ministry of Housing adhere to this thought as well: “there are a lot of transformations that happened in Muscat. A *structural plan* was done earlier, but the urban expansion surpassed the structural plan and the structural plan was not implemented according to its original plan” {Ministry of Housing 3}.

18. Strategies were only a ‘guideline’ and had no legislation power: this argument was actually repeated by various interviewees. {SCTP 43} stated that “this was a decree of the Council of Ministers that it becomes a guideline”. His colleague {SCTP 48} assumed the same position: “because it’s only guidance; there is no Cabinet decree or there is no rule that says you have to follow this one”. One of the early pioneers in strategy development, {Ministry of Housing 28}, could not agree more to this statement: “yes, indeed, these studies were not enforced; they were only as guideline. Anything in Oman cannot have the power of law unless it is issued by a decree”.

19. Weak governance: {Academic 30} with a general perspective on this topic predicts this as a possible factor that limits the implementation: “it is also a question of how established the system of governance is because in a fast growing society and rapidly modernizing society like the one in Oman, it might be difficult to expect that these kind of first time plans will already go into a smooth track of implementation and that might be too much to expect”.

20. Strategy without an action plan is worthless: although many claim that the implementation was poor due to the absence of a clear action plan, {expatriate consultant 23} declares that this was not always the case: “when I have written a little strategy in conservation, I have always called it strategy and action plan. Strategy without an action plan is worthless, I agree with you”.

- 21. People hate change:** This factor was introduced into this discussion by {local real estate developer 57} who has seen the growth of Muscat for more than forty years: “it is a natural phenomenon. People hate change and if someone is sitting in a cushy position and maybe realized just the thought or fear that it may bring about change, means he would go out of his way to stop it happening”.
- 22. Bureaucracy:** {Expatriate consultant 25} believes that “the major structural problem in Oman is *young bureaucracy* wherein information is a source of power and control and, as a result of that, there is very little cooperation at opposite levels”.
- 23. External factors:** (Oborn, 1982) highlights this in his evaluation of Ruwi: “without doubt the greatest influences on the town’s development have come not from within, but from without the Ruwi valley itself. During the mid-1970s, the demand for residential accommodation, particularly from the increasing number of expatriate Europeans, was rightly judged as being greater than the town of Ruwi could provide and the decision was taken to develop a residential suburb at *Madinat Qaboos*; a decision which was no doubt also influenced by a desire to segregate this section of the community. At the same time as this, the more wealthy Omanis were becoming dissatisfied with the somewhat cramped conditions found within the existing centres of population and they began to move out to the nearby headland at Qurm which provided for more spacious and secluded housing layouts”.
- 24. Lack of funds:** {Local environmentalist 41} identified this as one of the reasons for not implementing an environmental strategy: “by the time I joined, it was already there so we were supposed to start the implementation, but resources were never allocated to implement this strategy”. (Al-Rawas, 1996) also identified this as one of the reasons for lack of implementation of transport projects: “many plans have been shelved for lack of funds because of priority scheduling of most of them were not programmed according to the available funds”.

8.6. INTERPRETATION AND CRITICAL REFLECTION

Although it cannot be confirmed that the outcome narrated above is comprehensive for this debate, it does, however, provide genuine insights into the mind-set of the decision makers and their attitude towards this topic. What is comforting about the results obtained through this research is the number of participants with specialist expertise in urban planning, who have been involved in this context, and whose experience span over the past forty years of development. Moreover, majority of these participants have already left their organizations and were capable of providing critical assessment of those organizations, and of their own role when they were employed there. In addition, they were at ease in sharing their opinion about other organizations, and the overall performance of the new regime. In essence, it can be concluded that the role of bias in this outcome is minor.

8.6.1. WHERE WAS THE GAP IN PREVIOUS KEY STRATEGIES IMPLEMENTATION?

Table 8.3 below summarizes key strategies addressed in previous sections, and their relevant issues at strategy development or during the implementation phase.

	Strategy/Study	Strategy Issue	Implementation Issue
1	Key town strategy (National Level by SCTP)	<i>little knowledge about the existence of such framework</i>	
2	The Greater Muttrah Development Plan (1967-1972) by John R. Harris and Partners	<i>"the plan itself consisted of little more than proposals for road layouts and contained few other detailed planning proposals" (Oborn, 1982).</i>	
3	Muscat City Planning (Makiya, 1973)	<i>it is disappointing that the plan failed to gain acceptance "Their report emphasized the tremendous national value of Muscat's heritage, which they recommended should be enriched by maintenance and renovation and safeguarded against the onslaught of development" (Samar Damluji, 1998).</i>	<i>That was a brilliant study and the problem it was never implemented" {Expatriate Consultant 23}</i>
4	The Greater Muttrah Development Plan (VIAK, 1972)	<i>"too sophisticated for a country that was at such an early stage of development when it was implemented" (Oborn, 1982). "it did not allow for any phasing of the town's development" (Oborn, 1982). "was rushed through in six weeks with no thought given to alternative locations, with inadequate planning, no thought to likely water requirements and their source, or the likely cost, or the likely population growth" (Oborn, 1982).</i>	<i>"Has never been formally revised since the day it was first published and no such studies have ever been commissioned" (Oborn, 1982).</i>
5	Capital Area Structure Plan		<i>"has not been fully implemented because of certain external as well as internal causes"</i>

	CASP 1982 (Llewelyn-Davies, 1982)		(Muscat Structure Plan Phase I Survey Report 1989)
6	Muscat Regional Plan (Weidleplan and Muamir, 1989c)	<i>approve the first alternative, the poly-central development, after some modifications (SCTP, 1998).</i>	<i>"Honestly, if you come to reality, it is hub hazard, mixed" {Ministry of Housing 3} "It is ribbon development, and it is still prevalent, still exists, and it is still people's desire". {SCTP 43} "The progress of ribbon development was relentless" (Peterson, 2007) "Half-planned and half-accidental in origin, Muscat's ribbon development continues to evince numerous problems" (Peterson, 2007)</i>
7	Transport studies	<i>Lack of planning data Poor planning techniques and study outcomes Studies failed to predict and control the rapid growth urban development of the Muscat Area and to provide acceptable solutions. Some schemes were too ambitious and cost-effective solutions were not considered. (Al-Rawas, 1996)</i>	<i>Lack of qualified staff and the employment of inexperienced expatriates Lack of compatibility and agreement amongst the organizations Lack of project implementation Lack of coordination between the agencies for urban development</i>
8	Proposals for a system of Nature Conservation	<i>"The spatial plan for a large part of Oman was done at great government expense in 1985-1986 by the IUCN. It proposed a system of nature conservation areas, originally 94 areas for protection" {Expatriate Consultant 23}</i>	<i>"Hardly anything is being done. There were arguments between ministries about protecting minerals and so on" {Expatriate Consultant 23}</i>
9	Coastal Zone Management Plan by IUCN 1986	<i>"It's there, it's been done. It modified the IUCN". {Expatriate Consultant 23}</i>	<i>"They did not see the light of the day" {local environmentalist 27}</i>
10	National Conservation Strategy (MRMWR, 1995)	<i>"Another huge document that was approved by the Cabinet in its final Arabic form and it is full of good stuff and it costs a lot to produce like the IUCN report, but it is not being implemented" {Expatriate Consultant 23}</i>	<i>"They did not see the light of the day". {Expatriate Consultant 27} "by the time I joined, it was already there so we were supposed to start the implementation, but resources were never allocated to implement this strategy" {local environmentalist 41}</i>
11	National Scenic Reserve Strategy		<i>"Not possible for implementation not because of its academic or theoretical nature; it was because of the competition in land use. It's because you cannot dedicate all of this land as protected areas" {Expatriate Consultant 23}</i>
12	National Biodiversity Strategy and Action Plan (2000)		<i>"It is complicated why these are not getting implemented. It could be because of lack of involvement, lack of support from the cabinet or, in the end, the environmental issues become less of priority compared to education and health and other pressing needs" {local environmentalist 41}</i>
13	National Water Resources Plan (2000)		<i>"These maps all have been completely ignored. They were never taken up seriously by Ministry of Housing which is a great shame because that is where they end up logically" {Expatriate Consultant 23}</i>

Table 8.3 Summary of key strategies and their implementation issues – through literature review and interviews

8.6.2. THE PUBLIC PERCEPTION OF THE GAP

12% of the public that participated in the questionnaires thought that the problems were associated with implementation, versus 88% who thought the problems were related to strategies and planning issues.

In terms of strategy, the participants identified the following issues:

- Lack of proper future planning, strategy or vision.
- Poor urban planning (location of services, roads, plots, etc.).
- Accumulation of lack of planning for a long period; problems are solved as they occur, but not in a long term perspective.
- Lack of early planning for services.
- Deficiency and disorder in strategic planning for the long term.
- Urban planning was not done properly to accommodate changes in the future.
- Randomness in planning.

In terms of implementation, the participants identified the following issues:

- Slowness in implementation of projects.
- Blunders in implementing plans (for example, change of the pre-defined land use plans).
- Ad-hoc decisions in creation of new plots and modification with disregard to the criteria.

8.6.3. REFLECTION ON OMAN NATIONAL SPATIAL STRATEGY (ONSS)

The fact that the way forward for sustainable urban development in Oman is being considered through ONSS (SCTP, 2008b) highlights the significance of strategy development. Moreover, the recent announcement (Observer, 2014) of the government initiative, through its recently established *Supreme Committee of Planning*, to develop the *economic vision for Oman 2040* as a follow on from its predecessor *Oman 2020* (Economy, 1996), and the important *National Strategy for Logistic Services* instructed to the Ministry of Transport and Communication shows the magnitude of the government confidence on necessity for strategy development.

It is included in the discussion at this stage to address any shortcomings in its development as well as identifying any similarity with the patterns identified earlier in this chapter regarding factors impacting on its implementation. Since this study has not yet been concluded, and was still in the early phases of its development when the interviews were conducted, the feedback obtained from participants only related to its significance and the expectations of its outcomes.

To start with, it was necessary to identify the participant’s knowledge about the existence of ONSS. Table 8.4 below illustrates the participants that have responded to this question, and their prior knowledge or involvement in this particular study. {Muscat Municipality 9} summarizes this dilemma: “why wouldn’t I know about this ONSS? Do you think everybody in the government is aware of this one? I doubt at this stage”.

Category	Doesn’t know about it	Has heard of it	Involved
Ministry of Housing	1, 15, 20, 28, 29, 42	3, 6, 8, 40	
SCTP			2, 43, 48
Muscat Municipality	5, 7, 9, 13, 14, 16	7	
Expatriate Consultants		4, 12, 49	23, 25
Academic	10	50, 30	
Local real estate developers	51, 52	57	
Focus groups	1(4), 2(8), 4(4)	3(3)	
Others	21, 22, 24, 26, 31, 41	27	
Total (57) and %	37 (65%)	15 (26.3%)	5 (8.7%)

Table 8.4 Feedback obtained from participants about their knowledge of ONSS – through interviews and focus groups

{Expatriate consultant 12} is very optimistic about this upcoming study, but highlights its urgency and the need to start delivering quickly. Furthermore, he states that “as a strategy top-down and bottom-up approach is needed, but it has to start integrating economies, land use, and transportation whereas before it has been left to the different regions within the country and not really tying those up”. {Academic 30} thinks that the question at this point is “at what point does that project switch from being about data analysis into strategy generation?”

There has always been fear that this will turn out to be just another strategy and that it will end up facing the same destiny as with previous studies of its nature. {Expatriate consultant 23} who has seen some major studies unimplemented shares the same fear: “I think a number of us are worried about that and the leader of the project team was proposing that as an urgent emergency measure, we drew up a list of critical issues, spatial issues concerning natural and cultural heritage that is going to be destroyed by development”.

As for {SCTP 43, 48}, the following features were being considered to make the strategy more effective:

1. The planning process from preparation to implementation will be identified as responsibilities and functions.
2. The ONSS will guarantee the implementation of the data management system and exchange of information between the agencies.
3. The plan for preparing ONSS relies on a bottom-top approach: it will study the regions and the governorates; and will go down to a certain level in the regions that will be agreed upon in the first phase.
4. The output of this strategy should come with very strong land use, regulation and it should be approved by the cabinet.
5. The strategy should deal with something called *fixed land use* and this is a big challenge. Expansion has a strategy and it has phases and it will be known for which period the expansion will be either vertical or horizontal.

Like with any initiative, there are those that have doubts about the process or the intentions. One of the key decision makers who did not want to be identified for this statement thought he should have been involved in this important strategy, but has not been involved and has not even read its terms of references and does not know whether it was about land use or zoning. He believes that “urban development strategies should be an outcome of team collaboration” and that “a city is worth many opinions”. Furthermore, he believes that everyone wants to just take the credit for themselves and he questions the group behind this: “SCTP are Civil Engineering oriented group and not urban planners. They don’t propose; they only take orders to implement and provide solutions to Ministry of National Economy requests”.

Although it is not appropriate to conclude or forecast its destiny from this primitive stage or with this brief research input, but the outcome of the interviews does not provide much confidence in this process, especially with the fact that many important parties are not involved or aware of this massive task.

Furthermore, there are already glimpses of a poor strategy setup even before it is completely developed and ready for its implementation. For instance, this strategy has taken so far over seven years for its development since it was floated as a tender in 2008 (SCTP, 2008b). Moreover, the consultant team that was selected for this project has disintegrated for reasons unknown to the researcher. As with the implementation shortcomings mentioned earlier, this

strategy has also seen a major change in the team responsible for it, including the ministerial level as well as a complete change of the organization (whereby SCTP as an organization was disintegrated and amalgamated in a newly created Supreme Council of Planning). Like with other major initiatives of its kind, there is very little awareness of this project, and, even with the knowledge I have obtained in urban planning, I could not access any valuable status or knowledge of any of its outcomes so far. The drastic shift for this strategy was in the withdrawal of the initial consultant who had been awarded the consultancy contract and the appointment of a relatively new consultant with limited years of experience, especially in Oman, to carry out the tasks associated with this strategy. These issues do not paint any optimistic picture so far, but, as suggested earlier, conclusions about its destiny cannot be made at this stage.

8.6.4. HOW DECISIONS AND ACTIONS IN THE HISTORY LED TO PARTICULAR OUTCOMES FOR DEVELOPMENT?

It is possible to correlate certain problems associated with the current situation in the urban environment in Muscat to decisions made by the government, either through legislation, policies, or decision making by officials. Sometimes such decisions would have been taken under the titles of strategies, studies or projects. This section will identify a few such decisions and actions undertaken throughout the last forty years that have led to particular outcomes in urban development today.

Firstly, **Urban sprawl** has been identified as a key problem under the *settlement pattern* USD. This outcome should not be considered a coincidence or a result that have materialised out of the control of the decision makers. In fact, it is an outcome that was decided upon through various decision making approaches. {Muscat Municipality 9} highlighted this: “generally in Oman and more specifically in Muscat, the government has encouraged horizontal growth and spreading out of settlements at different nodes in different parts of the city”. The plot distribution system, orchestrated through the organization Ministry of Housing and its terms of references, and through the amendments to its legislation and regulations throughout the study period, all point out that such a reality was eminent. In fact, planners at the Ministry of Housing have set this as a doctrine for their daily work in such a way that they concern themselves with the target of allocating to the most possible extent any plot for residential use, justifying this as a directive

from the officials and as an undeniable result of the social pressure and drive for each individual to obtain a plot. Similarly the problem associated with **liner ribbon development as a dominant settlement pattern** emanates from a similar social driver, more specifically attracted to plots on major streets and a rising trend of requesting change of land use from residential to commercial use. The decision makers themselves contribute to this dilemma as it is commonly known for influential decision makers to target such plots for their personal commercial interests. So it is not difficult to conclude that both of these problems within the *settlement pattern* USD are logical outcome of decision making.

Secondly, in terms of **land use change** and **change in height restrictions**, especially without a study, has roots in actions undertaken by decision makers for a long period in this history of urban development. {Ministry of Housing 20} validates this: “You don’t just change the height without changing the plan itself. Because that scheme has been done for specific infrastructure; once you change that, you have increased the density. So when you increase the density, you have to change the infrastructure. All these have to change. You cannot change just the height and this has been exactly what was done: just changing the height”. The researcher obtained certain ministerial directives in this matter that are not for publication, and some of these directives have in fact been published in the newspapers. In fact, there have been contradictions in such directives from time to time, and it is obvious that decision making was done ad-hoc, instantaneously and without thought about long term implications. Within this mind-set of decision making, it is not strange for the following outcomes to occur as a consequence: plots are distributed but not used for development by those who get them; major development proposals in high risk flood zones; plot distribution does not correlate to urban growth and Lack of zoning plans.

Thirdly, the **big parking problem** identified through literature over the past forty years and through the interviews and public questionnaires conducted in this research, is also a direct consequence of decision making. (Al-Rawas, 1996) highlighted this issue more than twenty years ago: “the change of land use from residential to commercial and the invariable mix-up, and the increasing number of multi-story buildings around the commercial areas, particularly in Ruwi without providing car parks within the legal boundaries of the plots, create considerable pressure on the parking places and traffic movement”. It is also astonishing to see new commercial areas,

269 | Page

such as in Al Khoudh 6 or Mabeela, with commercial plots for 12 storey height been distributed on a plot area of 200 sq.m. The striking concern here is not in the outcome itself, but in the bewildering repetition of this mistake throughout the planned developments, especially in recent years. They have explained repetitively that “reality imposed itself differently” and that “reality is stronger than planners”, but I wonder whether they themselves are in touch with the reality of existing urban planning problems.

Many more outcomes of urban development today can be correlated back to decision making, but I have chosen to provide the above three examples. Other examples are embedded within the narration of this chapter and the previous Chapter 7.

8.7. CHAPTER SUMMARY

This chapter presented the *process analysis* phase of this research project, which followed on from the *problem analysis* phase presented in chapter 7. The main objective of this chapter was to address the role of strategies in urban development, and their destiny enabled in their implementation.

The chapter proceeded with the analysis on the implementation of key strategies, in section 8.2, which covered key strategies addressed in earlier chapters of this research. By far, the majority of respondents argued that these were very good strategies, and fit for the purpose, but their implementation was either weak or absent. Section 8.3 provided a first glimpse of current thoughts and approaches towards urban development, and more precisely urban planning. This section uncovered new approaches that have replaced strategic development and its implementation which have never been described earlier in the literature, or properly recorded or brought into the public domain.

The two sections that followed were reserved for outlining the shortcomings associated with strategy and implementation. These can be looked at as the main focus of this chapter, from which the interpretation and the conclusion evolves. Section 8.6 addressed the gap, and how the perception of this differed between the decision makers and the consultant versus the general public. It also tackled the upcoming ONSS and its current strategy development status and how that related to the previous knowledge of strategy and implementation. Obviously there is a gap

that can be clearly comprehended between strategy and implementation, which needs interpretation and to some extent bridging. The focus was to pinpoint critical issues derived from the results and which were extrapolated as general trends and themes of this dilemma.

Chapter 9 logically follows up with the potential for development and recommendations for an improved approach towards urban sustainability in Oman.

Chapter 9: Improved approach towards Urban Sustainability

9.1. OVERVIEW

Following on from the outcomes of the *problem analysis* phase (Chapter 7) and *process analysis* phase (Chapter 8), the research culminates in this chapter by summarizing the key recommendations for an improved approach towards urban sustainability.

This chapter covers the following topics: the gap of definition of sustainability (section 9.2), the recommendations towards the problem analysis phase (section 9.3 and 9.4), and bridging the gap between strategy and implementation (section 9.5).

9.2. SUSTAINABILITY DEFINITION FOR OMAN

It is imperative that we reflect on how sustainability is defined by the decision makers and consultants in Oman. This was identified as one of the key gaps in knowledge (gap of *definition*) as an outcome of the literature review in Chapter 3. (Willis, 2005) argued that “a prerequisite to achieving sustainable urban form is knowing what it is”. (Webster and Williams, 2005) stated that “the current position facing those involved in steering urban change is that both the mechanisms for attaining sustainable development and the future form which sustainable development might take remain ill-defined and contested”.

{Expatriate consultant 12} claims that “in Omani context, it is a word very loosely used. It is about finding a balance today to make things stack up, but also ensuring that the future is looked after. I think it is a buzz word, unfortunately, for sustainability not only in Oman, but throughout the region. Everybody is talking about sustainability and I think it is fragmented. It is possibly due to the planning and the design environment in the region (throughout the GCC). Departments in the government sector are very fragmented. They focus only on their disciplines”. {Ministry of Housing 20}, who played a major role in developing urban planning strategies between 1989 and 1991, could not describe much about sustainability: “sustainability

has come recently I think, say maximum 10 years. But during my time we never discussed about sustainability. The only sustainability we discussed was energy saving”.

{Local consultant 22} has another definition for sustainability in Oman: “we are still at the very early stages of development, considering even 40 years have elapsed since. So here sustainability would not apply necessarily to climate change, but the rest of the people will talk about the growth and more development. You may remember five years ago that the oil production of the country fell down and there is now gas shortage which impacts on power generation and industrial development; this is what the rest of the people know. Maybe we will talk also about minimizing pollution, but it is definitely not conserving the resources; not yet, we are not there”.

{Expatriate consultant 23} adds his views in this regards: “it is a big problem at high level in government and you would read reports in the paper by Ministers saying Oman is undergoing new ventures of sustainable development such as aluminium industries in Sohar and fertilizer industries and so on. By definition, those are simply adding value to gas. They are using up fossil fuels when maybe there are better ways. But the word is misused in the media in Oman because many people just use it as a fashionable word when they don't actually understand what it means. The question is I don't think anyone really takes it very seriously at the moment”.

{Expatriate consultant 25} argues that “sustainability is to do with good housekeeping particularly in our immediate environment. The biggest single problem in the planet today, as far as I am concerned, is too many people and it is getting worse continually also and that is stressing agriculture and water resources at least. These are the real sustainability issues. Can we actually feed ourselves?”

{Local environmentalist 27} is well versed about the global definition of sustainability: “there is only one connotation to sustainability. You cannot have an Omani sustainable development that is different from international sustainable development. Sustainability means “the rational use of your existing resources to meet the needs of the current population without jeopardizing the requirement and needs for future generations” and that is the only way to define sustainable development. Well, you see if you talk philosophy, then it is easy to assume that this is the magic word. If you are a true believer of sustainable development, then you have to look at these facets of development seriously, and you will be definitely addressing the matters differently. It can

only tell you that you may be propagating sustainability, but you are not implementing it. So there is divergence between proclaimed policy of sustainability and actual implementation”.

{Academic 30} adds his views as well: “I think the definition that you also mentioned which most, at least academic, work with – meaning the balance between the ecological, economic and social questions – I think this is a good broad definition. And as you said governance could be included. Yes, it’s a good basis. I don’t think that it is very much discussed here because the focus in the local/global discussion is very often on the ecological factors so people talk about green building and so on. The economic is often left out, and the social part I think is the most undervalued aspect of these three. I have not heard much of the discussion about social sustainability in Muscat so far which I find very decisive and important for any city in order to establish social cohesion”.

{Expatriate consultant 49} summarizes his views towards urban sustainability: “for a long time here, development equals plots of development. Now when you put them together, it doesn’t give you an urban form; that’s the problem here whereas, in the old settlements, urban form was responding to cultural and social structures. Now that has been lost because of the issue of plot allocation. That’s where the urban design or planning becomes very important to guide what the Ministry of Housing is doing. Without that you will end up with more sprawl and less sustainable urban development”.

Some of the local decision makers look at sustainability with a different lens. {Muscat Municipality 5} argues that “if you want sustainability, you have to push for the best, and employ the best quality, and pay – if you want to build history and legacy”. {Local real estate developer 57} talks about sustainability from the perspective of the private sector: “I don’t think that thought even went into anyone’s mind at that time. Whether they are there now, I do not know. I don’t think anyone at the moment doing a private project actually even sits down and thinks along these lines”.

There might be many that sympathise with those points of views that lean towards development and growth when it comes to defining sustainability for Oman as opposed to the alternative versions tackling climate change, conservation and environmental protection. Nevertheless, at this stage of the thesis, the reader would have appreciated the different dimensions of urban

274 | Page

sustainability and the potential opportunities that are available within the current urban domain which promises an overarching spread over the other facets contained with the global definition of sustainability. Oman has already embarked on this journey and has much to pride for, but the journey is long and the ambition is endless, especially with a society that is far steeped in its culture and heritage of conservation, environmental respect and harmony with nature.

9.3. RECOMMENDATIONS RESULTS FOR PROBLEM ANALYSIS PHASE

This section will identify and discuss the following three components:

1. **Attitudes:** are quantitative data obtained from the public questionnaires and the quick surveys with respect to specific USDs. They cover the attitudes towards a particular issue and their willingness to change their behaviour towards improving sustainability in the future.
2. **Opportunities:** are development factors which have positive effects on urban sustainability, but which have not yet been utilized or fully utilized. This means that the utilization of the potentials will benefit urban development and strengthen its socio-economic position.
3. **Recommendations:** a suggestion or proposal to improve urban sustainability in Oman. Some of these may have direct impact on the existing situation, especially when it comes to resolving some of the problems and challenges.

The reader will be faced with multiple tables that summarize the results obtained from various participants, and occasionally include quotes as evidence. The text that follows these tables complements the content of the table but most of the time does not replicate it.

9.3.1. USD 1.1: SETTLEMENT PATTERN

9.3.1.1. Settlement Pattern Opportunities

Table 9.1 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Low population density in Oman	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
2	Typography of Muscat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
3	Appropriate scale and pace of development	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
4	Current morphology			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Table 9.1 Settlement Pattern Opportunities – obtained from interviews and focus groups

{Muscat Municipality 5}, a prominent decision maker in the current set-up, shared his views that “Muscat has a big advantage considering its rugged mountain terrain and the sea, which leads to an organic pattern of development. The difficult terrain contributes to the identity and aesthetics of Muscat and this ensures a competitive advantage”.

9.3.1.2. Settlement Pattern Recommendations

Table 9.2 below summarizes the recommendations for this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	There should be limits to growth			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2	Providing sufficient employment for younger generation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Need to showcase sustainability in regeneration projects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
4	Muscat needs a new comprehensive structural plan	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
5	More focused mix-use in the right location		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Control of construction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
7	Concentrating the commercial activities in certain areas				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
8	Limiting the pressure for commercial ribbon development along the highways	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		

Table 9.2 Settlement Pattern Recommendations – obtained from interviews and focus groups

There should be limits to growth: {Expatriate consultant 49} reminds us of this philosophy: “there is a fine line between growth and over development. And if we are not careful enough, there are a lot of sensitive areas around Muscat that may be at risk. Yes, there is a need for investment, but also there is a rational where to put it. And I think that’s where strategically it’s got to be clearly identified where to touch and not to touch. And if the government is not careful enough, they might end up losing what is the key asset of Oman. So there is a fine balance to be struck; it’s where you develop and how much of it. You can achieve all of those by just being

smart and controlling one way or another: growth. I think the opportunities are here and it's who actually is managing these opportunities? I think that is where it comes down to".

Control of construction: {SCTP 43} narrates an earlier recommendation that has been studied but not passed: "Our earlier recommendations were the control of construction – why should I allow people to construct and develop in dispersed areas? You announce that this planned development will get the services connected in this particular year, and if you want to build, you have to study your alternatives. You are forced to build where the services are available. There is a committee assigned to look at this, and all of these issues will be studied".

The most important recommendation in this USD is that **Muscat needs a new comprehensive structural plan**. There seems to be a cry-out for this to the extent that some participants wanted a pause in terms of plot distribution until this structural plan is developed and become a road map for the future planning of the city. Along with this, there should be more emphasis on **focused mix-use in the right location**, such as strong district centres as opposed to just Seeb and Muttrah. In addition, there is a need to **limit the contentious spread of commercial ribbon development** along the highways, which have resulted in various problems within the *urban planning* and *urban transport* USDs as discussed earlier in Chapter 7.

9.3.2. USD 1.2: URBAN DESIGN

9.3.2.1. Urban Design Attitudes

The following tables illustrate participant's attitude towards population density within Muscat. Table 9.3 shows that 61.7% of the public questionnaires' participants were either satisfied or very satisfied with the current population density in their neighbourhood.

	46. How satisfied are you with the current population density in your neighbourhood?					Total
	very satisfied	satisfied	neither	unsatisfied	very unsatisfied	
Count	23	135	44	40	14	256
%	9.0%	52.7%	17.2%	15.6%	5.5%	100.0%

Table 9.3 Statistical frequency of the participants' satisfaction with current density (only questionnaire results)

Similarly, Table 9.4 shows that 66% of the quick survey and focus group's participants were either satisfied or very satisfied with the current population density in Muscat.

		73. How satisfied are you with the current population density in Muscat?					Total
		very satisfied	satisfied	neither	unsatisfied	very unsatisfied	
Quick Survey	Count	5	17	5	6	2	35
	%	14.3%	48.6%	14.3%	17.1%	5.7%	100.0%
Focus Groups	Count	0	11	1	3	0	15
	%	0.0%	73.3%	6.7%	20.0%	0.0%	100.0%
Total	Count	5	28	6	9	2	50
	%	10.0%	56.0%	12.0%	18.0%	4.0%	100.0%

Table 9.4 Statistical frequency of the participants' satisfaction with current density (only quick survey and focus groups results)

Table 9.5 shows that only 12.5% of the public questionnaires' participants were willing to consider living in a neighbourhood with a higher population density in order to improve the sustainability of Muscat. In comparison, table 9.6 shows that 74% of the focus group and quick survey participants agree or strongly agree that living in a neighbourhood with a higher population density has an impact on the sustainability of Muscat.

		56. I would consider living in a neighbourhood with a higher population density in order to improve the sustainability of Muscat			Total
		yes	no	I don't know	
Total	Count	32	89	136	257
	%	12.5%	34.6%	52.9%	100.0%

Table 9.5 Statistical frequency of the participants' willingness to live in higher density neighborhood (only questionnaire results)

		67. To what extent do you agree that living in a neighbourhood with a higher population density has an impact on the sustainability of Muscat?					Total
		strongly agree	agree	not sure	disagree	strongly disagree	
Quick Survey	Count	11	18	4	2	0	35
	%	31.4%	51.4%	11.4%	5.7%	0.0%	100.0%
Focus Groups	Count	2	6	4	1	2	15
	%	13.3%	40.0%	26.7%	6.7%	13.3%	100.0%
Total	Count	13	24	8	3	2	50
	%	26.0%	48.0%	16.0%	6.0%	4.0%	100.0%

Table 9.6 Statistical frequency of the participants' view of the importance of population density towards sustainability (only quick survey and focus group results)

9.3.2.2. Urban Design Opportunities

Table 9.7 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Cutting edge design is picking up momentum			☐			
2	Learn from Oman's history of urban design and planning				☐		☐
3	Learn from <i>Duqm</i>	☐					
4	Integrated Tourism Complex (ITC) is improving urban design				☐	☐	
5	Muscat Municipality proposals for Majestic Muscat			☐	☐		
6	Learn from <i>Shatti Al Qurm</i>	☐	☐		☐	☐	☐
7	Learn from <i>Madinat Sultan Qaboos</i>		☐		☐		☐
8	Muscat has a unique architectural identity and cityscape			☐	☐	☐	☐
9	Muscat unique height limitation	☐		☐	☐	☐	☐

Table 9.7 Urban Design Opportunities – obtained from interviews and focus groups

{Muscat Municipality 5} argues that the time has come for **cutting edge design** to be done: “appropriate design for Oman which will break the misconception of mandate from Muscat municipality. They say restriction hinders creativity, I say bureaucracy hinders creativity”.

Item 3 to 7 on the list, in the above table, point to the learning opportunities available within some of the better examples of urban developments, either existing or currently in progress. For example, within the *Duqm* development, there is a differentiation between urban planning and urban design: first in *Urban planning*: identifying regulation zoning, identifying the land use, and identifying the urban development framework for the town; and second in *urban design*: dealing at local level within each of these zones.

{SCTP 48} thinks that the best exercise of urban design is currently being delivered by ITC (Integrated Tourism Complex) projects, such as *The Wave Muscat* (Wave Muscat, 2014). Under the new team for Muscat Municipality, urban design has been used as the main task for the Municipality, and the overall driver for this is quality and identity which culminates in over a dozen new projects clubbed under the title “Majestic Muscat”, mainly aiming to enhance the liveability of the city and its people, especially in public parks and squares.

One of the most important potentials within Muscat is its unique architectural identity and cityscape. Many local and expatriate consultants continue to praise this aspect of Muscat urban design, especially with regards to the low height, human scale and the distinctive white colour that is uniformly cascaded on majority of the buildings.

{Expatriate consultant 49} is fascinated about **Muscat's unique height limitation**: “What’s unique about Muscat which you don’t see anywhere else in the Middle East is the height limitation. That is clever because that has prevented over development and that’s a tool that has controlled development as you go along. It managed to cap traffic. It managed to cap speculation within a certain extent. It managed to resolve a lot of issues”.

9.3.2.3. Urban Design Recommendations

Table 9.8 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Density has to be controlled				☑		
2	Work within the local context and learn from the process of others				☑	☑	☑
3	Focus on the quality of small places	☑					
4	A new strategy of Open spaces is needed		☑		☑		
5	Revision of urban planning criteria	☑					
6	Better ways for solid waste management	☑			☑	☑	☑
7	Involve all the organizations in urban design	☑	☑	☑	☑		☑
8	Need to allocate land for urban design			☑	☑		
9	Introduce water lagoons					☑	☑

Table 9.8 Urban Design Recommendations – obtained from interviews and focus groups

In essence, there is a need for a **new strategy for open spaces** as there is undoubtedly prevalent lack of open space in the city. The concepts contained with the *Majestic Muscat* recently initiated by Muscat Municipality (Observer, 2011) are aiming in the right direction, but it could be enhanced by an overall strategy rather than mere projects here and there.

{SCTP 43} who was responsible at some stage for the development of these criteria, provides his recommendations for **revision of urban planning criteria**: “Revision of provision rates (in Manual for Urban Planning) for social services like Schools, Health centres – all has to be

subjected to revision to reduce duration of trips, to reduce the pressure on these centres – i.e. for example, I can see that the Mosques do not have enough capacity to cater for the prayers; where is the deficit? Is the deficit in the size of the mosque or in their distribution, their provision rates?”

As urban design is a process-driven USD, there is an immediate need to **involve all the organizations** in this field. Although many would argue that this scale of urban development is the responsibility of Muscat Municipality, it cannot achieve much without a fully integrated and comprehensive team work with other organizations. For instance, there is a need to allocate land for urban design in the first place, and this role is for the Ministry of Housing. Likewise, when one considers Muscat as a coastal city, this is not replicated within the city fabric and the beaches are sort of at the backyard. Why not introduce lagoons in the inner parts of the city to reflect the real essence of Muscat history with the sea?

9.3.3. USD 1.3: LAND USE

9.3.3.1. Land Use Opportunities

Table 9.9 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Plot distribution system is adequate		☐				
2	Plot size is adequate		☐				
3	Converting agriculture land into different land use		☐		☐		
4	Ministry of Defence land is potential land for development	☐	☐			☐	
5	5m gap for services between plots may have other uses	☐	☐				

Table 9.9 Land Use Opportunities – obtained from interviews and focus groups

Although it appeared in the problem analysis phase, some of the participants felt the problem was not with the plot distribution system; in fact, some identified it as an opportunity. {Ministry of Housing 20} said “I don’t see any disadvantage if the law has been applied”. Additionally, {Ministry of Housing 40} said: “I think we are very lucky in Oman, but have we made the best out of this system? The government is giving land to create a family and the fees for land are very minimal”.

9.3.3.2. Land Use Recommendations

Table 9.10 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Slow down the distribution of plots		☑				
2	More control on plot distribution system				☑		
3	Start thinking about alternatives to plot distribution		☑				
4	Different plot size				☑		
5	Increase the cost of plots with readily available services	☑					☑
6	Freeze the planning in Muscat until the completion of a structural plan		☑				
7	Preparation and rehabilitation of land that was not available for development	☑				☑	

Table 9.10 Land Use Recommendations – obtained from interviews and focus groups

9.3.4. USD 2.1: HOUSING

9.3.4.1. Housing Attitudes

Table 9.11 shows that 64% of the quick survey and focus group's participants agree or strongly agree that living in a smaller house built-up area has an impact on the sustainability of Muscat.

		66. To what extent do you agree that living in a smaller house built-up area has an impact on the sustainability of Muscat?					Total
		strongly agree	agree	not sure	disagree	strongly disagree	
Quick Survey	Count	8	18	4	5	0	35
	%	22.9%	51.4%	11.4%	14.3%	0.0%	100.0%
Focus Groups	Count	0	6	6	2	1	15
	%	0.0%	40.0%	40.0%	13.3%	6.7%	100.0%
Total	Count	8	24	10	7	1	50
	%	16.0%	48.0%	20.0%	14.0%	2.0%	100.0%

Table 9.11 Statistical frequency of the participants' view of the importance of house size towards sustainability (only quick survey and focus group results)

Table 9.12 shows that only 19.5% of the public questionnaire participants will consider living in a smaller house built-up area in order to improve the sustainability of Muscat, while 40.9% will not consider this.

		55. I would consider living in a smaller house built up area in order to improve the sustainability of Muscat			Total
		yes	no	I don't know	
Total	Count %	50 19.5%	105 40.9%	102 39.7%	257 100.0%

Table 9.12 Statistical frequency of the participants' willingness to live in smaller house (only questionnaire results)

9.3.4.2. Housing Opportunities

Table 9.13 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Good housing conditions, and no slums			<input checked="" type="checkbox"/>			
2	Development of commercial land already distributed		<input checked="" type="checkbox"/>				
3	Large Integrated Tourism Complexes (ITC) are catering for residential needs				<input checked="" type="checkbox"/>		

Table 9.13 Housing Opportunities – obtained from interviews and focus groups

Wherein many cities around the world suffer from slums or poor conditions for housing settlements, Muscat is far from this situation. {Muscat Municipality 16} highlights this opportunity: “I think housing conditions is good; we have almost all new building. I don’t think there are slums’ maybe in Muttrah or in Muscat but very little. In general, the buildings are all in good condition. Even the worst buildings we have could be compared to the best buildings in other countries”. {Ministry of Housing 8} believes there is an opportunity that will present itself in the form of additional residential units that will come up in the commercial areas that have already been distributed but not yet developed.

9.3.4.3. Housing Recommendations

Table 9.14 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Zoning of residential land use		<input checked="" type="checkbox"/>				
2	Distributing apartments instead of plot distribution	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Introduce measures to control large houses				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4	Encourage vertical expansion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Housing should be planned based on available land		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>

6	Need to forecast future housing needs			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	Improve building energy performance				<input checked="" type="checkbox"/>		
8	Need a comprehensive housing strategy			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
9	Create a separate housing area for labour force			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>

Table 9.14 Housing Recommendations – obtained from interviews and focus groups

The first item in the above list is regarding the **zoning of residential and housing land use**. I believe this is an audible suggestion as there does not seem to be more than the villa zone, and the apartments are inappropriately coupled with the commercial use, which is not synonymous for Omani family living style. Moreover, **distributing apartments instead of plots** is another initiative that the Ministry of Housing should look at, which is applicable to this *housing* USD. This will pave the way for a paradigm shift in the lifestyle of Omani families as it is seldom the first choice for them to live in apartments, except for newlywed couples or low income groups. There ought to be new measures to control large houses which are overly sized and “in terms of sustainability they are nothing but a waste of money, energy and resources” as stated by {local environmentalist 27}.

Over the past few years, there is an ever **increasing trend for vertical expansion** and this should be encouraged. Furthermore, housing and plot distribution should be in par especially if we aim to maximise the benefit of distributing infrastructure and ensuring provision of services where needed the most. This cannot happen without proper forecast for the future housing needs, and this should tie up with a new comprehensive housing strategy, like *Muscat Housing Strategy* conducted in 1990. {Muscat Municipality 5} points this out: “we need a comprehensive housing study that will show the type of housing we have. Are we facing crisis? It should also look at market dynamics”.

9.3.5.USD 4.1: ENVIRONMENTAL PROTECTION

9.3.5.1. Environmental Protection Attitudes

In terms of their satisfaction with the **current level of air pollution in Muscat**, the participant’s results are shown and compared in table 9.15 below. Only 6.6% were very satisfied, while 35% were satisfied.

		48. How satisfied are you with the current level of air pollution in Muscat?					Total
		very satisfied	satisfied	neither	unsatisfied	very unsatisfied	
Questionnaire	Count	13	83	74	55	28	253
	%	5.1%	32.8%	29.2%	21.7%	11.1%	100.0%
Quick Survey	Count	5	17	6	7	0	35
	%	14.3%	48.6%	17.1%	20.0%	0.0%	100.0%
Focus Groups	Count	2	6	6	1	0	15
	%	13.3%	40.0%	40.0%	6.7%	0.0%	100.0%
Total	Count	20	106	86	63	28	303
	%	6.6%	35.0%	28.4%	20.8%	9.2%	100.0%

Table 9.15 Statistical frequency of participant's satisfaction of current level of air pollution in Muscat – through Questionnaires, quick survey and focus groups

9.3.5.2. Environmental Protection Opportunities

Table 9.16 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Environmental awareness is slowly picking up momentum	☑					
2	People are becoming more responsible towards the environment				☑		
3	Scenic value and visual landscape				☑		
4	Botanic garden as an opportunity for better environmental awareness				☑		

Table 9.16 Environmental Protection Opportunities – obtained from interviews and focus groups

{Expatriate consultant 25} highlights the important of preserving **scenic value and visual landscape**: “Muscat is unique to have this amazing backdrop, but I fear that more development in the mountainous areas, more infrastructure, power lines will destroy this; it needs to be managed and controlled”.

9.3.5.3. Environmental Protection Recommendations

Table 9.17 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Increasing green areas	☑				☑	
2	Managing waste in a sustainable manner			☑		☑	
3	Enhancing public awareness				☑	☑	☑

4	Utilizing <i>wadis</i> as parks			☐	☐		
5	Maintaining natural landscapes				☐	☐	
6	Controlling pollution from now					☐	

Table 9.17 Environmental Protection Recommendations – obtained from interviews and focus groups

{SCTP 43} believes that giving attention to **creating green areas**, fields and open space would improve the environmental protection. {Local resident 24} suggested the same. {Local environmentalist 41} supports this recommendation, and adds to it: “we need to maintain the naturally green areas, the sumr plants (woodlands)”.

{Expatriate consultant 12} suggest that **utilizing wadis as parks** this could add value to the urban environment and provides an example: “look at the wadi that goes towards Qurm where we are putting up massive walls at the moment and that’s because we haven’t really in the past understood how we interfere with storm water issues. The dead area, instead of now just been put as a gutter, can be partially used as a park at time, at close proximity”.

{Local environmentalist 41} recommends that “we need to **maintain the natural beauty** like the mountainous areas and so on. I am in favour of maintaining the natural areas rather than creating or reclaiming new areas and establishing modern parks and so on. There are quite a few of them we have: Al Sarrin areas and the woodlands near Murtafa Camp”. {Expatriate consultant 25} is very pleased with Muscat’s landscape: “I think a leader in the region, partly by default because you have the sea and the mountains and a beautiful backyard which people are able to enjoy”.

9.3.6.USD 4.2: CLIMATE CHANGE

9.3.6.1. Climate Change Attitudes

Table 9.18 shows that 87.3% participants perceive sustainability as important. Table 9.19 also shows that over 65.1% of participants are either concerned or very concerned about climate change, whereas almost 26.7% are either not concerned or not concerned at all.

		50. Do you think that sustainability is important?			Total
		yes	no	I don't know	
Questionnaire	Count	213	5	32	250
	%	85.2%	2.0%	12.8%	100.0%
Quick Survey	Count	35	0	0	35
	%	100.0%	0.0%	0.0%	100.0%
Focus Groups	Count	13	0	1	14
	%	92.9%	0.0%	7.1%	100.0%
Total	Count	261	5	33	299
	%	87.3%	1.7%	11.0%	100.0%

Table 9.18 Statistical frequency of participant's view of sustainability – obtained from Questionnaires, quick survey and focus groups

		52. Are you concerned about climate change?					Total
		not concerned at all	not concerned	I don't know	concerned	very concerned	
Questionnaire	Count	20	57	20	114	47	258
	%	7.8%	22.1%	7.8%	44.2%	18.2%	100.0%
Quick Survey	Count	0	4	3	14	13	34
	%	0.0%	11.8%	8.8%	41.2%	38.2%	100.0%
Focus Groups	Count	0	1	2	9	3	15
	%	0.0%	6.7%	13.3%	60.0%	20.0%	100.0%
Total	Count	20	62	25	137	63	307
	%	6.5%	20.2%	8.1%	44.6%	20.5%	100.0%

Table 9.19 Statistical frequency of participant's view of sustainability – obtained from Questionnaires, quick survey and focus groups

Table 9.20 shows that over 68% of the participants in the public questionnaires strongly agree or agree that their behavior has an impact on the sustainability of Muscat. This is almost comparable with the data obtained for the same question among the participants in the quick survey and focus groups, as shown in table 9.21.

		51. To what extent do you agree that your behaviour has an impact on the sustainability of Muscat?					Total
		strongly agree	agree	not sure	disagree	strongly disagree	
Total	Count	78	96	71	6	3	254
	%	30.7%	37.8%	28.0%	2.4%	1.2%	100.0%

Table 9.20 Statistical frequency of participant's view of sustainability - obtained from Questionnaires

		64. To what extent do you agree that public behaviour has an impact on the sustainability of Muscat?				Total
		strongly agree	agree	not sure	disagree	
Quick Survey	Count	17	11	4	3	35
	%	48.6%	31.4%	11.4%	8.6%	100.0%
Focus Groups	Count	7	5	2	1	15
	%	46.7%	33.3%	13.3%	6.7%	100.0%
Total	Count	24	16	6	4	50
	%	48.0%	32.0%	12.0%	8.0%	100.0%

Table 9.21 Statistical frequency of participant's view of sustainability – obtained from Questionnaires and focus groups

9.3.6.2. Climate Change Opportunities

Table 9.22 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Climate change has hit the national psyche after Gunu	☑	☑	☑	☑		
2	Some development projects were halted after Gunu		☑				
3	Climate change has already been considered in projects		☑	☑	☑	☑	
4	Securing plans for flood alleviation			☑	☑	☑	

Table 9.22 Climate Change Opportunities– obtained from interviews and focus groups

All of these opportunities are similar in nature, and they emanate from the cyclone *Gunu* disaster. For instance, climate change only hit the national psyche after *Gunu* although the government has never said *Gunu* is a product of climate change. I think it did have a profound effect on the way planning is being done in Oman, to the extent that some development projects have been halted after *Gunu* and some have been redesigned considering climate change. The government is also striding properly in terms of securing the right solutions for future plans in flood alleviation or any climatic condition that may result in similar disasters in the future.

9.3.6.3. Climate Change Recommendations

Table 9.23 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Invest time on the hydrology of the city				☑		
2	Shift the houses out of the <i>wadi</i> and compensate the people				☑		

Table 9.23 Climate Change Recommendations – obtained from interviews and focus groups

{Expatriate consultant 25} puts forward a provoking suggestion: “**Shift the houses out of the wadis and compensate the people** - simple solution. Do it, start putting so much money into it each year and progressively move people. There has to be a compensation committee. They must get some land, reasonably suitable at a reasonable fair price. It will be expensive but it will be more expensive to build dams. It is a political thing you see. You can’t shift people, you know

what I mean. There are a lot of things that happened there that probably shouldn't and now it will take some time to resolve. But it is improving".

9.3.7.USD 5.1: PUBLIC PARTICIPATION

9.3.7.1. Public Participation Attitudes

Table 9.24 illustrates a comparison of the participant's satisfaction with the current level of public participation in urban planning process. It clearly shows a variance in the responses whereby 30.2% of the public were either unsatisfied or very unsatisfied compared with 61.8% for the quick survey participants and 73.3% for the focus groups participants.

		49. How satisfied are you with the current level of public participation (involvement) in the urban planning process?						Total
		very satisfied	satisfied	neither	unsatisfied	very unsatisfied		
Questionnaire	Count	9	77	90	46	30		252
	%	3.6%	30.6%	35.7%	18.3%	11.9%		100.0%
Quick Survey	Count	0	2	11	14	7		34
	%	0.0%	5.9%	32.4%	41.2%	20.6%		100.0%
Focus Groups	Count	0	3	1	8	3		15
	%	0.0%	20.0%	6.7%	53.3%	20.0%		100.0%
Total	Count	9	82	102	68	40		301
	%	3.0%	27.2%	33.9%	22.6%	13.3%		100.0%

Table 9.24 Statistical frequency of participant's satisfaction of current level of public participation– obtained from Questionnaires, quick survey and focus groups

9.3.7.2. Public Participation Opportunities

Table 9.25 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Role of Oman Society of Engineers					☐	☐
2	Role of New Municipal and Shura Councils		☐				
3	Participation is picking up momentum					☐	
4	Omanis are building up more awareness		☐				
5	Decision makers are more supportive of public participation		☐				
6	ONSS is built around public participation	☐					
7	Royal camp concept	☐	☐		☐	☐	☐
8	The traditional system of a local community representative				☐		

Table 9.25 Public Participation Opportunities – obtained from interviews and focus groups

There is a general consensus that participation is picking up momentum and that Omanis are becoming more aware about its essentiality and how to deal with it. In addition, the decision makers are now open for such dialogue. In its fourth meeting in 1986, (SCTP, 1998) tackled this issue, and “confirmed the principle of public participation in stating their opinion about the urban development plans of their towns and villages, under no obligation for the government entity responsible for planning to adhere to their opinion. Moreover, this participation will be through a committee organized by the Minister responsible for planning, and to be chaired by the local *wali* and membership of officials and citizens of his selection”. {Ministry of Housing 3} identifies the following benefits: “You will get people’s satisfaction, you will get the type of development that you seek; and you will limit the number of requests”. Moreover, {SCTP 2} believes that there is genuine dialogue between the government and the public during His Majesty’s annual tour of the country and the various camps he sets in different regions where he meets the local residents in those areas.

Lastly, public participation is already one of ONSS objectives (SCTP, 2008b), and the team managing this project are continuously advocating for public participation.

9.3.7.3. Public Participation Recommendations

Table 9.26 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Listen to old people	☐				☐	☐
2	Increase public participation in planning	☐	☐		☐		☐
3	Increase public awareness about planning		☐				
4	Open School of Planning	☐					
5	Increase the transparency about planning						☐

Table 9.26 Public Participation Recommendations – obtained from interviews and focus groups

Increase public participation in planning was a recurring theme that was suggested by various participants: {Local resident 24}, {SCTP 43, 48}, {Local environmentalist 27, 41}, {expatriate consultants} and {focus group 1, 2, 3}. {Ministry of Housing 6} suggested: “Continuous awareness of planning objectives and goals through various media tools”.

Increase the transparency about planning was recommended by {focus group 1}: “first of all as citizens, there should be some transparency. We think what the citizens are looking for is whether we have a long term vision or we don’t have for Muscat Governorate”.

9.3.8.USD 6.1: URBAN TRANSPORT

9.3.8.1. Urban Transport Attitudes

Table 9.27 shows the main reasons why participants are not using public transport: 34.5% because public transport is not available; 29.5% because it is not comfortable; 9.2% because the climate is too hot and only 4.2% because of the cost.

30. What is the main reason that you are not using the public transport?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	public transport is not available	90	34.5	35.6	35.6
	public transport is too expensive	11	4.2	4.3	39.9
	the climate is too hot	24	9.2	9.5	49.4
	public transport is not comfortable	77	29.5	30.4	79.8
	other (please specify)	51	19.5	20.2	100.0
	Total	253	96.9	100.0	
Missing	System	8	3.1		
Total		261	100.0		

Table 9.27 Statistical frequency of the main reasons why the participants are not using public transport – obtained from questionnaires

Table 9.28 illustrates that 96% of the quick survey and focus groups’ participants agree or strongly agree that using public transport should be adequately available to improve the sustainability of Muscat.

		68. To what extent do you agree that using public transport should be adequately available to improve the sustainability of Muscat?				Total
		strongly agree	agree	not sure	strongly disagree	
Quick Survey	Count	26	8	1	0	35
	%	74.3%	22.9%	2.9%	0.0%	100.0%
Focus Groups	Count	7	7	0	1	15
	%	46.7%	46.7%	0.0%	6.7%	100.0%
Total		33	15	1	1	50
		66.0%	30.0%	2.0%	2.0%	100.0%

Table 9.28 Statistical frequency of the participants’ view of the importance of public transport towards sustainability (only quick survey and focus group results)

Table 9.29 shows that 44.6% of the public questionnaire's participants are willing to consider the use of public transport to improve the sustainability of Muscat, while 34.5% rejected this option.

Total	Count %	57. I would consider using public transport, if it is adequately available, in order to improve the sustainability of Muscat			Total
		yes	no	I don't know	
		115 44.6%	89 34.5%	53 20.5%	258 100.0%

Table 9.29 Statistical frequency of the participants' willingness to use public transport (only questionnaire results)

9.3.8.2. Urban Transport Opportunities

Table 9.30 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	Muscat Transport Study by Muscat Municipality			☐	☐		
2	Less centrality is good for transport				☐	☐	
3	Opportunity for marine transport				☐		
4	Decision makers are thinking about mass transport already	☐					
5	The regional railway project is underway				☐		

Table 9.30 Urban Transport Opportunities – obtained from interviews and focus groups

The new *Muscat Transport Study* by Muscat Municipality is one of the key studies that was in the pipeline during the course of this research, and it is being delivered in parallel to the ONSS, (SCTP, 2008b). The study has been commissioned in 2009 and awarded to Dar Al Handasah as the consultant. Answering the question about the expectations from this study, {Muscat Municipality 16} says: “we expect to address all those issues related to corridors, demands, what is required for the city, how those issues can be taken further with the government requirements and where we are heading with whatever we have now”.

9.3.8.3. Urban Transport Recommendations

Table 9.31 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Future urban planning should be encouraging mass transit	☑					
2	Public transport needs to be changed			☑			
3	Introduce metering system for taxis				☑		
4	Diversifying movement alternatives	☑		☑	☑		
5	Provide air-conditioned buses and bus stops	☑		☑	☑	☑	☑
6	Need reliable and affordable bus services			☑	☑		☑
7	Introduce incentives for the use of public transport	☑		☑	☑		☑
8	Decide the land use, then design the road network around it			☑			
9	Encourage carpooling for big organizations				☑		☑
10	Reinstate the old practice of bus shuttles for government ministries employees			☑			☑
11	Restrict the drivers behind private car ownership			☑	☑		
12	Reduce the travel distance to work			☑			
13	More roads isn't always the solution			☑	☑	☑	
14	Improve the drainage around transport corridors		☑	☑	☑		

Table 9.31 Urban Transport Recommendations – obtained from interviews and focus groups

The best transportation plan starts with a good land use plan. That's why I recommend that immediate action is given towards the introduction of corridors for new mass transport within the urban planning of the city. {SCTP 43} considers this a must for any future sustainable transport in Muscat: "taking in consideration mass transit, this might encourage that you ride the metro, and you go shopping, and roam, as opposed to when you have a ribbon development/strip and you roam it will be a disadvantage". For example, there is a need to provide better services for settlements to minimize the need to travel. {Muscat Municipality 16} aims to identify the roots of the problem: "you have to provide proper services to those settlements now and take the load from the road infrastructure also because the way they are doing it creates a huge impact on roads infrastructure. If you need something you have to drive all the way from Seeb to Qurm". {Ministry of Housing 3} adds: "key to sustainability is travel distance between workplace and accommodation which leads to emissions and congestions. This requires more decentralization and smaller centres so you don't have this suburban issue so much".



Figure 9.1 Aerial photo about Muscat Expressway junction at Qurm

Undoubtedly, the recommendation for introducing real measures for public transport has been voiced by almost everybody who participated in these interviews. {Muscat Municipality 16} considers this aspect is missing from the current mind-set: “we have roads, but roads will not take you anywhere. You need proper transportation system including monorail, rail, and underground system. It should be accounted for in urban planning”. Moreover, there is a need to diversify the options for the passenger in terms of public transport.

In terms of sorting out the issues associated with building new road infrastructure, {Expatriate consultant 12} produces one of the most direct quotes regarding this topic: “can’t just keep throwing money at infrastructure – more and more roads isn’t the solution. There has to be alternative methods of moving people”. In fact, Abu Dhabi 2030 vision advocates that “the most important principle for the roadway system in Abu Dhabi is to maximize connectivity, providing the largest amount of smaller options, rather than the smallest amount of large options” (Urban Planning Council, 2007). In addition, {SCTP 43} believes what is essential is “transport that is clear in all climatic conditions. We have neighbourhoods and cities where transport is disrupted from the slightest rainfall. This is because of the lack of the drainage systems. I think this differs from the level of cities that we want”.

9.3.9.USD 7.1: URBAN DEVELOPMENT MANAGEMENT

9.3.9.1. Urban Development Management Opportunities

Table 9.32 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1	ONSS will ensure a proper GIS	☑					
2	ONSS will respond to organizational set up	☑					
3	Creation of Supreme Council for Planning						
4	Lack of centralization may be right		☑				
5	The right amount of advising bodies					☑	
6	Guidelines are more flexible and useful than regulations				☑		
7	Work is on-going to develop planning legislation		☑				

Table 9.32 Urban Development Management Opportunities – obtained from interviews and focus groups

Majority of the above opportunities are already tackled by the team responsible for developing ONSS, or at least this is what they have proclaimed. Apparently, one of the major issues with the organizations is the management of information and how it is shared between organizations. In urban planning case, this is related to Geographic Information System GIS. {SCTP 43} assures that ONSS will cover this gap: “there was some prior work that is independent from the GIS system and the implementation mechanism that was approved did not reach its intended level, but the current strategy (ONSS) will guarantee the implementation of the data management system, not just recommendation. I suffer from this data aspect”.

In addition, ONSS team claim that they are **tackling the deficiency in terms of organizational setup and responsibilities** between them. {SCTP 43} promises that ONSS will resolve the planning process from preparation to implementation which will be identified as responsibilities and functions: “we have the multiplicity of responsibilities which must be placed in the crucible and seen and assessed to determine the strategy in light of it. We can’t cancel responsibilities and jurisdictions”.

On the other hand, the decision makers realize that there is work that needs to be done to **develop more appropriate urban legislation**. {Ministry of Housing 40} acknowledges this: “We don’t have planning legislation, but we are working on it. We have conducted a workshop

with all the engineers and planners and other regional departments and they will start to study it and develop the new planning legislation. There are many decisions and laws that govern planning, but it should be issued as laws so it can be used in front of courts”.

9.3.9.2. Urban Development Management Recommendations

Table 9.33 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Improve coordination in implementation of basic infrastructure and services		☑				☑
2	Improve the communication between organizations responsible for urban planning and development	☑	☑	☑	☑	☑	☑
3	Creating a centralized planning organization	☑	☑	☑			☑
4	Town planning to belong to the Municipality		☑	☑	☑		
5	Review the performance of the Ministry of Housing planning departments	☑		☑	☑	☑	☑
6	Empower Planning Offices in all the ministries						☑
7	Planning should have proper legislation	☑	☑				☑
8	Strong implementation and enforcement of legislation		☑		☑	☑	☑
9	Develop specific mechanism for following-up the planning						☑
10	Reserving the achievements of the city is important						☑
11	Strong leadership is required			☑	☑		
12	Learn from other successful models				☑	☑	☑
13	Stimulating or introducing incentives may be better than codes and governance				☑		
14	Recruit urban planners to handle planning			☑			

Table 9.33 Urban Development Management Recommendations – obtained from interviews and focus groups

I believe the topic of **centralizing planning functions within one organization** may be a reliable solution, but I also hesitate to fully support this recommendation especially taking in consideration cultural barriers, as well as historical government apparatus development whereby empowering certain organizations with such roles may result in over confidence and diverging from the aims and objectives set forth. Nevertheless, some participants have strong opinion in this regards. {Focus group 3} suggest that “in absence of centralized planning, then the random planning will prevail and this is what is happening”. {Muscat Municipality 9} would love to see “a single entity overlooking the masterplanning and the development of cities in Oman to avoid

the clashes and contradictions that may appear every now and then in certain developments”. {SCTP 48} believes that planning and implementation in urban development should be clubbed within one organization, and it should have tools for control. {Ministry of Housing 3} supports this idea: “it is a planning department that is in charge of land allocation, distribution of land, land use change and also controls the process”.

On the other side, I strongly believe there should be a thorough **review of the performance of the Ministry of Housing planning departments** as the product of their planning, visible in new cities sprouting in Muscat, has visible shortcomings and actual degradation of planning criteria from earlier town planning schemes. One of the expatriate consultants highlights this issue: “I think what we are probably coming to is a complete review of the Ministry of Housing remit and how it operates. That’s my conclusion having this discussion because they really are the prime culprit”. One participant from SCTP hints this as well: “Ministry of Housing should not be looking at *parcellation* of plots; that should be kept with planning bodies like Muscat Municipality. Ministry of Housing should be doing much more about policy issues and housing strategies for the country”.

Enough has been written earlier about the gap associated with **lack of urban planning legislation** and therefore a recommendation is eminent to cover this gap, especially in light of the recent public outcry and the scandals associated with plot distribution and land use change. After witnessing the shortfalls in the current urban planning system, {Ministry of Housing 20} insists there should be legislation to control this field and believes this will take us a long way: “If this was done, I think the implementation of Muscat structure plan would reach the 70% point that we want”. Others who support this recommendation are: {SCTP 43, 48}, {Ministry of Housing 29, 40}. There is clearly no alternative to strong implementation and enforcement of legislation. {Ministry of Housing 8} states, “implement the policies without any exceptions; these exceptions hinder proper implementation”. {Expatriate consultant 49} provides a different type of recommendation: “I think there are areas where you can regulate, code and govern development and there are areas where you can just stimulate it”.

Furthermore, there is a need to develop new mechanisms for **planning follow-up and to assess masterplanning** as well as urban development on a regular basis and to respond immediately

with better solutions where required. I do believe that there are significant problems which are recurring and sometimes chronic which are left unattended to the detriment of the public, which is a clear statement of lack of responsibility on the government organization accountable for it. All of this needs a strong response especially when the solutions are basically simple and straightforward.

9.3.10. USD 8.1: URBAN QUALITY

9.3.10.1. Urban Quality Opportunities

Table 9.34 below summarizes the opportunities within this USD.

	Opportunities	SCTP	MH	MIM	Expat	Others	Focus
1	People are becoming more aware of quality						☑
2	Oman has a rich tradition of community and culture				☑		
3	SCTP has injected urban quality in its projects	☑					
4	Quality is already achieved in the buildings structures			☑	☑	☑	☑
5	Muscat is considered one of the cleanest cities	☑	☑	☑	☑	☑	☑
6	Royal Opera House in Muscat as an icon for art and culture				☑	☑	
7	Muscat wastewater project will improve urban environmental quality				☑	☑	
8	There are still more discoveries to be made about Oman				☑		

Table 9.34 Urban Quality Opportunities – obtained from interviews and focus groups

In terms of actual urban quality projects, **SCTP has injected urban quality** in its work. {SCTP 43} provides ample examples of this: “today we are implementing internal roads in our projects in Salalah and Batinah and we identified the width of the road should not be less than 20m for the purpose of providing parking. In Duqm, we have a study for urban design alone just to identify how to adjust the planning to the topography to be part of the urban form. It is there so as not to alter the hills, excavate and fill, How to live with nature? There are many things that are happening in this respect, but individual projects”.

A good example of a project that highlights urban quality is the **Royal Opera House** in Muscat, shown in figure 9.2 below. {Local real estate developer 57} is optimistic about the impact of this important project in the public awareness and enhancement of urban quality: “we take pride that

Oman is probably one of the few countries where most of the musicians made up of the Royal Orchestra are from the interior where probably for the first time in their life when they heard of Beethoven or Mozart was when they came in and became students here and now they are playing it”.



Figure 9.2 Royal Opera House - Muscat

9.3.10.2. Urban Quality Recommendations

Table 9.35 below summarizes the recommendations within this USD.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1	Need to protect the identity of Muscat				☑		
2	Recreation should be within pedestrian level	☑		☑			☑
3	Need to motivate the public to do landscaping					☑	
4	Enhance the cosmetics			☑			
5	Quality construction should prevail			☑			
6	Improving what is existing to start with			☑			
7	Living environments should be compact and vibrant	☑					
8	Strengthen the presence of public beaches				☑		
9	Create community centres and clubs		☑				

Table 9.35 Urban Quality Recommendations – obtained from interviews and focus groups

Another recommendation is that recreation should be within pedestrian level which is provided by {SCTP 2} and claims it “has not been conceived as a possibility, especially with the use of

cars”. He also recommends introducing sports facilities within neighbourhood level, which was also suggested by participants in {focus group 2}. {SCTP 43} adds to this recommendation: “children playground is not provided by the required extent in the detailed plans and this is the role of Ministry of Housing”. {Muscat Municipality 9} responds to this recommendation: “If they find a way for the small play areas within the residential areas within a walking distance from everybody’s house, that’s great. But up to now that has not been successful. Plots are allocated, but they haven’t found the right means of really managing it properly and legally prevent all the vandalism and unacceptable behaviour that goes in those parks”.

{Muscat Municipality 9} recommends this: “You look at certain European cities which exist for hundreds of years as if they were done yesterday – why? Because they have simply planned them and built them that way. We need to work around the same thing. Make sure the quality of the design, the life span of the building itself, contextual elements and the beautification go (whether landscaping or architecture) go hand in hand with each other and should not really be segregated”. He further recommends to start with improving the existing infrastructure: “there is a focus on improving what is existing to start with and make sure you put the right facilities for it. Regarding addition, you could add two or more within the Seeb area, but that will take you far enough to make sure you satisfy the people there”.

9.4. INTERPRETATION AND SUMMARY OF RECOMMENDATIONS

The following section identifies some trends associated with the recommendations results identified in the previous section for various USDs. It concludes with the final recommendation towards urban sustainability.

9.4.1. Summary of results – by research method

Table 9.36 illustrates the results towards the recommendations associated with each USD, tabulated as comparison between various research methods. This can be used to identify the level of confidence by various participants towards the potential opportunities and recommendations required. For instance, the participants in the interviews and focus groups identified more

opportunities and recommendations with the *urban development management* USD, while the participants within the public questionnaires identified *urban transport* as the USD most worthy of recommendations. The ranking of priority is different between the two categories of research methods, each stemming either from the role of participants in these USDs or the level of importance they associate with these USDs.

Recommendations – Results Comparison							
No.	USD	Interviews & Focus Groups				Public Questionnaires	
		Opportunities	Recommendat.	Total	Rank	Sources	Rank
1.1	Settlement Patterns	4	8	12		15	
1.2	Urban Design	10	9	19	2 nd	5	
1.3	Land Use	5	7	12		16	
2.1	Housing	3	9	12		12	
4.1	Environmental Protection	4	6	10		10	
4.2	Climate Change	4	2	6		2	
5.1	Public Participation	8	5	13		18	3 rd
6.1	Urban Transport	5	14	19	2 nd	67	1 st
7.1	Urban Development Management	7	14	21	1 st	10	
8.1	Urban Quality	8	9	17	3 rd	28	2 nd

Table 9.36 Results comparison of recommendations by various research methods

9.4.2. Opportunities – result comparison by Category of participants

Table 9.37 illustrates the results towards the opportunities associated with each USD, tabulated as comparison between various participants within the interviews and focus groups. The expatriate consultants provided far more opportunities than the other participants.

	Opportunities	SCTP	MH	MM	Expat	Others	Focus
1.1	Settlement Patterns	3	2	3	1	1	2
1.2	Urban Design	3	2	4	7	4	5
1.3	Land Use	2	3	0	1	1	0
2.1	Housing	0	1	1	1	0	0
4.1	Environmental Protection	1	0	0	3	0	0
4.2	Climate Change	1	3	3	3	2	0
5.1	Public Participation	2	4	0	2	3	2
6.1	Urban Transport	1	0	1	4	1	0
7.1	Urban Development Management	2	2	0	1	1	0
8.1	Urban Quality	2	1	2	6	4	3
	Total	17	18	14	29	17	12

Table 9.37 Results comparison of opportunities identified by various categories of participants

9.4.3.Recommendations – result comparison by Category of participants

Table 9.38 provides a similar illustration but for the recommendations associated with each USD. Again, the expatriate consultants brought more recommendations, followed by the focus groups' participants and Muscat Municipality.

	Recommendations	SCTP	MH	MM	Expat	Others	Focus
1.1	Settlement Patterns	5	6	2	6	4	4
1.2	Urban Design	4	2	2	6	3	4
1.3	Land Use	2	3	0	2	1	1
2.1	Housing	2	4	4	3	4	6
4.1	Environmental Protection	1	0	2	3	6	1
4.2	Climate Change	0	0	0	2	0	0
5.1	Public Participation	3	2	0	1	1	3
6.1	Urban Transport	4	1	11	9	2	5
7.1	Urban Development Management	4	6	6	7	4	10
8.1	Urban Quality	2	1	4	2	1	1
	Total	27	25	32	41	26	35

Table 9.38 Results comparison of Recommendations identified by various categories of participants

9.4.4.Final Recommendations

The following Table 9.39 shows key recommendations identified through the previous research methods and their triangulation towards improvement in urban development and achievement of a better urban sustainable future in Oman cities.

No.	Sub-USD	Recommendation
1	Settlement Patterns	Limiting the pressure for commercial ribbon development along the main corridors; Muscat needs a new comprehensive structural plan; control construction and sprawl
2	Urban Design	Density has to be controlled; revision of urban planning criteria; need to allocate land for urban design; a new strategy of open spaces is needed
3	Land Use	Start thinking about alternatives to plot distribution; slow down the distribution of plots; more control is required
4	Housing	Zoning of residential land use; need to forecast future housing needs; need for a comprehensive housing strategy
9	Environmental Protection	Enhancing public awareness; control pollution from now; manage waste in a sustainable manner; maintaining natural landscapes
10	Climate Change	Invest time on the hydrology of the city; shift the houses out of the <i>wadi</i> and compensate the people
11	Public Participation	Increase public participation and awareness about planning; increase the transparency
13	Urban Transport	Future urban planning should be encouraging mass transit; public transport needs to be improved; decide land use then design the road network around it; restrict the drivers behind private car ownership
14	Urban Development Management	Improve coordination in implementation of basic infrastructure and services; creating a centralized planning organization; review the performance of the Ministry of Housing planning departments; planning should have proper legislation; strong leadership is required
15	Urban Quality	Need to protect the identity of Muscat; improve what is existing to start with; strengthen the presence of public beaches

Table 9.39 Summary of key recommendations towards urban sustainability

9.5. BRIDGING THE GAP BETWEEN STRATEGY AND IMPLEMENTATION

“We have to forecast the future and identify all these variables so we should have strategic planning. We have a group of obstacles that are impacting this work and we should resolve these obstacles: to find mechanisms for implementation, to put a specific work plan and to have a clear strategy with identified goals”. {Focus group 3}

It is evident that there is a gap between strategy development and implementation. However, the perception of this gap is different between different participants groups, as illustrated in table 9.40 below.

	Interviews, focus groups	Public Questionnaires
Strategy Shortcomings	38%	88%
Implementation Shortcomings	62%	12%

Table 9.40 Comparison of the gap between strategy and implementation between various participants

Nevertheless, the participants within the interviews and focus groups have been astounded by the sheer quantity and the quality level of some of the strategies that have been uncovered during this research period, especially those associated with urban planning and transport. These do seem to be more comprehensive, more practical than academic or theoretical, and many have come up with specific volumes for action plans, especially in terms of implementation projects and requirement of financial funds.

What happens after strategy development is what actually matters the most. The implementation shortcomings recorded by the participants in this research is valid and valuable. For instance, when it comes to the loss of strategies or the fact they have been shelved or destroyed, it has not been possible to collect any strategy except the new *Real Estate market study* (Housing, 2009a) from within the offices of the Ministry of Housing which has been responsible for tens of strategies in the 80s and 90s, as evident in the timeline for the history of urban development in Oman, available in Appendix B.

Another resonant issue within the implementation is the role of people. It cuts across various steps of this cycle, stemming from the role of people in the strategy development, to their involvement in the implementation, and the bewildering trend in Oman for exchange of teams soon after a strategy is developed and ready to be executed. Moreover, the lack of implementation is exacerbated by the lack of coordination between the organizations responsible for urban development. In this regards, (Weidleplan and Muamir, 1991) identify that “the responsibilities for urban development are dispersed over a multitude of ministries each following, more or less, their own development strategies and specific priorities”

The involvement of expatriate consultants in both strategy development and their implementation requires some attention. There is more volumetric product in strategy development during the 80s when the Ministry of Housing had in-house consultants. The vast array of strategy work cuts across multiple geographical region (Muscat and the other regions) as well as various scales of the city (regional, structural and local).

It has not been possible to determine the role of expatriate consultants in the implementation stage, but I suspect their role was minimal since the trend in Oman is to employ them for advisory and expertise role rather than executive or operational role. When I look at the recent development in other neighbouring countries, I strongly believe that there needs to be a paradigm shift in this approach whereby expatriate consultants need to be made responsible for development of strategies as well as their implementation and that their performance is measured by actual product results. (Milton-Keynes and Corporation, 1985) recommended a study of this aspect in the early 80s: “the substantial growth which has taken place has involved the considerable use of consultants. It may now be a sensible time for the government to carry out a review of the performance of consultants used, of their value for money, of the procedure used in their selection and of their suitability or otherwise for future commissions”.

The other significant issue which has been a recurring theme in this debate, and one of the essential causes for poor implementation of strategy is the lack of legislative mandate of strategies. This issue is linked to the *urban development management* USD. Not only that strategies are perceived as guidelines, but likewise the manual of urban planning (SCTP, 1996) is also reduced to a guidance manual. The worst of all is that urban planning has no law that can stand in front of judiciary courts {focus group 3; Ministry of Housing 3, 40}. This may not suffice as an excuse to the outsider, but one who knows the government structure in Oman and its politics would realize the prominence of royal decrees and the magnitude of substance this brings towards execution of strategies that are issued by a royal decree. The key decision makers of urban planning in Oman stress that ONSS will not be realized without being served its righteous legislative mandate.

So what does it take to bridge the gap between strategy and development? There is no single right answer to this, especially if one tries to establish one-fit-for-all solution across the different

USDs. (Oborn, 1982) has attempted this in the past: “the authors of the Master Plan Report (VIAC, 1972) had themselves recommended that the only relevant method of planning in such circumstances was by adopting the “*rolling-plan*” method whereby feedback from continuous studies of sociological, demographical, economical and other factors should be used to constantly revise the Master Plan in accordance with the changing structure of the population and its patterns of life”.

In terms of the public recommendation towards strategies and implementation, around 24% of the recommendations were associated with implementation, whereas 76% were associated with strategy development. The main recommendations for strategy development as identified by the participants in the public questionnaires are as follows:

- Development of national strategy for sustainability awareness, life quality and the importance for urban planning in the city.
- Long term planning for public projects, especially roads.
- Long term plan and vision for improving Muscat.
- Proper studies before embarking on projects and it should involve all sectors.
- Pre-planning and future planning for any project in Muscat and feasibility study and how people will benefit from these projects in the future.
- Providing a proper masterplan with clear milestones that reflects the population and urban growth for the future.
- Putting studies and solutions to reduce traffic accidents inside the city and to reduce traffic congestion either by improving the roads or creating new roads or removing old neighbourhoods.
- Benefitting from the experience in the world in urban planning to create a future vision and strategy towards sustainable urban development.
- Doing a complete survey of the all the plans for urban development planning.
- Learn from the mistakes.

On the other hand, the public recommendations towards implementation are as follows:

- Creating a permanent committee to support the urban planning of the city.
- Ensure that the right person is in the right place.

- Change current out-of-date data management systems.
- Ensure strict abidance and precise implementation of the plans by engineers and specialists especially with regards to pre-defined land use.
- Provision of easier procedures, smoothness and positive behaviour.

The following are additional recommendations by the researcher towards strategy development and implementation:

1. **Commission a complete new urban sustainability strategy for Oman and Muscat:** Time is now right for the government of Oman to commission this, especially for Muscat and key regional towns in Oman, and this should be undertaken as soon as possible.
2. **Detailed urban economic analysis and urban population forecast:** Urban sustainability strategies should be subjected to detailed economic and functional testing and to become concerned about the longer term implications, particularly in the light of the planned and predicted economic and population growth.
3. **Clear key objectives and targets:** It is of the greatest importance that, before any new plan is commissioned, a clear brief be prepared in which is stated those main objectives which the government expects the plan to achieve. The brief must be comprehensive and clear and its content should be endorsed by the government. However, the brief should not only identify key objectives, but should also contain targets against which the future development of the capital area can be monitored.

4. **Focus on priorities:** as shown in table 9.41 below.

No.	USD	Problem Analysis Phase		Recommendations	
		Interviews & Focus Groups	Public Questionnaires	Interviews & Focus Groups	Public Questionnaires
1.1	Settlement Patterns	2 nd			
1.2	Urban Design		3 rd	2 nd	
1.3	Land Use	1 st			
2.1	Housing				
4.1	Environmental Protection				
4.2	Climate Change				
5.1	Public Participation				3 rd
6.1	Urban Transport	3 rd	1 st	2 nd	1 st
7.1	Urban Development Management			1 st	
8.1	Urban Quality		2 nd	3 rd	2 nd

Table 9.41 Urban sustainability priorities – obtained from questionnaires, interviews and focus groups

5. **District structure plans encompassing all USDs:** it is sensible for each district contained with the development plan, encompassing all urban sustainability dimensions (USDs) to have a structure plan. This would enable development to take place in an orderly manner, with all those involved in development being aware of the likely form and content of future development which will take place.
6. **Five year financial budgets:** to ensure that the demand placed on government budgets is compatible with resources available, it is proposed that a five year financial budget should be prepared using the data which will be available from the development strategy and the five year implementation plan. This sort of task is a current practice in the government and should not be challenging. One of the important dimensions is its ability

to ensure equal distribution of investment amongst the various regions and districts to ensure social equity.

7. **Five year implementation action plans:** if the new urban sustainability strategy is to be an effective tool in ensuring that the future development is done in a way which meets the aspirations of the government, it is essential that it is accompanied by an implementation strategy. The five year implementation action plan should be required to present the programme in a way which would enable all those involved in development to be aware of its requirements. Publication of the five year implementation action plan would encourage well organized development, allow coherent investment in infrastructure and facilities and encourage economic growth.
8. **Sustainability Standards:** there is a need to develop details of the planning and environmental standards required by the government, and these should be presented in a clear and compact manner, and be comprehensive of all relevant USDs.
9. **Urban Development Management:** The task of managing and organizing growth on this scale requires that a single government department or agency should be given responsibility for co-ordination of planning and development. The task of this body would be to ensure that development proposals are compatible with the wishes of government and are implemented in an economical and effective manner. Since the major deficiency is implementation, this entity should be accountable and responsible for implementation, and should inform the relevant entities of their duties and tasks and monitor their implementation in a timely fashion.
10. **Public participation and inclusion:** no urban sustainability strategy will be effective in its achievements, or delivery without the full involvement of all relevant key stakeholders, especially the public.
11. **Feedback mechanism and strategy update:** all new urban sustainability strategies should be subjected to annual review and update to ensure that their implementation

challenges are addressed immediately, that targets are evaluated on a realistic manner, and that resources are adequately provided to support their implementation. The 5 year implementation action plan will need to be revised annually so that an up-to-date programme of future development is always available.

12. **Empower the implementation team:** the same team responsible for the strategy development should be tasked with its implementation, and this team should have energy, commitment, responsibility, accountability and support to deliver upon the strategy key objectives and promised targets. More importantly, they should have the required level of authority to execute these plans.
13. **Strong implementation and enforcement of legislation:** without this, there is no control over the process, and there will be no guarantee or assurance that the strategy will have any success in its implementation.

It would be useful to conclude this section by narrating the response from {Ministry of Housing 40} who shoulders the responsibility of strategic development. He highlights three pre-requisites to successful implementation of a particular strategy:

- Availability of resources (financial and others),
- Availability of local expertise that are capable of implementing these strategies, and
- Government confidence and belief of the importance of these strategies and their implementation.

9.6. THE PLOT DISTRIBUTION AS A PROMINENT FACTOR

It is very clear that what emerges from the previous three chapters (7, 8 and 9) is that the plot distribution system which is prominent in Oman is a governing factor for the urban development history and would remain a significant if not the major player for any urban sustainability initiative in the future. Reference can be made to section 5.1.4 which introduced this topic.

Table 9.42 illustrates the statistical results towards the participants' satisfaction with the current land distribution system. Only 21.2% are either very satisfied or satisfied and nearly 51.3% are

either unsatisfied or very unsatisfied. The cross tabulation between the category of how the plot was obtained and the public questionnaire participants' satisfaction with the current land distribution system is shown in table 9.43. Almost 52.6% of the participants who bought their plots were either unsatisfied or very unsatisfied, and less than 24% of those that obtained their plot through government grant were satisfied.

		45. How satisfied are you with the current land distribution system in Muscat?					Total
		very satisfied	satisfied	neither	unsatisfied	very unsatisfied	
Questionnaire	Count	8	47	68	70	56	249
	%	3.2%	18.9%	27.3%	28.1%	22.5%	100.0%
Quick Survey	Count	2	6	12	10	4	34
	%	5.9%	17.6%	35.3%	29.4%	11.8%	100.0%
Focus Groups	Count	0	0	2	10	3	15
	%	0.0%	0.0%	13.3%	66.7%	20.0%	100.0%
Total	Count	10	53	82	90	63	298
	%	3.4%	17.8%	27.5%	30.2%	21.1%	100.0%

Table 9.42 Statistical frequency of participant's satisfaction with current land distribution system – obtained from questionnaires, quick survey and focus groups

		45. How satisfied are you with the current land distribution system in Muscat?					Total
		very satisfied	satisfied	neither	unsatisfied	very unsatisfied	
16. Regarding your current dwelling residential plot, how was it obtained?	Government grant	0	5	5	4	7	21
	it was bought	1	21	31	32	27	112
	inheritance/gift	0	1	5	1	2	9
	I don't own the plot	2	8	12	13	10	45
	I don't know	2	10	12	13	7	44
	other (please specify)	0	1	1	3	2	7
Total		5	46	66	66	55	238

Table 9.43 Statistical crosstabulation between category of how the plot was obtained and the satisfaction with the current land distribution system (only public questionnaire data)

Only 15.1% of the participants within the public questionnaires considered living in smaller size residential plots to improve the sustainability, versus 53.2% who clearly rejected this option (as shown in table 9.44 below). 65.8% of the quick survey participants (decision makers and consultants) agree or strongly agree that living in a smaller size residential plot has an impact on sustainability, as shown in table 9.45 below.

	54. I would consider living in a smaller size residential plot in order to improve the sustainability of Muscat			Total
	yes	no	I don't know	
Count	38	134	80	252
%	15.1%	53.2%	31.7%	100.0%

Table 9.44 Statistical frequency of the participants' willingness to live in smaller plots (only questionnaire results)

		65. To what extent do you agree that living in a smaller size residential plot has an impact on the sustainability of Muscat?					Total
		strongly agree	agree	not sure	disagree	strongly disagree	
Quick Survey	Count	8	15	9	3	0	35
	%	22.9%	42.9%	25.7%	8.6%	0.0%	100.0%
Focus Groups	Count	1	3	7	3	1	15
	%	6.7%	20.0%	46.7%	20.0%	6.7%	100.0%
Total	Count	9	18	16	6	1	50
	%	18.0%	36.0%	32.0%	12.0%	2.0%	100.0%

Table 9.45 Statistical frequency of the participants' view of the importance of plot size towards sustainability (only quick survey and focus group results)

Many participants, as discussed earlier in section 9.3.3 concluded that the plot distribution as a system is not the problem, but the volume and the process of distribution where it is generally felt that there has been more volumetric distribution beyond the current or short-term need of the society. In some instances, plots have been distributed over 15 years ago and they still have not been developed due to, amongst many reasons, the lack of infrastructure and basic services. For instance, when we compare the total number of plots distributed in Muscat by Ministry of Housing (table 9.46) against the major building permits by Muscat Municipality (table 9.47), we can easily spot that the large quantity of plots distributed in 2005 was not paralleled with building permits. Moreover, we can also visualise more or less constant figures for the total number of building permits, with minor variance. With regards to the percentage of permits amongst the various directorates, we can see that for Greater Muttrah and Quriyat directorates, these percentages have remained almost constant over the years. Seeb maintained the highest percentage with slow decrease, and Al Amerat almost doubled between 2002 and 2006. Bousher has also witnessed slight decrease as well.

Type	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total	1,846	2,697	13,561	30,195	18,165	11,415	3,094	2,582	5,778

Table 9.46 Total Number of Plots Distributed in Muscat (Source: Ministry of Housing Annual Report 2011)

Type	2002	2003	2004	2005	2006	2007	2008	2009	2010
Greater Muttrah	6.4%	6.6%	6.2%	5.7%	6.1%				
Bousher	28%	25.2%	28.7%	27.9%	23.8%				
Al Amerat	9.6%	11%	11.9%	14.6%	18.3%				
Seeb	51.7%	52.2%	47.1%	45.6%	46.2%				
Quriyat	4.3%	4.9%	6.1%	6.2%	5.6%				
Total	2051	2238	1899	1705	2339	2565	4294		

Table 9.47 Major building permits in Muscat according to directorates (Muscat Municipality Annual Report 2005, 2003, 2006)

The plot distribution system has emerged throughout the discussion of various USDs. For instance, within *settlement pattern*, it was the major driver for sprawl and expansion of the city, and it determined to a great extent the linear ribbon development as a dominant settlement pattern, lack of centrality and the inadequate mix of use. *Urban design* problems emerged from “easy plans” or “dry” detailed plans as a consequence of the plot distribution system. Furthermore, both *land use* and *urban transport* USDs showed results that have been impacted upon by this plot distribution system.

Various references within the interrogated literature and gathered data suggest that it may be the right time now to start thinking about alternatives to plot distribution. {Ministry of Housing 40} shares some positive news: “we are studying different options for land distribution, services and infrastructure. We thought about the government constructing buildings as opposed to providing services and we found this alternative to be cheaper. Whether the government or the private sector takes this initiative is still open”. Others believe that reducing the plot size below the standard 600 m² might lead to more sustainable outcomes, especially in terms of density.

The research work conducted in this project leads to a suggestion that freezing the plot distribution and further planning in Muscat until the completion of a structural plan is an immediate action that needs to take place. Anything but this might lead to further deterioration of the situation and limitation of space available for proper sustainable development in the future. However, at this stage in the urbanism and economy of the city, a drastic solution as this may have some bad consequences, such as further escalation of land prices, and even worse

speculation. Therefore, it is a measure that needs proper study, taking in consideration the market dynamics and the current surplus of plots in the market.

9.7. CHAPTER SUMMARY

This chapter presented the improved approach towards urban sustainability in Oman. It has already been highlighted that one of the key issues associated with sustainability is its definition. Section 9.2 provided an insight into this issue as gathered from various participants in this research. It was very clear that there was a wide array of perceptions on sustainability and that the word has been used for different purposes and with different interpretations.

Section 9.3 covered the results around recommendations for specific USDs gathered from various research methods. It tabulated results for attitudes, opportunities and recommendations with ample illustrations and references. It was followed by interpretation and summary, section 9.4, which compared the results and trends, and provided the final recommendations towards the problem analysis phase.

Section 9.5 set out to bridge the gap between strategy and implementation. This was done by summarizing the key issues and some of the noteworthy recommendations gathered throughout this research and collected through various research methods. The research culminates in further recommendations that can be used to enhance the effectiveness of strategy development and their implementation. Section 9.6 highlighted the importance of the plot distribution system in this debate.

Chapter 10: CONCLUSION

10.1. OVERVIEW

There is always more than one way of looking at an issue and addressing it. One appropriate way, for sure, is to address the issue within its context and not to come to conclusion towards it based only on a wider global view. That's how I have tackled urban sustainability in Oman. Throughout this research, the debate was framed around key urban sustainability dimensions, USDs, which have been carried all the way throughout the research and up to the recommendations. Another clear difference in how I approached this topic is the view that the overall strategic approach towards urban sustainability is our closet bet towards solving the issues surrounding urban development in Muscat and Oman, as opposed to merely a project here and there, or only resorting to push the community to change its lifestyle (energy conservation, etc.) which undoubtedly have shown impressive results in various communities around the world.

With that basic overview, I summarize this thesis within this chapter by addressing the various deliverables that contribute to knowledge, as a direct response to the initial research aims and objectives, and how the research questions were answered throughout this research. This is followed by identifying the challenges encountered throughout this research project (section 10.3), and how the research may be taken forward in the future (section 10.4). Section 10.5 provides final reflection and thoughts on this project.

10.2. CONTRIBUTION TO KNOWLEDGE

As with any PhD project, this particular research claims to supplement the general knowledge of urban development and planning in Oman and the overall global debate on urban sustainability, with many contributions that are reported in this dissertation. The essence of this contribution lies around the dissection of the decision making process around urban planning and development in Oman and how it may be directed towards a sustainable urban future.

Furthermore, to highlight the most important contributions made to knowledge in this research, the following 5 research aims with their respective objectives and research questions are recalled again. Within each sub-section, it will be clarified how each was addressed throughout this research and where within this dissertation it is reported and documented.

10.2.1. Research Aim 1: History of urban development in Oman

Aim 1: To develop a comprehensive understanding of the history of urban development in Oman between 1970 and 2010, and to provide insights into strategic initiatives towards sustainability that have been proposed throughout this period.

This was addressed at length within the following segments of this dissertation:

- 1. Chapter 5: History of Urban Development in Oman**
- 2. Appendix B: Timeline for History of Urban Development in Oman**
- 3. Appendix C: Index for Policies of Urban Planning in Oman**

The comprehensive list of urban planning strategies, as well as other dimensions of urban development, such as water, environment and transport, is available for reference in Appendix B. Throughout the course of this research project, I have not come across a better index or tool, which clearly shows the lack of research in this field. Since no such tool was available in the general literature, the accumulation of such a timeline spanning over forty years of development is considered a genuine achievement of this research, and has been commended by various officials and practitioners in this field in Oman. It uncovers critical information about the milestones, and the key players that have performed in this stage throughout the last forty years. This is definitely going to be a companion for anyone who claims to champion any new strategy development, but at the same time an initial tool for any researcher into this subject. I have learned that one cannot claim something does not exist until he/she strives to prove that. In essence, what was uncovered goes beyond the thoughts of every researcher into the urban platform in Oman. This was also extended by developing another historical timeline for the policies in urban development in Oman, available also in Appendix C.

The following lists out the research questions associated with this aim, and the researcher's conclusions.

→ Question 1: What are the key milestones (strategies, projects, policies) in urban development of Oman?

This was a good start for this research as it opened up venues never before discovered in the history of urban development of Oman. Until recently, various researchers concluded to themselves that Oman lacked any meaningful urban planning strategies or plans, and that, to them, was the reason why we have certain weaknesses in urban planning results in the city today. We can bypass that now, as this research has uncovered the wealth of strategies and projects delivered in this regards throughout the last forty years of development in Oman, which can be referenced in Appendix B and C. Certain strategies were more significant than others and those were outline in various chapters, but more in depth in section 5.5.

→ Question 2: Who are the key players throughout the history of urban development of Oman (organizations, individuals)?

Appendix B outlined in full details of the key government organizations as well as various consultants and entities that participated in the progress of urban development throughout the last forty years. Of particular importance are three government organizations that have left significant imprints on the face of the urban environment: Ministry of Housing, Muscat Municipality and Supreme Committee for Town Planning (SCTP), all of which were introduced in section 5.2. Section 5.7.3 identified the major consultants that have contributed to urban development in Oman. Both *Llwellyn-Davies Weeks* and *Weidleplan & Muamir* have largely influenced the development of strategies, projects and urban planning policies.

→ Question 3: How has Urban Development strategy and implementation since 1970 led to current problems and issues?

This may be a difficult research question to answer in precise terms, but one which has been dealt with in various chapters. Chapter 8 identified this and narrated the outcome of the implementation of certain strategies, and additionally highlighted certain contemporary approaches that veered away from such strategies, but were used to drive urban planning and policies.

Section 7.13.2 identified trends of problems over the last forty years of urban development in Muscat, in particular. Table 10.1 below illustrates the comparison between the recurring, new, forgotten and resolved issues for three USDs that were identified as influential USDs. It is clear that there were more recurring issues over the period of this study, and only very few resolved issues, mainly in the urban transport. That particular section describes the nature of these problems and the reasons for their recurrence throughout the last forty years of development using various references from the data gathered during this research and from available literature resources.

No.	USD	Recurring issues	New issues	Forgotten issues	Resolved issues	Total
1.1	Settlement Patterns	11	6	4	0	21
1.3	Land Use	10	8	4	0	22
6.1	Urban Transport	10	4	3	4	21
	Total	31	18	11	4	44

Table 10.1 Summary for Trend analysis for problems associated with land use, settlement pattern and urban transport USDs

Furthermore, what is apparent is that between 1980 and 1995, there was significant strategy development approach within city planning, environment and transport. However, after that period, this strategy approach ceased to exist apart from a few transport studies that were mostly relevant to transport infrastructure projects. The current ONSS strategy project, (SCTP, 2008b), highlights the intention of the government to deal with the upcoming forty years or so of urban development in the country through another phase of strategy development. The two questions that should strike us here is whether history will repeat itself and whether any significant result toward sustainability will occur as a result of this new strategy?

10.2.2. Research Aim 2: Urban Sustainability Framework (USDs)

Aim 2: To develop a framework for urban sustainability in Oman

➔ Question 4: What are the key urban sustainability dimensions that are relevant to the context and history of Oman?

This was presented as a framework for identifying key USDs that are relevant for the urban sustainability research in Oman. Using over 34 different types of literature references, including

specific resources from Oman’s history of urban development, and employing five stages for this purpose, the outcome selection includes 16 USDs that should be included within any research that embarks on addressing the urban sustainability issues in Oman. This framework provides a comprehensive approach which is specific to Oman, and primarily focuses around resolving key issues for urban development as well as achieving the aims and objectives set forth across various disciplines that impact urban development, such as city planning, economy, environment and the society. In conclusion, 16 USDs have been selected to form the agenda for urban sustainability in Oman, as shown in Table 10.2. Some of these USDs were omitted from the scope of this research project as explained earlier in Chapter 6.

No.	USD	No.	Sub-USD	Included
1	Urban Planning	1.4.	Settlement Patterns	✓
		1.5.	Urban Design	✓
		1.6.	Land Use	✓
2	Urban Services	2.1	Housing	✓
		2.2	Energy (Electricity)	
		2.3	Water	
		2.4	Municipal Services	
3	Urban Economy	3.1	Economic Development	
4	Urban Environment	4.1	Environmental Protection	✓
		4.2	Climate Change	✓
5	Urban Society	5.1	Public Participation	✓
		5.2	Social Equity	
6	Urban Mobility	6.1	Urban Transport	✓
7	Urban Management	7.1	Urban Development Management	✓
8	Urban Quality	8.1	Urban Quality	✓
9	Urban Resources	9.1	Urban Resources	

Table 10.2. Urban Sustainability Dimensions for Oman

10.2.3. Research Aim 3: Contemporary approaches in urban development in Oman

Aim 2: To develop an understanding of contemporary approaches in urban development, including an understanding of decision makers and citizen's visions and attitudes towards urban sustainability.

These were addressed at length within **Chapter 7: Problem Analysis**. Using qualitative research methods, such as interviews and focus groups, the results and the interpretation of the *problem analysis phase* for each USD used the following components: *problems, challenges, drivers and barriers (constraints)*. This was followed by a detailed interpretation of this analysis, which provided a quantitative summary of the *problem analysis* phase, trend analysis for three USDs, and other detailed interpretation.

➔ **Question 5: What are the main problems and challenges associated with urban development in Muscat?**

➔ **Question 6: What are the main factors and barriers that control the sustainable growth of Muscat?**

Table 10.3 summarizes the quantitative outcome of this *problem analysis phase* for the selected USDs. It is clear that the emphasis amongst the interview and focus group participants to certain USDs yielded the following ranking of importance: first was *land use*; second was *settlement pattern*; and third was *urban transport*. In comparison, the public questionnaires participants ranking was as follows: first was *urban transport*; second was *urban quality*; and third was *urban design*. In total, there were 62 problems, 43 challenges, 23 drivers and 28 constraints that were conveyed by the participants. These are useful for the decision maker in addressing the roots of the problems and challenges, and can improve the solutions that are tailored for urban sustainability in Oman.

Problem Analysis Phase – Results Comparison										
No	USD	Interviews & Focus Groups							Public Questionnaires	
		Problems	Challenges	Drivers	Constraints	Total	%	Rank	Sources	Rank
1.1	Settlement Patterns	8	6	8	4	26	16.7	2 nd	19	
1.2	Urban Design	5	5	0	5	15	9.6		38	3 rd
1.3	Land Use	12	6	5	7	30	19.2	1 st	24	
2.1	Housing	5	5	1	0	11	7.1		21	
4.1	Environmental Protection	7	2	0	1	10	6.4		15	
4.2	Climate Change	4	4	0	0	8	5.1		3	
5.1	Public Participation	4	1	0	1	6	3.8		8	
6.1	Urban Transport	6	7	5	6	24	15.4	3 rd	178	1 st
7.1	Urban Development Management	7	5	0	3	15	9.6		5	
8.1	Urban Quality	4	2	4	1	11	7.1		45	2 nd
	Total	62	43	23	28	156	100			

Table 10.3 Summary of problem analysis components for selected USDs – – obtained from questionnaires, interviews and focus groups

10.2.4. Research Aim 4: The GAP between strategy and implementation

Aim 3: To investigate the gap between key strategies and their implementation in the urban development discourse.

It is apparent that there is a gap between strategy development and implementation. Table 10.4 shows that interview and focus groups' participants attribute the problem to the implementation phase, whereas the public questionnaire's participants attribute it to the strategy shortcomings.

	Interviews, focus groups	Public Questionnaires
Strategy Shortcomings	38%	88%
Implementation Shortcomings	62%	12%

Table 10.4 Comparison between participant's perception of the gap between strategy and implementation

All participants have been astounded by the sheer quantity and the quality level of some of the strategies that have emerged through this research, especially those associated with urban planning and transport. These do seem to be more comprehensive, more practical than academic or theoretical, and many have come up with specific volumes for action plans, especially in terms of implementation projects and requirement of financial funds.

The fact that the way forward for sustainable urban development in Oman is being considered through ONSS, (SCTP, 2008b), highlights the significance of strategy development. Moreover, the recent announcement of the government initiative (Observer, 2014), through its recently established *Supreme Committee of Planning*, to develop the economic vision for Oman 2040 as a follow on from its predecessor Oman 2020 (Economy, 1996), shows the magnitude of confidence on necessity for strategy development. What happens after strategy development is what actually matters the most. The knowledge derived in this regards is new and has not been recorded before, and it paves the way for better inclusion of decision making shortcomings in the implementation of any major strategic initiative in the future (that may be inherent in the people, problem, process or policies). This outcome should be a companion to the decision makers and technical consultants who aim to deliver real sustainable solutions in this context.

➔ Question 7: What are the contemporary sustainable strategies and the attitudes and agendas of stakeholders?

Section 8.3 outlined certain the following approaches that were revealed by various experts and decision makers never previously recorded academically:

1. Reality imposed itself differently.
2. The strategy for planning emanates from extension of existing settlements.
3. Private ownership governed planning in the early stages of development.
4. Urban Planning Criteria – the manual by SCTP.

5. 30% of the detailed block plan was identified for commercial use.
6. Horizontal expansion and sprawl.
7. Vertical expansion and building height increase.
8. Land use change – converting residential land use into commercial land use.
9. Economic development axis.
10. Distribution of infrastructure amongst the regions, and diluting Muscat of its current functions.
11. Barka city as a logistics centre and land port.
12. Integrated Tourism Complex.

In terms of attitudes, these were reported in various sections pertaining to specific USDs and highlighted the public as well as the consultants and decision maker's attitudes towards these USDs and urban sustainability in general. As supplementary to this research, this contribution was possible due to the fact that 38 key experts were interviewed in less intimidating environment, and it is possible to confirm there was less bias in their responses. In this process, many of the participants narrated their own feelings, attitudes and behaviour towards sustainability in general. Moreover, since they have experience that spans at least the last 30 years of development worth over 474 years of experience, we could reflect on their attitude change throughout this period, especially towards sustainability which hit the national psyche in Oman only after Gunu, the tropical cyclone in 2007.

→ Question 8: How have strategies been implemented in Muscat existing town developments?

Section 8.2 outlined some of the key urban strategies that were developed earlier and the feedback obtained from various participants as well as literature resources about their actual implementation. Table 8.3 details the shortcomings associated with the strategy development process and the shortcomings associated with the implementation for several of these key urban strategies.

→ Question 9: What are the problems and successes in the implementation of these strategies?

This following is a list of strategy shortcomings that were identified through various interview sessions. Section 8.4 reported detailed description of the statements and where applicable excerpts were taken from other Omani literature resources to investigate these arguments furthermore.

1. Strategies were not comprehensive
2. Strategies were “short-sighted”
3. Lack of integration between studies
4. Lack of clarity about the ownership of a strategy
5. Strategies contained poor statistics, estimates and forecasts
6. Misinterpretation of the vision
7. Strategies were theoretical
8. Lack of qualified staff behind these strategies
9. A masterplan has only a certain period
10. Some strategies are not known
11. Production of strategies stopped
12. Poor planning techniques and study outcome
13. Ambitious schemes and outcomes
14. Poor phasing plans

Section 8.5 detailed the following list of implementation shortcomings which are important in answering this particular research question 9:

1. Strategies were not followed
2. Strategies were put on the shelf
3. Strategies were lost
4. Strategies were destroyed
5. Strategies were not updated
6. Implementation was a challenge
7. Masterplans are never implemented
8. Was there enough justification for implementation?
9. Reality is stronger than the plan

10. Investors were smarter than the planners
11. The outcome is of unplanned process
12. There was a different political agenda
13. Short-term thinking
14. Lack of involvement by some people in the development of strategies
15. A new team became responsible for the implementation
16. The responsible teams are busy with daily routines
17. Urban growth without improving the transport infrastructure
18. Strategies were only a 'guideline' and had no legislation power
19. Weak governance
20. Strategy without an action plan is worthless
21. People hate change
22. Bureaucracy
23. External factors
24. Lack of funds

10.2.5. Research Aim 5: Improved approach towards urban sustainability

Aim 4: To develop an improved approach towards strategy development and implementation that will lead towards a sustainable urban future in Oman.

These were addressed at length within **Chapter 9: Improved Approach Towards Urban Sustainability**. For each USD considered in this research, opportunities as well as recommendations were developed which should help those interested in identifying areas for focus and consideration while attempting to deliver sustainable solutions within a city scale perspective. The attitudes of various participants were also reported in relation to certain USDs to support arguments made within the results. Although the set of recommendations was substantive and addressed a wide array, the chapter concluded with recommendations that are key to this debate, some of which that can be achieved in the short term.

➔ **Question 10: How can urban planning processes be improved to provide a sustainable urban future?**

➔ **Question 11: What are the lessons that can be used for better implementation of the upcoming urban development strategies (such as Oman National Spatial Strategy)?**

This was delivered in chapter 9 where I have attempted to formulate my own thoughts along with those gathered from the participants in a manner that is logical and follows the framework set forth in the early chapters, especially in identifying the key urban sustainability dimensions.

The following Table 10.5 shows key recommendations identified through the previous research methods and their triangulation towards improvement in urban development and achievement of a better urban sustainable future in Oman cities.

No.	Sub-USD	Recommendation
1.1	Settlement Patterns	Limiting the pressure for commercial ribbon development along the main corridors; Muscat needs a new comprehensive structural plan; control construction and sprawl
1.2	Urban Design	Density has to be controlled; revision of urban planning criteria; need to allocate land for urban design; a new strategy of open spaces is needed
1.3	Land Use	Start thinking about alternatives to plot distribution; slow down the distribution of plots; more control is required
2.1	Housing	Zoning of residential land use; need to forecast future housing needs; need for a comprehensive housing strategy
4.1	Environmental Protection	Enhancing public awareness; control pollution from now; manage waste in a sustainable manner; maintaining natural landscapes
4.2	Climate Change	Invest time on the hydrology of the city; shift the houses out of the <i>wadi</i> and compensate the people
5.1	Public Participation	Increase public participation and awareness about planning; increase the transparency
6.1	Urban Transport	Future urban planning should be encouraging mass transit; public transport needs to be improved; decide land use then design the road network around it; restrict the drivers behind private car ownership
7.1	Urban Development Management	Improve coordination in implementation of basic infrastructure and services; creating a centralized planning organization; review the performance of the Ministry of Housing planning departments; planning should have proper legislation; strong leadership is required

8.1	Urban Quality	Need to protect the identity of Muscat; improve what is existing to start with; strengthen the presence of public beaches
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Table 10.5 Summary of key recommendations towards urban sustainability

10.3. CHALLENGES

Like with any other research project, the researcher is faced with many challenges that impact his performance, and occasionally the outcome of the research. Since there is always more than one way for getting from one point to another, the path for this research was somewhat unique, but hopefully comprehensive. The following are some key challenges encountered throughout this research project, which I hope did not impact significantly on the outcome results:

1. **The choice of Qualitative Research Methodology**: the challenge associated with this is relevant to the significance associated with the data gathered, resulted derived, and the interpretation of such data. I tried to purge out aspects and conclusions that are not substantiated with evidence, experience, or general consensus amongst the participants. Nevertheless, there may still be further requirement for substantiation of some concluding remarks which may be possible by adopting other quantitative research methods. Although this research does contain certain quantitative research methods, mainly directed towards addressing general public attitude and behaviour towards various urban sustainability issues, it might not have crosschecked the findings derived from the interviews and focus groups. This may be attributed to the nature of the topic and its infancy in terms of academic research, especially at this scale of the city, and the overall assessment of strategy development and implementation. Moreover, the disconnection between the researcher's prior knowledge of urban development in Oman and the relatively new debate on sustainability may have contributed to this dilemma.
2. **The scale of urban sustainability and the width associated with USDs**: tackling sustainability at a city scale, and occasionally on a regional scale, demands a macro view of the context, and identification of patterns of development issues, decisions, policies and solutions, which logically leads to the framework adopted within this research, the wider list of urban sustainability dimensions. Although this was intended to be a solution

to impact the width associated with this research, it became in itself further widening tool. I do hope that this is justified and provides control of the issues with somehow diverging aspects that covers many intertwined threads that end up complementing the approach and paves the way towards a more comprehensive assessment of the problems and the process which yields wider range of recommendations. It was also challenging at the end of this research project to converge back into meaningful and precise conclusion of this topic of urban sustainability relevant to Oman. I have done my best to respond to these challenges and to continuously reflect on my approach, occasionally being flexible with the process, and sometimes controlling the outcome and its interpretation so it is more driven by my decisions rather than a mere mechanical process based on the framework.

3. **Lack of local academic and literature resources on the subject**: when I embarked on this project, I spent over a year trying to uncover literature resources and to solve the puzzle that may lie within. It wasn't possible except by returning to Oman and visiting various government organizations and, even then, there was still lack of any significant academic research into the urban development history, yet alone for any real attention towards urban sustainability. What was a major challenge became a successful opportunity and the result of this literature collection and review paved the way for a better focus of this research, and a more confident start.
4. **Difficulty to gain access to certain potential participants for the interviews**: after developing the participant's database, it was essential to set a period of time to conduct these interviews. Although the data gathered and the number of interviews conducted was satisfactory, there was hard work to gain access to these participants and in some occasions plenty of patience and persistence to convince some participants to meet.
5. **The large volume of data gathered on the history of urban development of Oman and data from the interviews and focus groups**: The number of strategies and projects that have been developed throughout this period (1970 to 2010) covers **242** milestones, including: strategies, projects, decrees, conferences, regulations, etc. It spans 29 A4

sheets, as shown in Appendix B. Before reviewing these documents, I had to classify them in a logical manner to identify their priority and significance for this research. Even with that, there was still significant amount of reading and review before establishing their usefulness. On the other hand, there were 38 interviews, 4 focus groups which translated into 374 sheets of A4 hand written transcription plus 449 pages in MS Word that was converted into Nvivo. Although the amount of the data gathered for this research was large, which may seem positive and comprehensive, it was a challenge to sieve through this and to identify what to include and what to exclude.

10.4. FUTURE WORK

This research project could have ventured into various ways, but I have tried to limit its scope, width and depth as I have done and reported herewith. In as much as I would have liked to venture into other territories, I had to control myself and not deviate far from the set target and goals. The following are some possible ways to develop this research further and to enhance the knowledge around other aspects of urban sustainability in Oman:

1. **Indicators for urban sustainability**: since this research was somewhat exploratory, it was necessary to build up the framework around urban sustainability dimensions, which were mostly qualitative. The success of any assignment or endeavour depends a lot on designing measures for it, and that has been evident in undertaking sustainability in the global platform, especially at a very local scale, like sustainable indicators for buildings. What has been plotted herewith as USDs may become more useful if indicators were developed to measure the success of their implementation.
2. **Additional USDs**: future work could embark on evaluating the role of *technology* on urban planning and sustainability, along with the advent of *telecommunication and data* (wifi, 4G) connectivity within the city.
3. **Identified USDs not included in this research**: there is a need to evaluate the remaining USDs that were identified as part of the framework for this research but not substantially

tackled later. These include: *energy, water, municipal services, economic development, social equity and urban resources*.

4. **Product Analysis Phase**: this research was designed around *problem analysis* phase and *process analysis* phase, but it would have been more comprehensive if another phase, *product analysis*, was performed. This would involve case studies within Muscat as a city to identify the association of the outcome with the strategies developed and their implementation.
5. **Oman National Spatial Strategy (ONSS) review**: a genuine target for this research is to correlate the development of the last forty years and to ascertain the likelihood outcome of the next forty years of development. At the border between the two periods is a crucial milestone, especially in terms of strategy development, which is the ONSS, (SCTP, 2008b). At the time of writing this thesis, there was very little available information about its status and progress. It would be useful if further research can be conducted to scrutinize this research outcome, especially in terms of the distinguished gap between strategy and implementation by examining the fate of this strategy development immediately after it is announced and to distinguish if it will be implemented in a different manner.
6. **Conduct quantitative analysis into the decision making process and to measure the gap behind strategy and implementation**: again, due to the fact that this research was exploratory in its nature, it would be useful if further research can be carried in a more quantitative manner to identify the significance of decision making into the overall urban development. This could be done by properly designed questionnaires that are aimed at decision makers, similar to the participants in this research that will yield measurable results as compared to the interviews and focus groups.
7. **Settlement Patterns in Muscat and the trends associated with its progress throughout the last forty years**: this particular research addressed settlement pattern as one of its key USDs, but has not dealt with it in a more technical matter, especially in its

assessment in terms of architectural or urban aspect. It would be useful to plot this pattern in a more diagrammatic method and to identify various trends throughout the last forty years at the local or regional level.

8. **Land use and plot distribution system**: by now the reader should have realized that the unique system of plot distribution in Oman is a major determining factor in its urban development and its quest for urban sustainability. There is also a gap in knowledge associated with this issue, and further research can be carried to decipher its roots, variables and consequences on the current urban scenery. One of the recommendations within this research is to develop alternatives to the plot distribution system, and this future research work should aim at delivering the logic behind these alternatives.
9. **Tribal dimension contribution to urban planning and development**: the Omani society is heavily dictated and influenced by an established tribal structure and hierarchy that impacts various aspects of life (politics, economic, social, etc.). There may be an argument that the tribe has an impact on urban planning or development, but the researcher has not identified this from the literature resources utilized in this research and it didn't creep up in the research methods conducted. To investigate this sufficiently, there may be a need to allow for other factors within the research method so that sufficient data is collected to understand it more in depth, and since this was not conducted or allowed for in the initial design of the research method, the researcher resolves to identify this as a possible future research work.

10.5. FINAL THOUGHTS

At the onset of this last section, it should be emphasized that 79% of the participants within this research have stated that they think Muscat is a good place for living, as shown in table 10.6 below.

		47. Do you think that Muscat is a good place for living?			Total
		yes	no	I don't know	
Questionnaire	Count	193	35	23	253
	%	76.3%	13.8%	9.1%	100.0%
Quick Survey	Count	32	2	1	35
	%	91.4%	5.7%	2.9%	100.0%
Focus Groups	Count	13	0	0	13
	%	100.0%	0.0%	0.0%	100.0%
Total	Count	238	37	24	301
	%	79.1%	12.3%	8.0%	100.0%

Table 10.6 Statistical results for participant's thoughts about Muscat as a place for living – obtained from various research methods as indicated

Parents are taught to behave so that their kids behave. It may sound inappropriate, but I believe governments and institutions should also behave before asking the public to behave – how so?

In the quest for sustainability across the globe and within Oman as a country, the louder voice calls for the public to improve upon their consumption and living styles, to respect the environment and to prepare for the consequences associated with climate change. They are also asked to reduce their energy and water consumption and to limit their use of plastic bags. In terms of transport, they are criticised for private ownership of vehicles and their lavish use of car transport which is not sustainable and ends up polluting the environment. All of these have been proven as audible measures for addressing sustainability and have produced significant results when properly implemented in certain societies. However, I am concerned that the citizens in Oman are not adequately informed what the government is doing on their behalf regarding sustainability and climate change apart from typing up reports regarding the global agenda 21 for sustainable development or what they report in front of the United Nations as part of their commitment to sustainable development. They are not aware of the inefficient town planning and land use zoning that produces travel journeys to their work beyond what is necessary and inhibits any meaningful public transport at their end; well, if there is any meaningful public transport to start with. They are also not told how their city is performing in aspects such as density, liveability, mixed-use, balanced urban growth and urban quality. And the story goes on!

I believe that if there is any route to sustainable development in Oman, and maybe elsewhere, that it should start with the government. In Oman, that has always been driven by strategy development which has been productive in terms of actually developing strategies throughout the last forty years of urban development. This, unfortunately, has not been matched with productive

implementation and that has been evident throughout this research. Although Muscat as a city is liked by both its residents and its visitors, it could have achieved a lot more in terms of urban sustainability and it deserves that. The government has spent genuine resources in developing such strategies, but apparently the implementation phase is challenging, and difficult. It doesn't have to be like that if we follow some basic recommendations as illustrated in the latter chapters of this thesis, and they are many, simple and would yield short term gains as well as pave the way for long term sustainable results.

That's why I will end up where I started with: if you want the citizens to behave in a sustainable manner, the government has to behave that way first!

LIST OF REFERENCES

- ABU DHABI URBAN PLANNING COUNCIL. 2014. *ESTIDAMA* [Online]. Australia. Available: <http://www.estidama.org/> 2014].
- ADINYIRA, E., OTENG-SEIFAH, S. & ADJEI-KUMI, T. A review of urban sustainability assessment methodologies. International conference on whole life urban sustainability and its assessment. Glasgow, 2007.
- AL-AWADHI, T. 2007. Monitoring and Modeling Urban Expansion Using GIS & RS: Case Study from Muscat, Oman. Urban Remote Sensing Joint Event, 2007. IEEE, 1-5.
- Al - Gharibi, H. 2014. Urban Growth from patchwork to sustainability, Case study: Muscat. [Online]. Available: <http://www.opus4.kobv.de> 2014].
- AL-RAWAS, M. A. S. 1996. *Urban transportation problems in the Muscat area, Sultanate of Oman*. University of Salford.
- AL SAID, H. S. A. B. T. Sep 3 2002. *RE: HH Sayyid Assaad bin Tariq Al Said speech at the World Summit on Sustainable Development in Johannesburg*.
- ALBERTI, M. 1996. Measuring urban sustainability. *Environmental impact assessment review*, 16, 381-424.
- ALLEN, J. & BROWNE, M. 2010. Sustainability strategies for city logistics. *Green Logistics: Improving the Environmental Sustainability of Logistics*, 282-305.
- ALSAID, H. S. A. B. T. 2002. *Oman Statement World Summit on Sustainable Development in Johannesburg*.
- ATKINS, W. S. I. M. C. L. S. C. 1986. Sohar Structure Plan - Final Report - Volume 1 - Planning Proposals and Policies. Diwan of Royal Court Affairs.
- ATKINSON, P. & HAMMERSLEY, M. 1994. Ethnography and participant observation. *Handbook of qualitative research*, 1, 248-261.
- BAINES, P. & CHANSARKAR, B. 2002. *Introducing marketing research*, J. Wiley & Sons.
- BANDYOPADHYAY, S. 2005. Problematic aspects of synthesis and interpretation in the study of traditional Omani built environment.
- BARR, S. 2003. Strategies for sustainability: citizens and responsible environmental behaviour. *Area*, 35, 227-240.
- BEATLEY, T. 2004. Planning for sustainability in European cities: A review of practice in leading cities. *The Sustainable Development Reader*. Routledge, London.
- BEDZED. 2002. *BedZED* [Online]. Available: http://www.zedfactory.com/projects_mixeduse_bedzed.html 2014].
- BELQACEM, M. 2010. Urban Sprawl and City Vulnerability: Where Does Muscat Stand? *Indian Ocean Tropical Cyclones and Climate Change*. Springer.

- BENNA, U. G. 1996. New towns in national and regional development: lessons from Jubail industrial city in Saudi Arabia. *Journal of King Saud University*.
- BERTELSMANN STIFTUNG, B. 2012. *Oman Country Report* [Online]. Available: <http://www.bti-project.de/fileadmin/Inhalte/reports/2012/pdf/BTI%202012%20Oman.pdf> [Accessed 18 Jan 2014].
- BLUE CITY, T. 2014. *The Blue City* [Online]. Available: www.almadinaazarqa.com) 2014].
- BREEAM. 2014. *Building Research Establishment Environmental Assessment Methods* [Online]. Available: <http://www.breeam.org/> 2014].
- BRIGGS, G. 2005. The intelligent city: Ubiquitous network or humane environment? *Future Forms and Design for Sustainable Cities*, Architectural Press, London.
- BRUNDTLAND, G. H. 1987. World commission on environment and development. *Our common future*, 8-9.
- BRYMAN, A. 2006. Integrating quantitative and qualitative research: how is it done? *Qualitative research*, 6, 97-113.
- BUDD, W., LOVRICH JR, N., PIERCE, J. C. & CHAMBERLAIN, B. 2008. Cultural sources of variations in US urban sustainability attributes. *Cities*, 25, 257-267.
- CAIN, A., AFSHAR, F. & NORTON, J. 1975. *Oman: The Problems and Potentials of the Indigenous Built Environment in a Developing Country*, Architectural Association School of Architecture.
- CAMAGNI, R. 1998. Sustainable urban development: definition and reasons for a research programme. *International Journal of Environment and Pollution*, 10, 6-27.
- CARMONA, M. 2010. *Public places-urban spaces*, Routledge.
- CLARK, W. C. & DICKSON, N. M. 2003. Sustainability science: the emerging research program. *Proceedings of the National Academy of Sciences*, 100, 8059-8061.
- CNU. 2014. *Congress of New Urbanism* [Online]. Available: <http://www.cnu.org/> 2014].
- COW, P. L. 2008. Study on Renewable Energy Resources commissioned In: REGULATION, A. F. E. (ed.). Muscat.
- COWI, P. L. 1989. As Sharqiya Regional Plan - Alternative Strategies. In: HOUSING, M. O. (ed.).
- COWI, P. L. 1990a. Ad Dakhliya Regional Plan - Draft Final Report - report 3. In: HOUSING, M. O. (ed.).
- COWI, P. L. 1990b. Ad Dhahira Regional Plan - Draft Final Report - report 3. In: HOUSING, M. O. (ed.).
- COWI, P. L. 1991. Jebel Akhdar Planning Study - Officially approved draft final report - report 4 - vol 2. In: HOUSING, M. O. (ed.).
- CRESWELL, J. W. 1994. *Research design*, Sage publications Thousand Oaks, CA.

- CRESWELL, J. W. 2012. *Qualitative inquiry and research design: Choosing among five approaches*, SAGE Publications, Incorporated.
- CRESWELL, J. W. 2013. *Research design: Qualitative, quantitative, and mixed methods approaches*, Sage Publications, Incorporated.
- CRESWELL, J. W. & CLARK, V. L. P. 2007. *Designing and conducting mixed methods research*, Wiley Online Library.
- CRESWELL, J. W. & CLARK, V. L. P. 2010. *Designing and Conducting Mixed Methods Research*, SAGE.
- CURWELL, S. & COOPER, I. 1998. The implications of urban sustainability. *Building Research & Information*, 26, 17-28.
- DARAL-HANDASAH, C. 1981. Oman Highway Master Plan: Highway Maintenance Project (1978-1981). In: COMMUNICATIONS, M. O. (ed.).
- DARAL-HANDASAH, C. 1987. Capital Area Transport Study (1985) - Final Report - Vol 1 Main Report. In: AFFAIRS, D. O. R. C. (ed.).
- DEVELOPMENT, N. R. C. P. D. B. O. S. 1999. *Our common journey: a transition toward sustainability*, National Academies Press.
- DEY, I. 1993. *Qualitative Data Analysis: A User-Friendly Guide*.
- DEY, I. 2003. *Qualitative data analysis: A user friendly guide for social scientists*, Routledge.
- DUNSTER, B., SIMMONS, C. & GILBERT, B. 2008. *The zedbook*, Routledge.
- EASTAWAY, M. & STØA, E. 2004. Dimensions of housing and urban sustainability. *Journal of Housing and the Built Environment*, 19, 1-5.
- ECONOMIC ASSOCIATION, T. O. Conference Conclusion Sustainable Development and Equity; Between Planning and Reality, 2013 Muscat.
- ECONOMY, M. O. N. 1996. Vision for Oman's Economy (1996-2020), Oman 2020.
- EISENSTAT, M. & BEER, I. R. A. 2000. The silent killers of strategy implementation and learning. *Sloan Management Review*.
- EUROPEAN COMMISSION 1990. Green Paper on the Urban Development. Brussels.
- EUROPEAN ENVIRONMENT AGENCY 1995. Europe's Environment: The Dobbris Assessment. In: EUROPEAN ENVIRONMENT AGENCY (ed.). Copenhagen.
- FANAK. 2014. *The oasis village of Bilad Sayt* [Online]. Available: www.fanak.com [Accessed Jan 18 2014].
- FLICK, U. 2009. *An introduction to qualitative research*, Sage.
- FOSTER, N. 2003. Architecture and Sustainability. *Foster and Partners*.
- FRANKFORT-NACHMIAS, C. & NACHMIAS, D. 2007. *Research methods in the social sciences*, Macmillan.
- FREY, H. & YANESKE, P. 2007. *Visions of sustainability: cities and regions*, Taylor & Francis.

- GIDDINGS, B., HOPWOOD, B., MELLOR, M. & O'BRIEN, G. 2005. *Back to the city: A route to urban sustainability*, Elsevier.
- GILHAM, B. 2001. *The Research Interview*, Continnum.
- GIRARDET, H. 2008. *Cities people planet: urban development and climate change*, John Wiley & Sons Incorporated.
- GLASER, B. G. Constructivist grounded theory? Forum Qualitative Sozialforschung/Forum: Qualitative Social Research, 2002.
- HALL, P. & TEWDWR-JONES, M. 2010. *Urban and regional planning*, Routledge.
- HALL, P. G. & PFEIFFER, U. 2000. *Urban future 21: a global agenda for twenty-first century cities*, Taylor & Francis.
- HALLA, F. 2007. A SWOT analysis of strategic urban development planning: The case of Dar es Salaam city in Tanzania. *Habitat International*, 31, 130-142.
- HASNA, A. M. 2006. Dimensions of sustainability. *Journal of Engineering for Sustainable Community Development*, 1, 47-57.
- HOUGH, M. 2004. *Cities and natural process*, Routledge.
- HOUSING, M. O. 1995. National Report on Urban Settlements (التقرير الوطني حول المستوطنات البشرية). In: HOUSING, M. O. (ed.).
- HOUSING, M. O. 2009a. Description of Tender for Consultancy Study of development of policies and procedures for Real Estate Sector in Oman (وصف العمل للدراسة الاستشارية لتطوير (السياسات والاجراءات الخاصة بقطاع العقارات). In: HOUSING, M. O. (ed.). Unpublished.
- HOUSING, M. O. 2009b. Detailed Urban Planning in Oman(التخطيط العمراني التفصيلي). Muscat/ Unpublished Report.
- HOUSING, M. O. 2009c. The General Policy for Urban Planning in Oman(السياسة العامة للتخطيط العمراني في السلطنة). Muscat, Unpublished Report.
- HOUSING, M. O. 2011. Annual Statistical Book for 2011. In: DEPARTMENT, P. A. S. (ed.). Muscat.
- HOWARD, E. 1965. *Garden cities of to-morrow*, MIT Press.
- HUI, S. C. M. 2008. *Sustainable architecture and building design* [Online]. Available: <http://www.arch.hku.hk/research/BEER/sustain.htm> 2008].
- IBRAHIM, M., GAUBE, H., MERSHEN, B., RIBBECK, E., GANGLER, A., BUERKERT, A. & HSER, J. 2000. Oasis Settlement in Oman: Pilot Study 1999–2000. *Muscat*. SQU.
- INFORMATION, M. O. 2010. *History of Oman* [Online]. [Accessed September 15 2010].
- INSTITUTE OF STANDARDS AND TECHNOLOGY, T. N. 1998. BEES - Building for Environmental and Economic Sustainability System USA.
- JACOBS, J. 1961. *The Death and Life of Great American Cities*, New York, UK: Random house.
- JEDDAH, M. 2009. Jeddah Strategic Plan - Executive Summary

- JENKS, M. & DEMPSEY, N. 2005. *Future forms and design for sustainable cities*, Routledge.
- JOHNSON, R. B. & ONWUEGBUZIE, A. J. 2004. Mixed methods research: A research paradigm whose time has come. *Educational researcher*, 33, 14-26.
- JOHNSON, R. B., ONWUEGBUZIE, A. J. & TURNER, L. A. 2007. Toward a definition of mixed methods research. *Journal of mixed methods research*, 1, 112-133.
- KAJIKAWA, Y. 2008. Research core and framework of sustainability science. *Sustainability Science*, 3, 215-239.
- KATES, R. W., CLARK, W. C., CORELL, R., HALL, J. M., JAEGER, C. C., LOWE, I., MCCARTHY, J. J., SCHELLNHUBER, H. J., BOLIN, B. & DICKSON, N. M. 2001. *Sustainability science*, International Institute for Applied Systems Analysis.
- KAUFMANN-HAYOZ, R. & GUTSCHER, H. 2001. *Changing Things--moving People: Strategies for Promoting Sustainable Development at the Local Level*, Springer.
- KEEBLE, L. 1969. *Principles and practice of town and country planning*, Estates Gazette London.
- KEIRSTEAD, J. & LEACH, M. 2008. Bridging the gaps between theory and practice: a service niche approach to urban sustainability indicators. *Sustainable Development*, 16, 329-340.
- KENWORTHY, J. R. 2006. The eco-city: ten key transport and planning dimensions for sustainable city development. *Environment and urbanization*, 18, 67-85.
- KHATIB & ALAMI, A. P. & EDDY, M. 2003. Muscat Wasterwater Scheme Project - draft final wasterwater master plan - vol 2. *In: MUNICIPALITY, M. (ed.)*.
- KHATIB&ALAMI, C. E. C. 1995a. Muscat Area Traffic Study 1993-94 Executive Summary. *In: MUNICIPALITY, M. (ed.)*. Muscat.
- KHATIB&ALAMI, C. E. C. 1995b. Muscat Area Traffic Study 1993-94 Study Report - Stage 2 Report - Draft Final. *In: MUNICIPALITY, M. (ed.)*. Muscat.
- KOMIYAMA, H. & TAKEUCHI, K. 2006. Sustainability science: building a new discipline. *Sustainability Science*, 1, 1-6.
- LEECH, N. & ONWUEGBUZIE, A. 2009. A typology of mixed methods research designs. *Quality & Quantity*. Springer Netherlands.
- LEOPOLD, A. 1970. A Sand County Almanac. 1949. *New York: Ballantine*.
- LINDBERG, C. & CONNELLY, S. Bridging the Sustainability/Planning Implementation Gap. presentation at the Building Sustainable Communities Conference, Kelowna, BC, 2007.
- LLEWELYN-DAVIES, W. 1977. Muscat Structure Plan 1977. *In: MUNICIPALITIES, M. O. L. A. (ed.)*. Muscat.
- LLEWELYN-DAVIES, W. 1981. Housing Study for Muscat. *In: MUNICIPALITIES, M. O. L. A. (ed.)*. Muscat.
- LLEWELYN-DAVIES, W. 1982. Capital Area Structure Plan CASP 1982. *In: MUNICIPALITIES, M. O. L. A. (ed.)*. Muscat.

- LONDON SCHOOL OF ECONOMICS, T. 2002. *Promoting Action for Sustainability through indicators at the local level in Europe (PASTILLE 10)*, London
- MACLAREN, V. W. 1996. Urban sustainability reporting. *Journal of the American planning association*, 62, 184-202.
- MAKIYA, A. C. 1973. Muscat City Planning.
- MCLENNAN, J. F. 2004. *The philosophy of sustainable design: The future of architecture*, Ecotone Publishing.
- MEADOWS, D. H. R., JORGEN; BEHRENS III, WILLIAM W 1972. *The Limits to Growth: A Report to The Club of Rome (1972)*, Universe Books, New York.
- MILES, M. & HUBERMAN, A. 1994. *Qualitative Data Analysis; an Expanded Source Book*, Thousand Oaks, CA, Sage Publications.
- MILLENIUM VILLAGES, T. U. 2003. How to create sustainable settlements and sustainable communities *In: SM WHEELER, T. B. (ed.) The sustainable urban development reader*. New York: Routledge.
- MILTON-KEYNES & CORPORATION, D. 1985. A report on the proposals for the future development within the Capital Area. *In: AFFAIRS, D. O. R. C. (ed.)*. Muscat.
- MINISTRY OF FINANCE 2010. Eighth Five-Year Development Plan (2011-2015). Muscat.
- MINISTRY OF HOUSING, E. A. W. 2002. Annual Statistical Book for 2002. *In: DEPARTMENT, P. A. S. (ed.)*. Muscat.
- MORSE, J. 1991. Approaches to Qualitative-Quantitative Methodological Triangulation. *Nursing Research*, 40, 120-123.
- MORSE, J. M. 1994. *Critical Issues in Qualitative Research Methods*, London, Sage Publications.
- MORSE, J. M. 2003. Principles of mixed methods and multimethod research design. *Handbook of mixed methods in social and behavioral research*, 189-208.
- MOTT, M. & WATSON, H. 1992. Preparations of wastewater masterplans for nine towns - memorandum report no 2 - alternative master plans. *In: ENVIRONMENT, M. O. R. M. (ed.)*.
- MRMWR 1995. National Strategy for Environmental Protection in Oman - Executive Summary (الاستراتيجية الوطنية لحماية البيئة العمانية - حماية البيئة وصون الموارد الطبيعية من أجل تنمية مستدامة - المجلد الرابع - (الموجز التنفيذي). *In: RESOURCES, M. O. R. M. W. (ed.)*.
- MRMWR 1997. CONVENTION ON BIOLOGICAL DIVERSITY - FIRST NATIONAL REPORT. *In: ENVIRONMENT, D.-G. O. N. R.-M. O. R. M. A. (ed.)*.
- MRMWR 2005. The Omani Environment over three decades (البيئة العمانية خلال ثلاثة عقود). *In: RESOURCE, M. O. R. M. W. (ed.)*.
- MUMFORD, L. 1938. The Culture of cities.
- MUNICIPALITY, M. 2002. Annual Report for 2002. *In: DEPARTMENT, S. (ed.)*. Muscat.

- MUNICIPALITY, M. 2008. Annual Report for 2008. In: DEPARTMENT, S. (ed.). Muscat.
- NABERS. 2014. *National Australian Building Environmental Rating System* [Online]. Australia. Available: <http://www.nabers.gov.au/public/WebPages/Home.aspx> 2014].
- O'MEARA SHEEHAN, M., STARKE, L. & CHAFE, Z. 2007. *State of the world 2007: our urban future: a Worldwatch Institute report on progress toward a sustainable society*, London: Earthscan.
- O'CATHAIN, A., MURPHY, E. & NICHOLL, J. 2010. Three techniques for integrating data in mixed methods studies. *BMJ*, 341.
- OBORN, P. M. 1982. *Ruwi, a New Town in the Sultanate of Oman: Its Development and Its Architecture: a Dissertation Submitted for the Degree of Master of Architecture*. Department of Architecture, Edinburgh College of Art/Heriot-Watt University, Edinburgh.
- OBSERVER, O. D. 2011. 'Majestic Muscat' to enhance the quality of living. *Observer, Oman Daily*, 25 Jan 2011.
- OBSERVER, O. D. 2014. Supreme Committee of Planning, to develop the economic vision for Oman 2040 *Oman Daily Observer*, 30 Dec 2013.
- OLMSTED, F. L. 1914. The Town-Planning Movement in America. *Annals of the American Academy of Political and Social Science*, 51, 172-181.
- OMAN DAILY. 2012. ندوة للاستراتيجية الوطنية للتنمية العمرانية لمحافظة شمال وجنوب الباطنة ومسندم
- Oman National Spatial Strategy workshop for North and South Batinah and Musandam Governorate. *Oman Daily*, 17 April 2012.
- OMANET. 2014. Available: www.omanet.om [Accessed Jan 18 2014].
- ONWUEGBUZIE, A. J. & LEECH, N. L. 2006. Linking research questions to mixed methods data analysis procedures. *The Qualitative Report*, 11, 474-498.
- PATTON, M. Q. 1990. *Qualitative Evaluation and Research Methods*, Newbury Park, Sage Publications.
- PATTON, M. Q. 2005. *Qualitative research*, Wiley Online Library.
- PERRINGS, C. 2007. Future challenges. *Proceedings of the National Academy of Sciences*, 104, 15179-15180.
- PETERSON, J. E. 2004. Oman: Three and a Half Decades of Change and Development. *Middle East Policy*, 11, 125-137.
- PETERSON, J. E. 2007. *Historical Muscat: an illustrated guide and gazetteer*, Brill.
- PITTS, A. 2004. *Planning and design strategies for sustainability and profit*, Architectural Press.
- POPE J., ANNANDALE D. AND MORRISON-SAUNDERS A. (2004) *Conceptualising Sustainability Assessment*. *Environmental Impact Assessment Review*. 24, No. 6, 595-616.
- POWER, A. 2004. Sustainable communities and sustainable development: A review of the Sustainable Communities Plan.

- PRESIDENCY, G. 2007. Leipzig charter on sustainable European Cities. *Final draft, document prepared by the German Presidency of the European Union, Leipzig*.
- RABINOVITCH, J. & LEITMAN, J. 1996. Urban Planning in Curitiba. In: SM WHEELER, T. B. (ed.) *The sustainable urban development reader*. New York: Routledge.
- RATCLIFFE, J. & STUBBS, M. 2013. *Urban planning and real estate development*, Routledge.
- REES, W. & WACKERNAGEL, M. 1996. Urban ecological footprints: Why cities cannot be sustainable—And why they are a key to sustainability. *Environmental impact assessment review*, 16, 223-248.
- SAMAR DAMLUJI, S. 1998. *The architecture of Oman*, Garnet Publishing.
- SCTP 1991. Manual for Urban Planning. Oman, : Supreme Committee for Town Planning.
- SCTP 1996. Manual for Urban Planning (دليل التخطيط العمراني). In: PLANNING, S. C. F. T. (ed.).
- SCTP 1998. The list of decisions and decrees from the meetings of Supreme Committee of Town Planning (1985-1998) (1998 - 1985 - 1985 - 1985). *مجموعة القرارات المتخذة في اجتماعات اللجنة العليا لتخطيط المدن لعام 1985 - 1998*. In: PLANNING, S. C. F. T. (ed.). Muscat / Unpublished Report.
- SCTP 2008a. Consultancy Services for the Preparation of Oman National Spatial Strategy (ONSS). Supreme Committee for Town planning.
- SCTP 2008b. Tender document RFP for Consultancy Services for the Preparation of Oman National Spatial Strategy (ONSS). Muscat.
- SEGHEZZO, L. 2009. The five dimensions of sustainability. *Environmental Politics*, 18, 539-556.
- SHEN, L.-Y., JORGE OCHOA, J., SHAH, M. N. & ZHANG, X. 2011. The application of urban sustainability indicators—A comparison between various practices. *Habitat International*, 35, 17-29.
- SIEGEL, H. & LOFTNESS, V. 2008. *Architecture of Sustainability* [Online]. Available: <http://www.Architectureofsustainability.blogspot.com> 2008].
- SILVERMAN, D. 2010. *Qualitative research*, Sage.
- SINGH, R. K., MURTY, H., GUPTA, S. & DIKSHIT, A. 2009. An overview of sustainability assessment methodologies. *Ecological indicators*, 9, 189-212.
- SOLESBURY, W. 1974. *Policy in urban planning: structure plans, programmes and local plans*, Pergamon Press Oxford.
- SOMMER, R. & SOMMER, B. B. 1992. *A practical guide to behavioral research*, Oxford University Press.
- SPANGENBERG, J. H. 2004. Reconciling sustainability and growth: criteria, indicators, policies. *Sustainable Development*, 12, 74-86.
- STATISTICS & INFORMATION, N. C. F. 2013. *National Centre for Statistics and Information* [Online]. Available: http://www.ncsi.gov.om/NCSI_website/publications.aspx 2014].

- STEAD, W. E. & STEAD, J. G. 1995. An empirical investigation of sustainability strategy implementation in industrial organizations. *Research in corporate social performance and policy*, 1, 43-66.
- STEADMAN, P., LAUTSO, K., WEGENER, M., SPIEKERMANN, K., SHEPPARD, I., MARTINO, A., DOMINGO, R. & GAYDA, S. 2004. PROPOLIS: planning and research of policies for land use and transport for increasing urban sustainability.
- SYRIAN, A. R. M. O. L. A.-. 2009. Towards a Syrian Urban Development Policy Memorandum on Sustainable Urban Development in Syria Final version December 2009.
- TASHAKKORI, A. & TEDDLIE, C. 2003. *Handbook of mixed methods in social & behavioral research*, Sage.
- TEDDLIE, C. 2009. *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*, Sage Publications Inc.
- THAYER, R. L. 1989. The experience of sustainable landscapes. *Landscape Journal* 8, 101-110.
- THERIVEL R, WILSON E, THOMPSON S, HEANEY D, PRITCHARD D. (1992) *Strategic Environmental Assessment*; Earthscan: London.
- TIMES, O. O. 2010. Oman National Spatial Strategy - interview with Engr Al Affani and Consatt Architect.
- TOWNSEND, J. 1977. *Oman: The making of a modern state*, Croom Helm London.
- TROCHIM, W. M. 2006. Qualitative measures. *Research Measures Knowledge Base*, 361-9433.
- UNDP 2003. Human Development Report of 2003 *In: PROGRAMME*, U. N. D. (ed.).
- UNEP/ROWA, E.-. The National Plan of Action to Combat Desertification in Oman. 1993.
- UNITED NATIONS 2003. World urbanization prospects: the 2003 revision.
- UNITED NATIONS. 2010. *UN Millennium Development Goals* [Online]. Available: <http://www.un.org/millenniumgoals/> 2010].
- URBAN PLANNING COUNCIL, A. D. 2007. Plan Abu Dhabi 2030 - Urban Structure Framework Plan
- URBAN TASK FORCE 1999. Towards an Urban Renaissance, Final Report of the Urban Task Force chaired by Lord Rogers of Riverside, Department of the Environment, Transport and the Regions, London. *E & FN Spon, London*.
- USGBC. 2014. *LEED - Green Buildings Council's Leadership in Energy and Environmental Design* [Online]. USA. Available: <http://www.usgbc.org/leed> 2014].
- VALE, B. & VALE, R. J. D. 1991. *Green architecture: design for an energy-conscious future*, Little, Brown.
- VIAK 1972. Greater Muttrah Plan. *In: MUNICIPALITIES*, M. O. L. A. (ed.).
- VUCETICH, J. A. & NELSON, M. P. 2010. Sustainability: virtuous or vulgar? *BioScience*, 60, 539-544.
- WACE, B. 1969. Master Plan for Muscat and Oman. *Geographic Magazine*.

- WALTON, J., EL-HARAM, M., CASTILLO, N., HORNER, R., PRICE, A. & HARDCASTLE, C. 2005. Integrated assessment of urban sustainability. *Proceedings of the ICE-Engineering Sustainability*, 158, 57-65.
- WAVE MUSCAT, T. 2014. *The Wave Muscat* [Online]. Available: www.thewavemuscat.com 2014].
- WEBSTER, H. & WILLIAMS, P. 2005. Envisioning the Future: Sustainable Models for Rural Communities. *Future Forms and Design for Sustainable Cities*.
- WEEKS, L.-D. 1983. Capital Area Structure Plan CASP 1982. *In: MUNICIPALITIES*, M. O. L. A. (ed.). Muscat.
- WEIDLEPLAN & MUAMIR 1989a. Muscat Area Structure Plan - Phase 1 Survey Report - Vol 1 Report. *In: HOUSING*, M. O. (ed.). Muscat.
- WEIDLEPLAN & MUAMIR 1989b. Muscat Regional Plan - Phase 1 - Survey Report. *In: HOUSING*, M. O. (ed.).
- WEIDLEPLAN & MUAMIR 1989c. Muscat Regional Plan - Phase 2 Strategy Report. *In: HOUSING*, M. O. (ed.).
- WEIDLEPLAN & MUAMIR 1990a. Muscat Area Structure Plan - Phase 2 Report. *In: HOUSING*, M. O. (ed.). Muscat.
- WEIDLEPLAN & MUAMIR 1990b. Muscat Regional Plan - Phase 3- Draft Final Reptot - vol 2 - implementation of the regional plan. *In: HOUSING*, M. O. (ed.).
- WEIDLEPLAN & MUAMIR 1991a. Final Muscat Area Structure Plan Report and Executive Summary, Phase 3, Report No 4. *In: HOUSING*, M. O. (ed.).
- WEIDLEPLAN & MUAMIR 1991b. Final Muscat Regional Plan Report and Executive Summary, Phase 3, Report No 4. *In: HOUSING*, M. O. (ed.).
- WEIDLEPLAN & MUAMIR 1991c. Muscat Area Structure Plan - Phase 3 Draft Final Report - Volume 1 Report. *In: HOUSING*, M. O. (ed.). Muscat.
- WELLINGTON, J. & SZCZERBINSKI, M. 2007. *Research methods for the social sciences*, Continuum International Publishing Group.
- WHEELER, S. M. & BEATLEY, T. 2004. *The sustainable urban development reader*, Routledge New York.
- WIEK, A., WITHYCOMBE, L. & REDMAN, C. L. 2011. Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science*, 6, 203-218.
- WILLIAMS, K. 2010. Sustainable cities: research and practice challenges. *International Journal of Urban Sustainable Development*, 1, 128-132.
- WILLIS, B. 2005. Towards a Sustainable City: Rebuilding Lower Manhattan. *Future Forms and Design for Sustainable Cities*.
- WONG, C. 2004. *Indicators for urban and regional planning: the interplay of policy and methods*, Routledge.

YOUNG, T. 1996. Confronting Sustainability. *In*: REILLY, W. (ed.) *Sustainable Landscape Design in Arid Climates*. Geneva: Aga Khan Trust for Culture.

APPENDIX A: MUSCAT CITY PLAN







APPENDIX B: TIMELINE FOR HISTORY OF URBAN DEVELOPMENT IN OMAN

	Title	Date	Author	Organization
1	Establishment of a department responsible for Road & Housing Organization/management in Muscat and Muttrah	1938		
2	Establishment of the first Municipal Council in Muscat and Establishment of Muttrah Municipality	1939		Muttrah Municipality
3	The First Municipality Law was issued for Sultanate Muscat & Oman	1949		Muttrah Municipality
4	A Development Department was established in Muscat, with a subsidy of 250,000 pounds from the British government	1958		
5	oil companies amalgamated under the title Petroleum Development Oman (PDO)	1960		PDO
6	Oil was discovered in commercial quantities and the first exports begun	1964 1967		PDO
7	The word of Sultan Sa'id bin Taimur, Sultan of Muscat and Oman, about the history of the financial position in the past and the hopes for the future after the export of oil	1968		
8	Muscat and Greater Muttrah Development report; Capital Region of Oman Plan; Greater Muttrah Plan	1967	John R. Harris	
9	The Department of Lands was under the Ministry of Justice and its mission was to consider applications submitted by citizens to award them lands of various uses. The decisions on those applications were made by a committee headed by the Director of Muscat Municipality and the responsibility of construction was under the supervision of the Director of Greater Muttrah construction.	Before 1970		Ministry of Justice

10	construction of an air strip alongside the fort of Bait Al Falalj in the Ruwi Valley and the construction of 10 km of surfaced road running between it and the Palace of Muscat	1967-1970		
11	H.M. Qaboos bin Said becomes Sultan of Oman	23 rd July 1970		
12	The government appoints a British Consultancy firm to study the feasibility of establishing regional Municipalities in Nizwa, Sohar and Sur	1971		
13	Establishment of 'Interim Planning Council' in March 1972, replaced by the Supreme Council for Economic Planning and Development, chaired by the Sultan, and establishment of the 'Centre for Economic Planning and Development'	1972		Supreme Council for Economic Planning and Development
14	The planning department was annexed to the Ministry of Development for the distribution of lands and the issuance of building permits in Muttrah and subsequently a letter is sent to the Department of Lands to award the entitled person a residential, industrial or commercial plot.	1972	Royal Decree ?/72	Ministry of Development
15	Ministry of Land Affairs established which was constituted from: Land Section, Real Estate Register Section, and Survey Section.	1972	Royal Decree ?/72	Ministry of Land Affairs
16	Creation of the Ministry of Communications and Public Services	1972		Ministry of Communications and Public Services
17	Land Organization Law issued, and establishing the Ministry of Land Affairs (which will comprise a Technical Committee, a Judicial Committee and an Administrative Committee which were to become collectively known as the Town Planning Department)	1972	Royal Decree 6/72	Ministry of Land Affairs
18	Building byelaws	1972	VIAC	Ministry of Land Affairs
19	Madinat Sultan Qaboos Project	1972		Towel Group
20	the Greater Muttrah Development Plan	1972	VIAC	Ministry of Land Affairs
21	Muttrah Municipality was joined to Muscat Municipality	1972		Muscat Municipality

22	Sultanate of Oman: economic survey 1972; (environment and resources, infrastructure and socio-economic conditions, use of resources by activity sector: agriculture, fisheries, oil...) – (Research work carried out for the Government of Oman)	1973	Townsend, J.S.; Driscoll, G.J.; Heard-Bey, F.U.; Eastman, A.; Habanec, I. --- Harold Whitehead and Partners Ltd., Muscat (Oman). Whitehead Consulting Group	
23	Report on the Provision of Sewerage and Sewage disposal for Muscat and Muttrah	1973	Brain Colquhoun & Partners	
24	the first Oman Transport Survey	1973	Italconsult	Ministry of Communications
25	Muscat City Planning	1973	Makiya Associates	
26	Water Supply to Muscat and Muttrah	1974	Sir Alexander Gibb & Partners	
27	Establishment of Development Council, chaired by the Sultan, and Qais Zawawi as Vice-chairman	Nov 1974		Development Council
28	Establishment of the Office of the Advisor for Conservation of the Environment in the Diwan of Royal Court	1974		Diwan of Royal Court
29	amending the title of Muscat Municipality to be The Capital Municipality	1974		The Capital Municipality
30	Regional Program for Housing – summary of preliminary report	1974	Renardet S. A. Consulting Engineers	Ministry of Land Affairs
31	Planning of central business District, Greater Muttrah (Ruwi Valley)	1974	Town Planning Department	Ministry of Land Affairs
32	the Economic Development Law was issued	Mar 1975		
33	The Law on the Organization of Government was issued – Law of the Administrative Apparatus of the State	June 1975	Royal Decree No. 26/75	
34	terms of reference of the Ministry of Land Affairs was issued	1975	On June 28, 1975, the Royal Decree No. (26/1975)	Ministry of Land Affairs
35	Water Resources Development Project, Northern Oman	1975	International Landbouwadvisbureau, Arnhem (Netherlands)	Ministry of Communications, Water Resources Centre
36	Sultan Qaboos declares Dhofar secure for civil development (End of Dhofar War)	Dec 1975		

37	Oman 1 st five year Development plan	1976-1980		Development Council
38	Qurm Development Area Planning; Qurm Heights 32, 20, 19; PDO Residential Area; Extension to Information (I3lam) City Area; Madinat Qaboos and its extension; North Al Khuwair 17; Qurm Commercial Area; Al Khuwair ministries and embassies	1976	Gibb Petermuller & Partners with Sir Alexander Gibb & Partners	Ministry of Land Affairs
39	West Dhofar Roads – Vol 1 Access to Border – Scheme Report	1976	Sir William Halcrow and Partners	Ministry of Defence
40	Royal Decree No. (17/1976) was issued to make some amendments to the organizational structure of the ministry where its name became the Ministry of Lands Affairs and Municipalities and devolved upon the responsibility for supervising the affairs of Muscat Municipality and the Regional Municipalities	1976	Royal Decree No. (17/1976)	Ministry of Lands Affairs and Municipalities
41	Capital Area Structure Plan Muscat Structure Plan 1977	June 1977	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
42	Oman Planning: Paper on Demographic and Economic Contex	1977	Llewelyn – Davies Weeks with Forestier-Walker & Bor	Ministry of Lands Affairs and Municipalities
43	Social Housing Law issued	1977	Royal Decree 35/77 , modified by 27/88 & 92/88	Ministry of Lands Affairs and Municipalities
44	Establishment of the Oman Housing Bank	1977	Royal Decree 51/77	Oman Housing Bank
45	Jibroo Redevelopment alternatives	1978	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
46	Establishment of the Council for the Conservation of Environment and Prevention of Pollution	1979	Royal Decree 68/79	Council for the Conservation of Environment and Prevention of Pollution
47	law on national parks and national reserves	1979	Royal Decree 26/79	
48	South Ruwi local plan West Ruwi Local plan Sheradi Seeb Town Improvement Plan	1980	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
49	Land ownership Law issued	1980	Royal Decree 5/80	Ministry of Lands Affairs and Municipalities

50	Planning Manuals (Procedures, Standards & Guidelines)	1980	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
51	Capital Area Structure Plan – The Action Programme	Nov 1980	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
52	Oman 2nd five year Development plan	1981-1985		Development Council
53	Housing Study for Muscat 1981	Jan 1981	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
54	Building Regulations issued	1981	Ministerial Decree 40/81	Ministry of Lands Affairs and Municipalities
55	Oman Highway Master Plan: Highway maintenance project (1978-1981)	1981	Dar Al-Handasah Consultants	Ministry of Communications
56	Capital Area – Muscat: Analysis of existing traffic conditions	1981	W. D. Scott with Transportation Planning Associates (TPA)	Inspector General of Police & Customs
57	Law on conservation of the Environment and Prevention of Pollution	1982	Royal Decree 10/82 modified by 114/2001	The Council for the Conservation of Environment and Prevention of Pollution
58	The Royal Decree No. (48/1982) was promulgated appending the Ministry of Public Works to the Ministry of Lands and Municipalities Affairs to become a directorate general in the name of (the Directorate of Public Works) which oversee the construction execution mandated by the ministries and various governmental units.	1982	the Royal Decree No. (48/1982) On June 1, 1982	Ministry of Lands Affairs and Municipalities
59	Central Business District Lulai & Wattayeh West Redevelopment North Ghubra Detailed Plan South Ghubra new community Muttrah Improvement Plan Airport Heights new town	1982	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
60	Madina Al Nahda Development Plan	1982	WS Atkins & Partners Overseas	Ministry of Lands Affairs and Municipalities

61	Musandam Town Planning and Implementation Assistance Project	Nov 1982	Darwish Shankland Cox in association with Mott Macdonald & Partners	Ministry of Lands Affairs and Municipalities
62	Capital Area Structure Plan CASP 1982	Jan 1983	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
63	Energy Conservation Programme – General guidelines for the application of thermal insulation in buildings – 2 nd edition	Jan 1983		Ministry of Electricity and Water
64	Greater Sohar Structure Plan	June 1983	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
65	Capital Area-Cultural & Recreational facilities study & Plan	Dec 1983	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
66	Al Ansab Mabila Detailed Plan South-Ruwi / Hamriya Improvement Plan Bausher Structure Plan	1983	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
67	Qurm Development Plan – Khuwair South	1983	Gibb Petermuller & Partners	Ministry of Lands Affairs and Municipalities
68	Closing Ruwi High Street For Vehicular Traffic	1983	Viak Consulting Engineering and Surveyors	Ministry of Communications
69	Socio Economic Survey 1984 for Muscat	Aug 1984	Directorate General of National Statistics	Development Council
70	Muscat Renewal Plan – Civic District	Nov 1984	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
71	Government Land entitlement system Law issued	1984	Royal Decree 81/84	Ministry of Lands Affairs and Municipalities
72	the responsibility for supervision (construction execution mandated by the ministries and various governmental units) was transferred to the Municipality of the Capital which was supervised by the Diwan of Royal Court	1984	Royal Decree 18/84 On March 1, 1984	Municipality of the Capital which was supervised by the Diwan of Royal Court

73	Mabila North Al Hail Local Plan Hamriya (implementation) Hellat As Sadd / Hamriya West South Ruwi / Hamriya Improvement Plan	1984	Llewelyn – Davies Weeks	Ministry of Lands Affairs and Municipalities
74	Adheiba New Community	1984	Cowi Consult	Ministry of Lands Affairs and Municipalities
75	Shati Al Qurm New Community	1984	Development Consultant	Ministry of Lands Affairs and Municipalities
76	Roads and Beautification in Ruwi	1984	Gibb Petermuller & Partners with Sir Alexander Gibb & Partners	Ministry of Lands Affairs and Municipalities
77	Establishment of the Ministry of Environment	1984	Royal Decree 45/84	Ministry of Environment
78	The Hydrology of the Sultanate of Oman – A preliminary Assessment	1984	William Doyel and others	Public Authority for Water Resources
79	Socio Economic Survey 1984 for Muscat	1984	Directorate General of National Statistics	Development Council
80	Establishing the Ministry of Regional Municipalities, for the advancement of municipal services in the regions and devolving the powers ascribed to the Ministry of Lands and Municipalities Affairs in the area of regional municipalities and the name of the ministry became, the “Ministry of Land Affairs.”	1985	Royal Decree No. (2 / 1985) On January 1, 1985	Ministry of Regional Municipalities Ministry of Land Affairs
81	Amending the name of the Ministry of Land Affairs to become the Ministry of Housing entrusted with the same terms of reference ascribed to the Ministry of Land Affairs.	1985	Royal Decree No. (10/1985) On January 8, 1985	Ministry of Housing
82	Establishment of the Supreme Committee of Town Planning	1985	Royal Decree 27/85	SCTP
83	Amending the title of the Ministry of Environment to be the Ministry of Environment and Water Resources	1985	Royal Decree 104/85	Ministry of Environment and Water Resources

84	Amending the title of the Council for the Conservation of Environment and Prevention of Pollution to be the Council for the Conservation of Environment and Water Resources	1985	Royal Decree 105/85	Council for the Conservation of Environment and Water Resources
85	Ruwi – Walja Services Plan	1985	Llewelyn – Davies Weeks	Ministry of Housing
86	Muscat Renewal Plan – Royal Mall & Government District	1985	Weidleplan & Muamir	Ministry of Housing
87	Dhofar Land Use Plan – Initial Zonation	Jan 1985	Land Development Resources Centre	Planning Committee for Development and Environment in the Southern Region
88	A report on the proposals for the future development within the Capital Area (Shati Al Qurm, Khuwair South, Ghubra South, Adheiba, Airport Heights, Madinat Al Nahda)	Feb 1985	Milton Keynes Development Corporation	Diwan of Royal Court Affairs
89	The solid waste management, collection, transportation and treatment for the capital area	April 1985	Scantec Consultant and Engineering	Diwan of Royal Court Affairs
90	Oman 3rd five year Development plan	1986-1990	Development Council	
91	Proposals for a system of Nature Conservation Areas	Jan 1986	International Union for Conservation of Nature and Natural Resources	Diwan of Royal Court Affairs
92	Capital Area Transport study (1985)	Jan 1986	Dar Al-Handasah Consultants	Diwan of Royal Court Affairs
93	Oman coastal zone management plan – greater Capital area	June 1986	International Union For Conservation Centre	Ministry of Commerce and Industry
94	Economic Development Prospects for the Southern Region	July 1986	Shankland Cox International Ltd with ULG Consultants Ltd	Planning Committee for Development and Environment in the Southern Region
95	Pastoral Management Study – 1986	1986	Dr M J Morris Consultant	Planning Committee for Development and Environment in the Southern Region
96	Sohar Structural Plan	1986	WS Atkins International with Maunsell Consultants ltd with Shankland Cox International	Diwan of Royal Court Affairs
97	Adheiba Commercial Centre	1986	Llewelyn – Davies Weeks	Ministry of Housing
98	Qantab	1986	??	Ministry of Housing

99	Origin and age of groundwater in Oman – a study of Environmental Isotopes	1986	Cansult with Gartner Lee International Inc.	Public Authority for Water Resources
100	Establishment of GIS system at SCTP	1986	SCTP Decree 5/86	SCTP
101	Approval of the SCTP General Framework for Policy making regarding Town planning	1986	SCTP Decree 33/86	SCTP
102	Salalah Plain : Land Use Plan – Integrated Rural Development for the Jerbeeb – Prefeasibility Study for a pilot project	1986	Cowi Consult	Planning Committee for Development and Environment in the Southern Region
103	Comprehensive Planning in the Ministry of Housing	1987	Droidege, P. and Gordova, M.	Ministry of Housing
104	GCC Citizens ownership of Real Estate	1987	Royal Decree 70/87 modified by 21/2004	Ministry of Housing
105	Proposed Terms of reference for national water resources management plan	1987		
106	Al Khurais Subdivision Plan	1987	??	Ministry of Housing
107	Amending the title of Capital Municipality to be The Muscat Municipality	1988		Muscat Municipality
108	Fisheries development in Oman – a review of policy options and proposals for development	1988	Marine Resources Assessment Group Ltd of Renewable Resources Assessment Group, Imperial college	
109	Determination of Planning Areas – Circular no 3/88	1988	Circular no 3/88	Prime Minister's Office for Legal Affairs
110	Study for services provision for Muttrah CBD area	1988	VIAK	Ministry of Housing
111	Al Khod Extension 1 Al Khod Extension 2 Adheiba Redevelopment	1988	??	Ministry of Housing
112	Establishment of the Ministry of Water Resources and specifying its responsibilities	1989	Royal Decree 100/89	Ministry of Water Resources
113	Batinah Regional Plan – Phase 2	June 1989	Weidleplan & Muamir	Ministry of Housing

114	Ad Dakhliya (Interior) Regional Plan Ad Dhahira Regional Plan As Sharqiya Regional Plan	1989	Cowi Consult	Ministry of Housing
115	Preparation of draft Regulations for solid (non-hazardous) and hazardous wastes	Aug 1989	Cowi Consult	Council for Conservation of Environment and Water Resources
116	Muscat Regional Plan Muscat Area Structure Plan Muscat Area Housing Study Batinah Regional Plan Musandam Regional Plan	1989	Weidleplan & Muamir	Ministry of Housing
117	Village settlement survey Labour accommodation survey The land use and building survey	1989	Weidleplan & Muamir	Ministry of Housing
118	Temporary restrictions on urban development	1989	SCTP decree 11/89	SCTP
119	Detailed Investigation for Development of up to 1000 Hectares of irrigated land – Najd Region	Sep 1989	Mott McDonald	Ministry of Agriculture
120	Oman Coastal Zone Management Plan – Musandam	Oct 1989	IUCN – The World Conservation Union	Ministry of Commerce and Industry
121	The study on the port development for northern oman	Dec 1989	Japan International Cooperation Agency	Ministry of Communications
122	Revised Ruwi-Hamriya Plan	1989	SCTP	SCTP
123	Ibri Town Structure Plan Buraimi Town Structure Plan Ad Dakhliya Regional Struture Plan Sumail Town Structure Plan Mudhaibi Town Structure Plan	1989	Cowi Consult	Ministry of Housing
124	Diba Structure Plan Khasab Structure Plan Madha Structure Plan Bukha Structure Plan	1990	Weidleplan & Muamir	Ministry of Housing
125	Izki Town Structure Plan Nizwa Town Structure Plan Ibra Town Structure Plan	1990	Cowi Consult	Ministry of Housing

126	Planning consultancy services for Batinah, Muscat and Musandam regions	July 1990	Weidleplan & Muamir	Ministry of Housing
127	Feasibility studies of road projects	04/06/1990	Gibb Petermuller & Partners with Sir Alexander Gibb & Partners	Ministry of Communications
128	Ten years fisheries sector development plan (1991-2000) programme and project vol 2 of 3	1990	Halcrow International Partnership with Fisheries Development Ltd	Ministry of Agriculture
129	New Port development plan in Sohar – Study on the port development for Northern Oman	1990	Japan International Cooperation Agency	Ministry of Communications
130	The study on a master plan for Agricultural development	1990	Japan International Cooperation Agency	Ministry of Agriculture
131	Mina Qaboos Development Plan	Oct 1990	Japan International Cooperation Agency	
132	Muscat, Sultanat Oman: Geographische Skizze einer einmaligen arabischen Stadt	1990	Fred Scholz	Das Arabische Buch - Berlin
133	Oman 4th five year Development plan	1991-1995		
134	Muttrah Improvement Plan	June 1991		Ministry of Housing
135	The Ministry of Environment and the Council for the Conservation of Environment and Prevention of Pollution were merged with the Ministry of Regional Municipalities to be the “Ministry of Regional Municipalities and Environment”	1991	Royal Decree 117/91	Ministry of Regional Municipalities and Environment
136	Urban Planning Criteria Manual approved by SCTP	1991	Atkins	SCTP
137	Rustaq Structure Plan	1991	Weidleplan & Muamir	Ministry of Housing
138	Jebel Akhdar Planning Study	1991	Cowi Consult	Ministry of Housing
139	Muscat Municipality Law issued	1992	Royal Decree 2/92	Muscat Municipality
140	Oman became signatory to the convention on Biological Diversity (CBD)	1992	ratified in 1994 by Royal Decree 119/94	
141	Oman became signatory to the UN conference for Environment and Development in Rio de Janeiro	1992		
142	Elevational Guidelines for Shati al Qurm Area	Jan 1992		Diwan of Royal Court Affairs
143	Building Regulations for Muscat	Jan 1992	Local Municipal Order 23/92	Muscat Municipality

144	Water and wastewater masterplan for Salalah – Final Masterplan report	Feb 1992	Dames & Moore International in association with Enterprise	Office of the Minister of State & Governor of Dhofar – Dhofar Municipality – Salalh Town
145	Preparation of wastewater master plans for nine towns (Al Buraimi, Ibri, A'Rustaq, Saham, Khasab, Samail, Nizwa, Sur, Ibra)	June 1992	Mott McDonald with Watson Hawksley	Ministry of Regional Municipalities and Environment
146	Al Wusta (Central) Regional Planning	Sep 1992		SCTP
147	Preliminary feasibility study for The development and beautification of sur town	Oct 1992	Electrowatt Engineering Services	Ministry of Finance & Economy
148	Oman standards and specifications for roads and road structures	April 1993	Travers Morgan	Muscat Municipality
149	The National Plan of Action to Combat desertification in Oman (Conference)	Dec 1993	ESCWA – UNEP/ROWA	
150	Regulations for the Management of Solid & Non-Hazardous Waste	1993	Ministerial Decree 17/93	Ministry of Regional Municipalities, Environment and Water Resources
151	Evaluation of rural development policies and programmes in Oman	1993	Joint ESCWA/FAO Agriculture Div., Amman (Jordan)	
152	Salalah Wastewater project	1993	Dames & Moore International with Camp Dresser & McKee International, Majan Engineering consultants, Gulf Development Trading Enterprise	Dhofar Municipality
153	Appraisal study on port development in Northern Oman – final report	May 1993	Rotterdam Municipal Port Management with GEM Consultants, ECT Consultancy	Development Council
154	Commercial Town at Al Maziona Planning of Al-Maziona Commerical Town	1993	Cowi Consult Weidleplan & Muamir	Development Council
155	Nizwa Industrial Estate – Phase 1 Planning Study – Final Report	1993	National Engineering Office	Public Establishment for Industrial Estate

156	First general census of population, housing and establishments	1993		Ministry of Development
157	Oman became a Party of the United Nations Framework Convention on Climate Change	1994	Royal Decree 119/94	
158	Muscat Area Traffic Study 1993-94	1994	Khatib & Alami consolidated engineering company	Muscat Municipality
159	The Desert Agricultural project – a report on project development to Dec 93	1994	Petroleum Development Oman LLC	Petroleum Development Oman LLC
160	Oman LNG Project Environmental Impact Statement	1994	Environment Advisory Unit Ltd	Shell International Petroleum
161	Instruction to bidders – Muscat Wastewater Concession	1994	Tender Document	Muscat Municipality
162	National Report on Urban Settlements	Dec 1995		Ministry of Housing
163	Preparatory report for an Industrial Development Plan in the Sur Area	1995	Huckle and Partners	Ministry of Housing
164	Rules governing the application of thermal insulation in buildings	Jan 1995	SCTP decree 3/95	SCTP
165	National Strategy for Environmental Protection in Oman – Executive Summary	1995	Ministry of Regional Municipalities Water Resource	Ministry of Regional Municipalities Water Resource
166	Law of handling & use of chemicals	1995	Royal Decree No 46/95	
167	Oman 5th five year Development plan	1996-2000		Ministry of Development
168	The National Conservation Strategy for Oman was issued	1996		Ministry of Regional Municipalities and Environment
169	The Vision for Oman's Economy: 2020	1996		Ministry of Development
170	Basic Law of the State issued	1996	Royal Decree No 101/1996	
171	<u>Planning studies – A'Sharqiya Region:</u> Al Kamil AL Wafi Structure Plan Bani Bu Ali Town Structure Plan Ibra Town Centre Development Plan Al Mintrib Structure Plan Dama Tayin Structure Plan	1996	Azri Architects	Ministry of Housing
172	Geographic Information Systems (GIS) – Implementation Plan	1996	PLANGRAPHICS, INC with	Ministry of Housing

Computer Systems				
173	Feasibility study of Quriyat-Sur road	June 1996	Renardet S. A. Consulting Engineers	Ministry of Communications
174	<u>Dakhliya Planning Studies:</u> Bahla Town Structure Plan Samail Town centre Development Plan Adam Town Structure Plan	1996	National Engineering Office	Ministry of Housing
175	<u>Dhahira Planning Studies</u> Mahdah Town Structure Plan Yanqul Town Structure Plan Dhank Town Structure Plan	1996	National Engineering Office	Ministry of Housing
176	Technical and Financial Feasibility study of Bausher – Al Amerat Road	April 1997	Renardet S. A. Consulting Engineers	Muscat Municipality
177	CONVENTION ON BIOLOGICAL DIVERSITY – FIRST NATIONAL REPORT	1997	Directorate-General of Nature Reserves	Ministry of Regional Municipalities and Environment
178	Sixth Arab International Solar Energy Conference AISEC-6 – Bringing solar energy into the day light	March 1998		Sultan Qaboos University
179	Qalhat Industrial Area Master Plan – Executive Summary	1998	Huckle and Partners	Ministry of National Economy
180	Proposed modifications to the Temporary restrictions on urban development	1998	SCTP decree 5/98	SCTP
181	Sohar Industrial Area – Master Plan Study	July 1999	Brown & Root Mid-East LLC	Ministry of National Economy
182	Final report for the master plan study of Salalah port and its hinterland in the Sultanate of Oman	2000	Japan International Cooperation Agency	Ministry of Communications
183	Conference on development and regional planning	2000		Sultan Qaboos University
184	National Biodiversity Strategy and Action Plan was approved	2000	by the Ministers Council	Ministry of Regional Municipalities, Environment and Water Resources
185	merging the Ministries of Transport and Housing in one ministry called the <u>Ministry of Transport and Housing</u>	2000	On January 25, 2000, the Royal Decree No. (10/2000)	
186	Household Expenditures & Income Survey	2000	Directorate General of Social	Ministry of National Economy

Statistics					
187	Oman 6th five year Development plan	2001-2005	Ministry of National Economy		
188	Energy Efficient Buildings in hot climates: Concept Development workshop	11/06/2001	Sultan Qaboos University		
189	Oman international Forum on Environment & Sustainable Development	22-24/12/2001	Ministry of Regional Municipalities, Environment and Water Resources		
190	The Law on Conservation of the Environment and Prevention of Pollution issued	Nov 2001	Royal Decree No 114/2001	Ministry of Regional Municipalities, Environment and Water Resources	
191	Law on Protection of Sources of Drinking Water from pollution issued	2001	Royal Decree 115/2001		
192	The Ministry of Water Resources was merged with the Ministry of Regional Municipalities and Environment to become one ministry titled the “Ministry of Regional Municipalities, Environment and Water Resources”	2001	Royal Decree 47/2001	Ministry of Regional Municipalities, Environment and Water Resources	
193	separating the transport sector from the Ministry of Transport and Housing to be merged to the Ministry of Transport and Communications while electricity and water sectors were added to the housing sector and its name became the Ministry of Housing, Electricity and Water	2001	Royal Decree 47/2001		
194	The National Report of Implementation of Agenda 21 on Sustainable Development was published	2002		Ministry of Regional Municipalities, Environment & Water Resources	
195	Years of Environment designated	2001, 2002	Royal Decree		
196	Salalah Waterfront development plan – Dhofar Governorate	Oct 2002	khatib & Alami and Partners	SCTP	

197	Consultancy services for design, supervision and operation & management studies for a new port and drydock complex at Duqm	Oct 2002	Royal Haskoning with SCTP Khatib & Alami and Al Baraka Economic consultancy	
198	Muscat Wastewater Scheme Project – Wastewater Master Plan	March 2003	khatib & Alami and Partners with Metcalf & Eddy	Muscat Municipality
199	Fishery Harbour at Seeb – Functional Planning Report	2003	Consulting Engineering Services LLC	Ministry of Agriculture
200	Second general census of population, housing and establishments	2003	Directorate General of Social Statistics	Ministry of National Economy
201	Muscat Expressway Traffic Study	2003	Parsons International & Company	Muscat Municipality
202	Law on Nature Reserves and Wildlife	2003	Royal Decree 6/2003	Ministry of Regional Municipalities, Environment & Water Resources
203	Ruwi – Wadi Al Kabir Link Road (P1 Road) Traffic & Feasibility study	2004	Mott McDonald	Muscat Municipality
204	Al Khoudh and Al Mawaleh Interchange	2004	Parsons International & Company	Muscat Municipality
205	a new law of privatization has been issued reflecting the privatization experience in the Fifth Five Year Plan, Oman's association with the WTO and the move towards liberalization of the local and foreign investment climate		Royal Decree no. 77/2004 dated 14.7.2004	
206	Oman ratified the Kyoto Protocol	2004	Royal Decree 107/2004	Ministry of Regional Municipalities, Environment & Water Resources
207	Muscat Ceremonial Route: design appraisal	2004	Report	Muscat Palace Office
208	Muscat Development Plan: approach and scope	2005	Report	Muscat Palace Office
209	Al Amerat – Qurayat Road Traffic Study	2005	Parsons International & Company	Muscat Municipality

210	Preservation of Environmental and Water Resources amid Economic Development		06/02/2005	Sultan Qaboos University
211	Oman 7th five year Development plan	2006-2010		Ministry of National Economy
212	Foreigners are granted ownership of real estate in the Sultanate in the integrated tourist complexes	2006	Royal Decree 12/2006	Ministry of Housing
213	Establishing a secretariat-general for the Supreme Committee for Town Planning	March 2006	Royal Decree ??/2006	SCTP
214	Muscat International Airport Interchange Central Corridor Traffic Study	2006	Parsons International & Company	Muscat Municipality
215	Muscat Urban Renewal Masterplan	2006	Report	Muscat Municipality
216	The symposium on the sustainable development of the agricultural sector	12/02/2007	by Royal Decree	Ministry of Agriculture
217	National Population Strategy – Oman	2007		Ministry of National Economy
218	Establishment of the Ministry of Environment and Climate Affairs	2007	Royal Decree 90/2007	
219	amending the name of the Ministry of Housing, Electricity and Water to the name of the Ministry of Housing	2007	On September 9, 2007, the Royal Decree No. (93/2007)	
220	Tropical Cyclone Gonu hits Oman	June 2007		
221	Government Land entitlement system revised to entitle the Omani Woman the right to own residential plot	2008	Royal Decree 125/2008	Ministry of Housing
222	Oman considering rail network between Sohar and Barka	2008		SCTP
223	The World Summit for Sustainable Development – the National Report on Implementation of Agenda 21 o Sustainable Development – Oman 2002	2008		Ministry of Regional Municipalities Water Resource
224	Conference on Sustainable Development in the Use and Application of Renewable Energy for Mitigation of Climate Chang	03/01/2008		Ministry of Environment and Climate Affairs
225	The First International Conference Water Resources & Climate Change in the MENA region – Conference Program & Abstracts	11/02/2008		Ministry of Regional Municipalities Water Resource

226	Feasibility Study for Exclusive Corridor for Heavy Vehicles Bait Al Falaj Signalized Intersection Design of Wadi Adai Interchange Traffic Impact Assessment on Major Developments in Al Qurm	2008	Parsons International & Company	Muscat Municipality
227	Traffic Impact Assessment on 18 November Road and access to the Wave Development in Al Athaiba Area	2008	WS Atkins	Muscat Municipality
228	Design of Roads Surrounding Maidan Al-Fath in Wattayah Traffic Study	2008	Renardet S. A. Consulting Engineers	Muscat Municipality
229	Tender for Consultancy Services for the Preparation of Oman National Spatial Strategy (ONSS)	2008		SCTP
230	Study on renewable Energy Resources, Oman	2008	Cowi and Partners LLC	Authority for Electrical Regulation
231	Muscat Area Traffic Study 2009 – Terms of Reference	2009		Muscat Municipality
232	Renewable Energy & Energy Efficiency Seminar	10/05/2009		Authority for Electrical Regulation
233	Sustainable Development in Oman and the French Expertise	15/11/2009		
234	Tender to build the first phase of the Batinah Coastal road in Northern Oman is floated	2009		SCTP
235	International Conference on Capacity Building in Urban Water – Management Under Water Scarcity Conditions	13/12/2009		Ministry of Regional Municipalities Water Resource
236	Gulf Eco 2010 Symposium – Environmental & Climate change, sustainable water & marine resources, alternative & renewable energy	Jan 2010		Ministry of Environment and Climate Affairs
237	Royal Decree for 200 Million Omani Rials Implementation of all social housing applications upto end of 2009	May 2010		Ministry of Housing
238	New master-planned township for Hasik	2010		
239	Tropical Cyclone Phet hits Oman	June 2010		
240	Muscat Green Days Conference on October 5, 6	2010		

241	Royal Decree No 116/2011 promulgates Municipal Councils Law	2011	Royal Decree No 116/2011 on 26 October 2011	
242	Muscat Municipality has launched a mega project at 24 locations, showcased in the Majestic Muscat exhibition	2011		Muscat Municipality
243	Plantation of one million dates palm trees project	2011		Diwan of Royal Court and Ministry of Agriculture
244	Plantation of one hundred thousand coconut palm trees	2011?		
245	Establishing the Supreme Council of Planning, chaired by His Majesty, while the minister of commerce and industry will be the deputy chairman of the council. The assets of the general directorate of development planning of the erstwhile Ministry of National Economy will be transferred to the general secretariat of the Council	2012	Royal Decree No. 30/2012	Supreme Council of Planning
246	Omani real estate law, Royal Decree No. 43-2012, has taken land ownership rights one step further, by allowing for the “expansion or increase in land area [of a given plot of land]”.	2012	Royal Decree No. 43-2012	
247	Royal Decree 32/2012 clarifies certain earlier decrees regarding the abolition of the Supreme Committee for Town Planning: All the jurisdictions of the SCTP as shown in Articles 5, 6, 7 of the Annex No. 1 attached to the said Royal Decree 15/2007 shall be transferred to the Ministry of Housing. And allocation of assets of the erstwhile Ministry of National Economy to the Ministry of Finance	2012	Royal Decree 32/2012	
248	issues Royal Decree No 43/2012 amending some provisions of the Municipal Councils Law	2012	Royal Decree No 43/2012 on 09 August 2012	
249	Oman Salinity Strategy	2012	International Center For Biosaline Agriculture (Icba) Dubai, UAE	Ministry Of Agriculture And Fisheries (Maf)

250	Food Security strategy	2014?	Ministry of Agriculture and Fisheries
251	Fisheries Sector Development Strategy	2014?	Ministry of Agriculture and Fisheries
252	National Energy Strategy – aiming to identify general policies and initiatives necessary to secure energy resources for the Sultanate in the medium to long term upto 2040	2014?	

APPENDIX C: INDEX FOR POLICIES OF URBAN DEVELOPMENT IN OMAN

ID	Title	Arabic title	Decree Ref	Published Date	Publisher Organization	/
1	Law No. 4/72 regarding distribution of fertile lands	القانون بشأن توزيع الأراضي الخصبة	Royal Decree 4/72	1-Jan-1972		
2	Law regulating the land (land within the city limits and outside the cities and agricultural and non-agricultural land and leasing the state owned plots)	قانون تنظيم الأراضي (الأراضي الواقعة ضمن حدود المدن وخارج المدن والزراعية وغير الزراعية وتأجير أراضي الدولة)	Royal Decree 6/72	1-Jan-1972		
3	Royal decision on lending to some of the citizens to build houses for their accommodation	القرار السلطاني بشأن اقراض بعض المواطنين لبناء منازل لسكنهم	Royal Order 5/74	1-Jan-1974		
4	Royal Decree No. 26/75 to promulgate the law organizing the State's Administrative Apparatus and the amendments thereto		Royal Decree No. 26/75	1-Jan-1975		
5	The Royal Decree No. (26/1975) was issued promulgating the administrative apparatus of the state and defining the terms of reference of the Ministry of Land Affairs	المرسوم السلطاني رقم (1975/26) بإصدار قانون تنظيم الجهاز الإداري للدولة وحدد اختصاصات وزارة شؤون الأراضي	Royal Decree 26/1075	28-Jun-1975		
6	Statement of the real estate registration fees	بيان رسوم التسجيل العقاري	Ministry decree 10/76; 26/83	1-Jan-1976	Ministry of Land Affairs & Municipalities	
7	The Royal Decree No. (17/1976) was issued to make some amendments to the organizational structure of the ministry where its name became the Ministry of Lands and Municipalities Affairs	المرسوم السلطاني رقم 1976/17 بإجراء بعض التعديلات على الهيكل التنظيمي للوزارة ليصبح مسماها وزارة شؤون الأراضي والبلديات وألت إليها مسؤولية الإشراف على شؤون بلدية مسقط والبلديات الإقليمية	Royal Decree 17/1976	7-Jun-1976		

8	The establishment of the Housing Bank of Oman (the heir to the Oman National Company for Housing Development)	تأسيس بنك الإسكان العماني وريثا للشركة الوطنية العمانية للإئماء الإسكاني	Royal decree 51/77	1-Jan-1977	
9	Social housing law and its amendments	قانون المساكن الإجتماعية وتعديلاته	Royal Decree 35/77; 27/88; 92/88	1-Jan-1977	
10	Local Ordinance No: (10) issued on 16/4/1977 in respect to the organization and control of advertisements		Local Ordinance No: (10)/1977	16-Apr-1977	Muscat Municipality
11	The Land Law promulgated under Royal Decree no. 5/80 and amendments thereto;	قانون الأراضي	Royal Decree 5/80	1-Jan-1980	
12	Regulations issued by Royal Decree No. (5) for the year 1980, the Land Act	إصدار اللائحة التنفيذية للمرسوم السلطاني رقم (5) لسنة 1980 في شأن قانون الأراضي	Ministry decree 17/80	1-Jan-1980	Ministry of Land Affairs & Municipalities
13	Regulation of buildings	شأن تنظيم المباني	Ministry decree 40/81	1-Jan-1981	Ministry of Housing
14	Royal Decree No. 5/81 To Organize Usufruct over the Sultanate's Landsments thereto	مرسوم سلطاني بتنظيم الإنتفاع بأراضي السلطنة	Royal Decree 5/81	13-Jan-1981	
15	The Royal Decree No. (48/1982) was promulgated appending the Ministry of Public Works to the Ministry of Lands and Municipalities Affairs to become a directorate general in the name of (the Directorate of Public Works)	المرسوم السلطاني رقم (1982/48) بالحاق وزارة الأشغال العامة بوزارة شؤون الأراضي والبلديات لتصبح مديرية عامة بإسم (مديرية الأشغال العامة) تقوم بالإشراف على تنفيذ الإنشاءات التي تكلفها بها الوزارات والوحدات الحكومية المختلفة	Royal Decree 48/1982	1-Jun-1982	
16	Royal Decree No. 88/82 To Endorse the Executive Regulation of the Law Regarding Organization of Usufruct over the Sultanate's Lands	المرسوم السلطاني بإعتماد اللائحة التنفيذية لقانون تنظيم الإنتفاع بأراضي السلطنة	Royal Decree 88/82	8-Nov-1982	
17	Royal Decree NO :77/84 Law of regulating Muscat Municipality and its amendments		Royal Decree NO :77/84	1-Jan-1984	
18	The Governmental Lands Entitlement System promulgated by the Royal Decree No. 81/84	نظام استحقاق الأراضي الحكومية	Royal Decree 81/84 - ratified by royal	1-Jan-1984	

decree 38/1989				
19	The Royal Decree No. (18/1984) – responsibility for supervision was transferred to the Municipality of the Capital which supervised by the Diwan of Royal Court	المرسوم السلطاني بنقل مسؤولية الإشراف على بلدية العاصمة عن الوزارة، ليشراف ديوان البلاط السلطاني على مهامها	Royal Decree 18/1984	1-Mar-1984
20	The Royal Decree – responsibility for supervision of urban planning in Sohar was transferred to the Diwan of Royal Court	المرسوم السلطاني بإسناد مسؤولية الإشراف على التخطيط العمراني في ولاية صحار إلى ديوان البلاط السلطاني	Royal Decree No. 11/85	1-Jan-1985
21	The Royal Decree No. (2 / 1985) was promulgated establishing the Ministry of Regional Municipalities, devolving the powers ascribed to the Ministry of Lands and Municipalities Affairs.. And the name of the ministry became, the “Ministry of Land Affairs	المرسوم السلطاني رقم(2/1985) بإنشاء وزارة شئون البلديات الإقليمية للنهوض بالخدمات البلدية في المناطق والولايات المختلفة وتوكل إليها الصلاحيات التي كانت مقررة لوزارة شئون الأراضي والبلديات في مجال البلديات الإقليمية وأصبح مسمى الوزارة "وزارة شؤون الأراضي"	Royal Decree 2/1985	1-Jan-1985
22	The Royal Decree No. (10/1985) was promulgated to amend the name of the Ministry of Land Affairs to become the Ministry of Housing entrusted with the same terms of reference ascribed to the Ministry of Land Affairs	المرسوم السلطاني رقم(10/1985) بتعديل مسمى وزارة شئون الأراضي ليصبح وزارة الإسكان ويوكل إليها نفس الاختصاصات المقررة لوزارة شئون الأراضي	Royal Decree 19/1985	8-Jan-1985
23	Royal Decree to create Supreme Committee for Town Planning		Royal Decree 27/85	24-Feb-1985
24	Local Ordinance concerning the amendments of some of the rules of the local Ordinance Concerning imposing the revenues of the Municipality on the value of the consumption of electricity in the Capital Area		Local Ordinance No 16/85	15-Jun-1985 Muscat Municipality

25	Policies establishing the regulations for ownership of expropriated land valuation for the public benefit and the regulations of pricing of government land	سياسات أسس تقيم الأراضي المنزوعة ملكيتها للمنفعة العامة وأسس تسعير الأراضي الحكومية	Decree 1/85	31-Aug-1985	SCTP
26	Pricing of government land in the states and remote areas	تحديد أسعار الأراضي الحكومية بالولايات والمناطق النائية	Ministry decree: 23/86, 106/87, 149/91, 51/92, 52/93	1-Jan-1986	Ministry of Housing
27	General framework for the preparation of the general policy of the Town Planning	الإطار العام لإعداد السياسة العامة لتخطيط المدن	Decree (3/86)	25-Jun-1986	SCTP
28	ROYAL DECREE No. 78/86 ISSUING THE LAW REGULATING BROKERAGE PROFESSION IN REAL ESTATE ACTIVITIES	مرسوم سلطاني بإصدار قانون تنظيم أعمال الوساطة في المجالات العقارية	Royal Decree 78/86	18-Oct-1986	
29	Approve the establishment of the Geographic Information System	الموافقة على إنشاء نظام المعلومات الجغرافية	decree 3/86	26-Nov-1986	SCTP
30	The by-laws of housing assistance	لائحة المساعدات السكنية	Ministry decree 168/87 and ratified by 142/91	1-Jan-1987	Ministry of Housing
31	Policies for urban development along roads	سياسات التنمية العمرانية على امتداد الطرق	decree 16/87	1-Jul-1987	SCTP
32	Policies and regulations for the provision of filling stations	سياسات وأسس توفير محطات تعبئة الوقود	decree 16/78	1-Jul-1987	SCTP
33	Owners of the Social Security exemption from all fees relating to land	إعفاء أصحاب الضمان الاجتماعي من كافة الرسوم المتعلقة بالأراضي	Ministry decree 160/88	1-Jan-1988	Ministry of Housing
34	The formation of committees of Land Affairs and the Committee of Appeal	تشكيل لجان شؤون الأراضي ولجنة الاستئناف	Ministry decree 44/88	1-Jan-1988	Ministry of Housing
35	The council of Ministers approves the general framework for developing the general policy of town planning	اعتمد مجلس الوزراء الإطار العام لإعداد السياسة العامة لتخطيط المدن	Cabinet Decision 6/88	5-Apr-1988	Council of Ministers
36	Determining the Planning areas and the main centers	تحديد المناطق التخطيطية ومراكزها الرئيسية	decree 6/88	5-Apr-1988	Council of Ministers
37	General framework for the preparation of the general policy of the Town Plan	الإطار العام لإعداد السياسة العامة لتخطيط المدن	Decree (6/88)	5-Apr-1988	Council of Ministers

38	Determining the Planning areas and the main centers	تحديد المناطق التخطيطية ومراكزها الرئيسية	Decree 3/88	14-Apr-1988	SCTP
39	Proposals for the protection of temporary construction of flood risk	ألمقترحات المؤقتة لحماية العمران من مخاطر الفيضانات	Decree 5/88	1-Oct-1988	SCTP
40	Provisions of the division of land prepared for building	أحكام تقسيم الأراضي المعدة للبناء	Ministry decree 163/88	28-Dec-1988	Ministry of Housing
41	System of land distribution	نظام توزيع الأراضي	Ministry decree 26/89, 48/89	1-Jan-1989	Ministry of Housing
42	Provisions to address the temporary restrictions on urban development	الأحكام المؤقتة لمعالجة القيود الموضوعة على التنمية العمرانية	decree 11/89	14-Jan-1989	SCTP
43	Royal Decree No. (48/89) To promulgate Apartments and Levels Ownership Act	مرسوم سلطاني بإصدار نظام تملك الشقق والطبقات	Royal Decree 48/1989	20-Mar-1989	
44	Executive Regulation of the Apartments, Levels and Shops Ownership Act issued under Ministerial Resolution No. 50/89	أحكام اللائحة التنفيذية لنظام تملك الشقق والطبقات والبناء	Ministerial Resolution No. 50/89	28-Mar-1989	Ministry of Housing
45	Decision on Building Permits	قرار بشأن إباحات البناء	Ministry decree 21/90	1-Jan-1990	Ministry of Regional Municipalities and Environment
46	Regulations to determine the main roads right of ways	القواعد المنظمة لتحديد احرامات الطرق الرئيسية	Decree 19/90	9-May-1990	SCTP
47	Regulations to determine right of ways for shores of the sea	القواعد المنظمة لتحديد احرامات شواطئ البحر	decree 20/90	9-May-1990	SCTP
48	Local Ordinance of determining colors that distinguish water transportation vehicles		Local Ordinance 21/90	23-Jul-1990	Muscat Municipality
49	The by-laws of affordable housing loans to low-income	لائحة القروض السكنية الميسرة لذوي الدخل المحدود	Ministry decree 50/91; ratified by 141/91	1-Jan-1991	Ministry of Housing
50	Royal Decree NO. 6/91 regarding the approval of the administrative division of the Sultanate and its amendments		Royal Decree NO. 6/91	1-Jan-1991	
51	A decision on the real estate registration fees	قرار بشأن رسوم التسجيل العقاري	Ministry decree 5/91	1-Jan-1991	Ministry of Housing
52	Local Ordinance No: 22/91 regarding the		Local Ordinance	1-Jan-1991	Muscat

	protection of Public Health		No: 22/91		Municipality
53	SCTP approves the criteria for urban planning	اعتمدت اللجنة العليا لتخطيط المدن معايير التخطيط العمراني	SCTP decision 9/91	6-Oct-1991	SCTP
54	local ordinance in respect to the breeding animals in the limits and boundaries of Muscat Municipality		Local ordinance no 24/91	5-Nov-1991	Muscat Municipality
55	Applications for government land grants	طلبات منح الأراضي الحكومية	Ministry decree: 38/92, 89/93, 110/94	1-Jan-1992	Ministry of Housing
56	Local Ordinance No: 23/92 for arranging buildings in Muscat and its amendments		Local Ordinance No: 23/92	1-Jan-1992	Muscat Municipality
57	Royal Decree for issuing Muscat Municipality law		Royal Decree 8/92	8-Feb-1992	
58	Local Order No. 23/92 Building Regulation For Muscat		Local Order No. 23/92	12-Apr-1992	Muscat Municipality
59	Local ordinance concerning the organization and control of advertisements		Local Ordinance no 25/93	1-Jan-1993	Muscat Municipality
60	Royal Decree amending the terms of reference of SCTP to undertake the role of drafting and developing the general policy for urban planning	المرسوم السلطاني المعدل لإختصاصات اللجنة العليا لتخطيط المدن لتتولى رسم وإعداد السياسة العامة لتخطيط المدن	Royal Decree 70/93	1-Jan-1993	
61	Technical Committee formed to study the implementation steps for the sewage system for the ten cities in the regions of the Sultanate	اللجنة الفنية المشكلة لدراسة الخطوات التنفيذية لنظام الصرف الصحي لعشر مدن في مناطق السلطنة	decree 32/94	1-Jan-1994	SCTP
62	Local Ordinance No. 27/94 Concerning the development of the Municipality revenues and its amendments		Local Ordinance No. 27/94	1-Jan-1994	Muscat Municipality
63	The Ministerial Committee formed to take over the executive to take steps to project the sewage system in Salalah	اللجنة الوزارية المشكلة لتتولى اتخاذ الخطوات التنفيذية لمشروع نظام الصرف الصحي في صلالة	decree 10/94	1-Jan-1994	SCTP

64	Committee formed to study the means of protection to reduce the risk of flooding to areas of existing and new	اللجنة المشكلة لدراسة وسائل الحماية للحد من مخاطر الفيضانات على المناطق القائمة والجديدة	Decree 21/94	1-Jan-1994	SCTP
65	Committee formed to study the development of a uniform system of numbering and addressing and the possibility of linking GIS	اللجنة المشكلة لدراسة وضع نظام موحد للترقيم والعنونة وإمكانية ربطه بنظام المعلومات الجغرافية	decree 26/94	1-Jan-1994	SCTP
66	The committee formed to propose solutions in the short term to address the problem of coastal erosion in coastal areas and prioritize areas	اللجنة المشكلة لإقتراح الحلول على المدى القصير لمعالجة مشكلة تآكل الشواطئ في المناطق الساحلية وتحديد أولويات المناطق	decree 33/94	1-Jan-1994	SCTP
67	The Ministerial Committee formed to take over the review of the financial plan, administrative and executive steps to take sanitary drainage project for the governorate of Muscat	اللجنة الوزارية المشكلة لتولي مراجعة الخطة المالية والإدارية واتخاذ الخطوات التنفيذية لمشروع الصرف الصحي لمحافظة مسقط	Order 10/94	1-Jan-1994	SCTP
68	Administrative Circular No. 1/94 Basis of Compensation	تعميم إداري بشأن أسس التعويض	Administrative Circular No. 1/94	22-Mar-1994	Ministry of Housing
69	Ministerial decision on the division of land and the provision of services	قرار وزاري بشأن تقسيم الأراضي وتوفير الخدمات	Ministerial decision 132/94	10-Jul-1994	Ministry of Housing
70	Local Ordinance No.29/95 Regulating &controlling the slaughtering and skinning of animals Ordinance no. 31/96 Regarding Taxi work at Muscat Governorate		Local Ordinance No.29/95	1-Jan-1995	Muscat Municipality
71	Rules governing the application of thermal insulation in buildings	القواعد المنظمة لتطبيق نظام العزل الحراري في المباني	decree 3/95	22-Jan-1995	
72	Local Ordinance No. 32/97 Regarding Protection of the utilities belong to Muscat Municipality		Local Ordinance No. 32/97	1-Jan-1997	Muscat Municipality
73	Local ordinance concerning the amendment of local ordinance no 24/91		Local Ordinance No 35/98	1-Jan-1998	Muscat Municipality
74	Ordinance NO. 34/98 Regarding arranging use of Taxi meter Working at A' Seeb International Airport		Ordinance NO. 34/98	1-Jan-1998	Muscat Municipality

75	Royal Decree No. 2/98 To Promulgate the Property Registry Act	نظام السجل العقاري	Royal Decree 2/98	1-Jan-1998	
76	Ordinance NO. 1/99 Regarding Arranging Building Naming at Muscat Governorate		Ordinance NO. 1/99	1-Jan-1999	Muscat Municipality
77	Regulations to determine right of ways for oil pipelines and gas	القواعد المنظمة لتحديد احرامات خطوط أنابيب النفط والغاز	Royal decree 2/99	3-Jan-1999	
78	Ministerial Resolution No. 29/99 To issue the Executive Regulation of the Property Registry Act Promulgated under Royal Decree No. 2/98		Ministerial Resolution No. 29/99	5-Sep-1999	Ministry of Housing
79	Royal Decree granting extension of loans and housing assistance for low income people	مرسوم سلطاني باستمرار منح القروض والمساعدات السكنية لذوي الدخل المحدود	Royal Decree 24/2000	1-Jan-2000	
80	The Royal Decree No. 20/2000 Regulating Ownership of Real Estate by GCC Citizens in the Member States	المرسوم السلطاني بتنظيم تملك العقار لمواطني دول مجلس التعاون لدول الخليج العربية	Royal Decree 20/2000	1-Jan-2000	
81	The Royal Decree No. (10/2000) was promulgated merging the Ministries of Transport and Housing in one ministry called (the Ministry of Transport and Housing	المرسوم السلطاني رقم (2000/10) بدمج وزارتي المواصلات والإسكان في وزارة واحدة تسمى (وزارة النقل والإسكان)	Royal Decree 10/2000	25-Jan-2000	
82	The Royal Decree to separate the transport sector from the ministry to be merged to the Ministry of Transport and Communications while electricity, water sectors were added to the housing sector to form Ministry of Housing, Electricity and Water.	المرسوم السلطاني رقم (2001/47) بفصل قطاع النقل عن الوزارة ليضم إلى وزارة النقل والاتصالات، وأضيف إلى الإسكان الكهرباء والمياه ليصبح مسماها وزارة الإسكان والكهرباء والمياه	Royal Decree 47/2001	14-May-2001	
83	Local Ordinance No.2/2001 Amending of the Local ordinance No. 27/94 concerning the development of the municipality's revenues		Local Ordinance No.2/2001	7-Aug-2001	Muscat Municipality
84	Local Ordinance NO. 1/2001 Regarding Regulating the Markets at Muscat Governorate		Local Ordinance NO. 1/2001	7-Aug-2001	Muscat Municipality

85	Ordinance NO. 14/2003 For Delegation of Jurisdiction Control to some of Muscat Municipality Employees	Ordinance NO. 14/2003	1-Jan-2003	Muscat Municipality
86	Ministerial decision to grant some of the technical mandates	القرار الوزاري بمنح بعض التفويضات الفنية Ministerial decision 159/2003	1-Jan-2003	Ministry of Housing
87	Royal Decree specifying the terms of reference of the Ministry of Housing, Electricity and Water and the approval of its organizational structure	المرسوم السلطاني بتحديد اختصاصات وزارة الإسكان والكهرباء والمياه واعتماد هيكلها التنظيمي Royal Decree 5/2003	1-Jan-2003	
88	Royal Decree No.21/2004 Regulating Ownership of Real Estate by GCC Citizens in the Member States	المرسوم السلطاني بتنظيم تملك مواطني دول مجلس التعاون لدول الخليج العربية للعقار في الدول الأعضاء Royal Decree 21/2004	11-Feb-2004	
89	Ministerial Decision No (63/2006) Regarding the Rules of Granting an Extension	قرار وزاري بشأن ضوابط منح الإمتداد Ministerial Decision No (63/2006)	23-Jun-2004	Ministry of Housing
90	Ministerial Decision no 160/2004 with regard to the technical authorization	قرار وزاري بالتفويض في التوقيع على المخططات وتغيير الإستعمالات والدمج والتقسيم والإمتداد والتعويض Ministerial Decision no 160/2004	23-Jun-2004	Ministry of Housing
91	Local Ordinance No:2/2004 Concerning the amendment of Local Ordinance No: 24/91 on arranging the breeding of animals in the limits and boundaries of Muscat Municipality	Local Ordinance No:2/2004	31-Aug-2004	Muscat Municipality
92	Local ordinance concerning the amendment of local ordinance no 24/91	Local Ordinance No 2/2004	31-Aug-2004	Muscat Municipality
93	Local Ordinance NO. 1/2005 On the amendment of the Local Ordinance No: 23/92 for arranging buildings in Muscat and its amendments	Local Ordinance N O. 1/2005	11-Jul-2005	Muscat Municipality
94	Local Ordinance NO. 3/2005 On the amendment of the Local Ordinance No: 33/97 for arranging the use of public parking against fixed fees	Local Ordinance NO. 3/2005	10-Aug-2005	Muscat Municipality

95	Royal Decree No. 12/2006 to Promulgate the Real Estate Ownership Act in the Integrated Tourism Complexes		Royal Decree No. 12/2006	19-Feb-2006	
96	Local Ordinance NO. 1/2006 Regarding the protection of Public Health		Local Ordinance NO. 1/2006	21-Aug-2006	Muscat Municipality
97	Circular dated 2-6-2007 Request for Extension that hinders Access of Services	التعميم بشأن عدم جواز النظر في طلب الإمتداد الذي يعيق وصول الخدمات	Circular dated 2-6-2007	6-Feb-2007	Ministry of Housing
98	Circular dated 18-2-2007 Regulations for Granting Extensions	تعميم بشأن ضوابط منح الإمتدادات وتخصيصها	Circular dated 18-2-2007	18-Feb-2007	Ministry of Housing
99	Circular dated 25-3-2007 Regulations for Changing Land Use and Extension Requests	تعميم بشأن ضوابط طلبات تغيير الإستعمال والإمتداد	Circular dated 25-3-2007	25-Mar-2007	Ministry of Housing
100	Circular dated 25-3-2007 Regulations for the Use of Lands as Hotel Apartments, and for Granting Extension	التعميم بشأن ضوابط الإستعمال للشقق الفندقية ومنح الإمتداد	Circular dated 25-3-2007	25-Mar-2007	Ministry of Housing
101	SCTP approves the policy for determining the building heights in the Sultanate	سياسة تحديد ارتفاعات المباني في السلطنة		1-May-2007	SCTP
102	The Royal Decree No. (93/2007) was promulgated to amend the name of the Ministry of Housing, Electricity and Water to the name of the Ministry of Housing	المرسوم السلطاني رقم (93/2007) ليعدل مسمى وزارة الإسكان والكهرباء والمياه إلى مسمى وزارة الإسكان	Royal Decree 93/2007	9-Sep-2007	
103	Ministerial Decision No. 191/2007 Issuing the Executive Regulations of the Real Estate Ownership Act in Integrated Tourism Complexes	اللائحة التنفيذية لنظام تملك العقارات في المجمعات السياحية المتكاملة	Ministerial Decision No. 191/2007	19-Sep-2007	Ministry of Housing
104	Ministerial Decision No. 69/2008 Regarding Agricultural Lands	القرار الوزاري بشأن الأراضي الزراعية	Ministerial Decision No. 69/2008	1-Jan-2008	Ministry of Housing
105	Ministerial Decision No: 28/2008 Concerning the Ministerial Decision NO. 14/2003 For Delegation of Jurisdiction Control to some of Muscat Municipality Employees		Ministerial Decision No: 28/2008	1-Jan-2008	Muscat Municipality

106	Local Ordinance concerning the amendment of some rules arranging the relationship between the landlords of residential, commercial and industrial premises and the registration of their tenancy contracts issued under royal decree no 6/89		Local Ordinance no 72/2008	1-Jan-2008	
107	the Royal Decree No. 3 / 2008 for the Terms of Reference of the Ministry of Housing and the adoption of its organizational structure	المرسوم السلطاني بتحديد اختصاصات وزارة الإسكان واعتماد هيكلها التنظيمي	Royal Decree No. 3 / 2008	1-Jan-2008	
108	Committee formed to address the situation of white agricultural land	اللجنة المشكلة لمعالجة أوضاع الأراضي الزراعية البيضاء		2-Apr-2008	Ministry of Housing
109	Local Ordinance NO.2/2008 On the amendment of Local Ordinance NO: 3/2001 Regarding Rendering of Narghile at Coffee shops		Local Ordinance NO.2/2008	5-Apr-2008	Muscat Municipality
110	Ministerial Circulation No. 4/2008 Regarding Allocation of Government Lands to the Government Sector and Public Utilities	تعميم وزاري بشأن تخصيص الأراضي الحكومية للقطاع الحكومي والمرافق العامة	Ministerial Circulation No. 4/2008	8-Jun-2008	Ministry of Housing
111	Ministerial circular (No. 6 / 2008) on How to Deal with Land Applications that have not been Followed up	تعميم وزاري بشأن كيفية التعامل مع طلبات الأراضي التي لم يراجع أصحابها بشأنها	Ministerial circular (No. 6 / 2008)	11-Nov-2008	Ministry of Housing
112	ROYAL DECREE NO. 37/2010 ISSUING THE SOCIAL HOUSING LAW	مرسوم سلطاني بإصدار قانون الإسكان الإجتماعي	Royal Decree 37/2010	14-Apr-2010	
113	Ministerial Decision No. 114 / 2010 Rules of Allocating Government Lands for Public Halls	قرار الوزاري رقم 114 / 2010 بشأن تخصيص الأراضي الحكومية للمجالس العامة	Ministerial Decision No. 114 / 2010	30-Oct-2010	Ministry of Housing
114	Ministerial decision to issue the executive regulations of the Social Housing Act	قرار وزاري بإصدار اللائحة التنفيذية لقانون الإسكان الإجتماعي	Ministerial decision 6/2011	15-Jan-2011	Ministry of Housing

APPENDIX D: USD ANALYSIS IN LITERATURE

			1	2	3	4	5	6	7	8	9
No	Reference Details	Year	Urban Planning	Urban Infrastructure	Urban Economy	Urban Environment	Urban Culture	Urban Mobility	Urban Management	Urban Quality	Urban Resources
1	Brundtland Commission	1983			economic growth without damage to the environment	environmental protection	social equity				
2	<i>dwelling version of BREEAM, Ecohomes has 7 categories:</i> BREEAM (Building Research Establishment Environmental Assessment Method)	1990	land use	energy performance water use health		ecological considerations pollution reduction noise reduction		transport (access to public transport & local amenities)		daylight well-being	material issues
3	<i>Target values and benchmarks:</i> Green paper on the Urban Development, published by European Commission in Brussels CEC 1990	1990		Achieving energy efficiency managing waste, waste water and pollution		reducing CO2 omission improving river water quality					
4	<i>Principles of green architecture</i> from Green Architecture: Design for an Energy-Conscious Future 1991 by Brenda and Robert Vale	1991	respect for site	conserving energy		working with climate	respect for users		holism		minimizing new resources
5	<i>Goals to make cities more sustainable.</i> European Environment Agency	1995		protecting the health of the urban population			Maintaining cultural and social diversity Ensuring equal access to resources and services		rationalising and efficiently managing urban flows		minimising the consumption of space and natural resources
6	<i>Key characteristics of urban sustainability</i> from Urban Sustainability Reporting - Journal of the American Planning Association 1996 by Virginia Maclaren	1996		satisfaction of basic human needs	economic vitality & diversity	protection of natural environment	intergenerational equity intragenerational equity community self-reliance			individual well-being	minimal use of non-renewable resources
7	<i>Urban Planning in Curitiba</i> from Scientific American by Jones Rabinovitch & Josef Leitman	1996				working with environment	innovation with citizen participation in place of master planning participation through inventive	public transportation priority to public transport		appropriate rather than high-tech	

			1	2	3	4	5	6	7	8	9
No	Reference Details	Year	Urban Planning	Urban Infrastructure	Urban Economy	Urban Environment	Urban Culture	Urban Mobility	Urban Management	Urban Quality	Urban Resources
8	BEES - building for Environmental and Economic Sustainability System (USA) by the National Institute of Standards and Technology	1998		water intake Human health	first cost Future costs	global warming Acidification Habitat alteration Air pollutants smog Ozone depletion Ecological Toxicity				Indoor air quality	Fossil Fuel Depletion
9	<i>Key principles of urban design</i> Towards an Urban Renaissance Final Report of the Urban Task Force	1999	site & setting context, scale, character optimizing land use & density sustainable buildings			environmental sustainability	mixing activities mixing tenures	access & permeability		building to last public realm	
10	<i>Intelligent City Indicators</i> by urban development consultancy Landonomics	2000			Economy	Environment		Accessibility	Property		
11	<i>dimensions of the sustainable cities - Urban Future 21 - A global agenda for 21st century cities</i> by Peter Hall & Ulrich Pfeifer	2000		sustainable urban shelter	sustainable urban economy	sustainable urban environment	sustainable urban society sustainable urban democracy	sustainable urban access		sustainable urban life	
12	<i>4 key measures of sustainable communities</i> from Sustainable Communities and Sustainable Development - a review of the sustainable communities plan by Prof Anne Power, London School of Economics	2000	how we plan and design where we live; at what density, and with how much open space	how much energy we use and what impact our demands make on the environment	how we develop jobs and skills to ensure economic prosperity	what support we provide to communities and how we manage neighbourhood environments					
13	ESTIDAMA PEARL RATING SYSTEM (ABU DHABI)	2001		precious water resourceful energy		living systems				liveable cities	stewarding material
14	<i>Promoting Action for Sustainability Through Indicators at the Local Level in Europe</i> (PASTILLE 10) indicators by The London School of Economics	2002	public open areas sustainable land use	satisfaction with local community services		local contribution to global climatic change noise pollution		local mobility & passenger transportation, children school journey	sustainable management of local authority	local outdoor air quality	availability of products promoting sustainability
15	PROPOLIS indicator system in Modelling Policies for Urban Sustainability <i>by Kari Lautso, Klaus Spiekermann and Michael Wegener</i>	2002		health		air pollution environmental quality global climate change	equity opportunities	total net-benefit from transport accessibility & traffic			Consumption of natural resources
16	<i>Planning for sustainability in European cities: a review of practices in leading cities</i> <i>by Timothy Beatley</i>	2003	compact cities and regions green urbanism: compact & ecological			greening the urban environment		sustainable mobility thinking beyond the automobile building pedestrian cities,	green cities, green governance	expanding the public realm	renewable energy and closed-loop cities

			1	2	3	4	5	6	7	8	9
No	Reference Details	Year	Urban Planning	Urban Infrastructure	Urban Economy	Urban Environment	Urban Culture	Urban Mobility	Urban Management	Urban Quality	Urban Resources
17	<i>Public places, urban spaces: the dimensions of urban design</i> by Matthew Carmona	2003	morphological dimension	Functional dimension?			Social dimension temporal dimension?			perceptual dimension visual dimension	
18	<i>The eco-city: ten key transport and planning dimensions for sustainable city development</i> article in Environment and Urbanization April 2006 by Jeffery Kenworthy	2006	compact, mixed-use urban form physical structure and urban design high-quality public realm	use of environmental technologies for water energy waste management	economic performance of the city and employment creation	protects the natural environment, biodiversity & food-producing areas closed loop systems	public culture, community equity and good governance personalized for human needs	Freeway and road infrastructure are de-emphasized in favour of transit, walking and cycling infrastructure	"debate and decide" process, not a "predict and provide"	innovation, creativity and the uniqueness legible, permeable, robust, varied, rich, visually appropriate	hinterland provide a major proportion of its food needs
19	Abu Dhabi 2030	2007	urban structure		economic development	Unique environment	evolving culture identity & opportunity identity & imageability (community making)	connectivity		excellence & liveability	Sustainability (resource efficiency)
20	LEIPZIG Charter on Sustainable European Cities	2007		modernizing infrastructure networks; improving energy efficiency; proactive education and training for children & young people; Proactive innovation & educational policies	strengthening local economy; strengthening local labour; market policy; long-term stability		attention to deprived neighbourhoods	promotion of efficient and affordable urban transport	integrated urban development policy approaches Strategies for upgrading the physical environment Perform local tasks in a responsible manner	creating and ensuring high-quality public spaces	
21	<i>Dimensions of urban sustainability</i> from the Sustainable Urban Development Reader by Stephen Wheeler & Timothy Beatley	2008	land use & urban design architecture building construction practices	energy	local economic development	urban ecology & restoration environmental justice	social equity	transportation			resource use
22	<i>4 core ZED principles</i> ZED: Zero Energy Development from the ZED Book by Bill Dunster, Craig Simmons and Bobby Gilbert	2008				make carbon history				enable a high quality life on a low footprint	design out fossil fuels reduce demand-run on native renewables
23	<i>5 dimensions of urban sustainability attributes</i> William Budd et al	2008	counter measures to urban sprawl	public health	economic vitality	environmental quality			Official planning activities and policies		
24	Syrian Urban Development Policy	2009	Urban Planning Urban Informality	Urban Services	Urban Economy	Urban Environment	Urban Identity				

			1	2	3	4	5	6	7	8	9
No	Reference Details	Year	Urban Planning	Urban Infrastructure	Urban Economy	Urban Environment	Urban Culture	Urban Mobility	Urban Management	Urban Quality	Urban Resources
25	Jeddah Strategic Plan	2009	Urban Territory & settlement patterns Unplanned settlements Waterfront management Open space & leisure	Social Services Infrastructure Housing	Local Economy Tourism	Environment	Culture & Heritage	Transportation	Management	Urban Quality	
26	<i>guiding principles towards a sustainable city</i> <i>from rebuilding lower Manhattan by</i> <i>Beverly Willis</i>	??			productivity	sustainability	self determination & inclusion arts & culture Memorialization diversity	efficient transportation	decentralization	liveability & balance	
27	The BREEAM Gulf Scheme	??	land use	energy water waste health		ecology pollution		transport	management	well-being	materials
28	The BREEAM Communities - UK	??	buildings	energy	business	Climate change ecology	community	transport & movement		place making	resources
29	The Green Building Rating Standard (LEED: Green Building Council's leadership in Energy and Environmental Design)	??	sustainable sites	water efficiency energy		atmosphere		Transportation		innovation & design process indoor environmental quality	materials & resources
30	Quality of Life factors / indicators	??	green space	amenities		clean air	community	walkability		safety	
31	<i>12 vitally important sustainability dimensions</i> Inbuilt's Framework FOR SUSTAINABLE DEVELOPMENT	??	Land Use	Energy Waste Water	Economics	Biodiversity Quality of Environment		Transport & Movement	Management	Happiness & well-being Quality Design & Future Proofing	Materials
32	<i>how to create sustainable settlements and sustainable communities</i> The UK Millennium villages	??			the community should be commercially viable	local environment capital should be protected	equity and social inclusion should be increased participation in governance should be as broad as possible integration			design quality should be high	resources consumption should be minimized
33	<i>Sustainability Checks for development</i> - developed framework at the UK Building Research Establishment	??	land use, urban form and design Buildings (use of BREAM ratings)	energy (generation and street lighting)	Business (opportunity, employment and training)	ecology (conservation, site enhancement and planting)	community (involvement and measures to reduce crime)	Transport: public, parking, pedestrian cyclists, etc.			natural resources (local materials, air quality, water, drainage and composting)
	Total (out of 42)		19	24	18	30	20	20	12	22	19

APPENDIX E: LIST OF QUESTIONS FOR INTERVIEWS

#	USD	Type of Questions	Arabic	Questions	Prompt	Key concerns	Aims & Objectives	Strategy
1	Settlement Patterns	Strategy / Implementation (Past)	ما هي الاستراتيجيات الرئيسية التي تتحكم في أنماط الاستيطان في المناطق الحضرية في مسقط؟	What are the main strategies that control urban settlement patterns in Muscat?	Urban growth and urban sprawl	dispersed population; linear urban development; dispersal of urban functions; ribbon development; Urban Sprawl, growth & physical expansion	Development of a distinct centrality pattern; Connecting urban settlements	Muscat City Plan (1973, Makiya Assoc., John R. Harris), Greater Muttrah Plan (1972, VIAK), Muscat Struct. Plan 1977 (Llewelyn – Davies), CASP 1982, Muscat Area Structure Plan 1989, Muscat Regional Plan 1989, Oman National Spatial Strategy (ONSS)
2		Barriers / Drivers (Current)	ما هي التحديات الرئيسية التي تواجه نمط الاستيطان الحضري الحالي في مسقط؟	What are the key challenges with the current urban settlement pattern in Muscat?				
3		Recommendations (Future)	هل من الممكن للتنمية الشريطية في مسقط أن تصبح فرصة لتحقيق الاستدامة في المستقبل؟ إذا كان الأمر كذلك، كيف؟ إذا لم يكن كذلك، لماذا لا؟	Is it possible for ribbon development in Muscat to become an opportunity for sustainability in the future? If so, how? If not, why not?				
4	Urban Design	Strategy / Implementation (Past)	كيف يتم تنفيذ التصميم الحضري، ومن المسؤول عن تنفيذه؟	How is urban design implemented and who is responsible for its implementation?	Urban Planning, Density, mixed-use, urban Structure, physical structure, urban form, Spatial Development	inappropriate and unsympathetic application of Western design; design guide; The outdated of the existing spatial plans; Low density urban form	to establish size, distance & functional relationships among all old & current development areas; urban expansion possibilities; strategic development; design criteria; sustainable spatial development; balanced urban growth	Building regulations – Ministerial decision no 40/81, Planning policies (1988, SCTP), Manual for Urban Planning (دليل التخطيط) العمراني, 1991 SCTP), Building Regulations for Muscat (1992), Elevational Guidelines for Shati al Qurm Area (1992)
5		Barriers / Drivers (Current)	ما الذي يمكن أن يعيق التنفيذ الناجح للتنمية المكانية المستدامة في مسقط؟	What would prevent the successful implementation of sustainable spatial development in Muscat?				
6		Recommendations (Future)	ما هي عناصر التصميم الحضري التي تحتاج إلى تحسين من أجل تحقيق مستقبل مستدام في المناطق الحضرية في مسقط؟	What are the elements of urban design that need to be improved in order to achieve a sustainable urban future in Muscat?				
7	Land Use	Strategy / Implementation (Past)	ما هي الإستراتيجية الحالية لإستخدام الأراضي في عمان وكيف يتم تنفيذها؟	What is the existing land use strategy in Oman and how is it implemented?	Land distribution, land use strategy	unsuitable location; land use conflicts; Land distribution system; isolated development , non-utilization of land, underutilization of land, land use restrictions	Organization of the land use structure; to provide a solid framework for land use strategy; achieve optimization in land allocation	Land Organization Law (Royal Decree 6/72), Land ownership Law (Royal Decree 5/80), Government Land entitlement system Law (Royal Decree 81/84)
8		Barriers / Drivers (Current)	ما هي العيوب الرئيسية لنظام استخدام الأراضي الحالي في عمان؟	What are the major disadvantages of the current land use system in Oman?				
9		Recommendations (Future)	ماذا ستغير في النظام الحالي لإستخدام الأراضي من أجل تحقيق الكفاءة في تخصيص الأراضي؟	What would you change about the current land use system in order to achieve optimization in land allocation?				
10	USD	Strategy / Implementation	ما هي الاستراتيجيات الرئيسية التي تتحكم توفير السكن في عمان، وكيف	What are the main strategies that govern the provision of	Shelter	housing demands, public housing, housing	enable housing strategies	Housing Study for Muscat (1981, Llewelyn

		n (Past)	يتم تنفيذها؟	housing in Oman and How are they implemented?		market, unsuitable housing conditions	implementation; adequate housing	- Davies Weeks), Muscat Area Housing Study (1989, Weidleplan & Muamir), Consultancy Study of development of policies Real Estate Sector in Oman (2009 Tender, لتطوير السياسات والإجراءات (في قطاع العقارات
11		Barriers Drivers (Current)	/ ما هي المشاكل الرئيسية التي تواجه قطاع الاسكان في مسقط؟	What are the main problems facing the housing sector in Muscat?				
12		Recommendations (Future)	ماذا ينبغي أن تكون الأهداف الرئيسية للاستراتيجيات المستقبلية لقطاع الإسكان في مسقط؟	What should be the main objectives for future strategies of the housing sector in Muscat?				
13	Energy (Electricity)	Strategy Implementation (Past)	/ ما هي الاستراتيجيات الحالية لقطاع الكهرباء في سلطنة عمان، وكيف يتم تنفيذها؟	What are the current strategies of the electricity sector in Oman and How are they implemented??	Conserving energy, performance, resourceful energy, efficiency	power quality; Insufficient power supply		Study on Renewable Energy Resources (2008, COWI and Partners LLC, Authority for Electricity Regulation)
14		Barriers Drivers (Current)	/ ما الذي يمنع تنفيذ مشاريع توليد الطاقة الكهربائية من خلال الطاقة المتجددة في عمان؟	What prevents the implementation of power generation through renewable energy in Oman?				
15		Recommendations (Future)	كيف يمكننا تحسين المحافظة على الطاقة في عمان؟	How could we improve energy conservation in Oman?				
16	Water Service	Strategy Implementation (Past)	/ ما هي الاستراتيجيات الحالية للإستدامة في استخدام المياه في عمان، وكيف يتم تنفيذها؟	What are the current strategies towards more sustainable use of water in Oman and How are they implemented?	Use, efficiency	criteria used for consumption and water main dimensions; water network efficiency		
17		Barriers Drivers (Current)	/ ما هو العوامل الدافعة والممانعة من الإستدامة في استخدام المياه؟	What are the main drivers and barriers towards sustainable use of water?				
18		Recommendations (Future)	كيف يمكننا تحسين المحافظة على المياه في عمان؟	How could we improve the conservation of water in Oman?				
19	Municipal Services	Strategy Implementation (Past)	/ ما هي الاستراتيجيات الحالية لخدمات البلدية في مسقط، وكيف يتم تنفيذها؟	What are the current strategies for municipal services in Muscat, and how are they implemented?	Urban Services, local community services, basic human needs, amenities, telecommunication	large part of the population is still inadequately supplied with development infrastructure; deficiency in provision of infrastructure and basic services	identify the strategic needs of the country in terms of infrastructure and services; completion of the infrastructure; necessary basic services	Muscat Wastewater Scheme Project (2003, khatib & Alami)
20		Barriers Drivers (Current)	/ ما هي المشاكل الرئيسية في توفير خدمات البلدية في مسقط؟	What are the main problems in provision of municipal services in Muscat?				
21		Recommendations (Future)	ماذا ينبغي أن يكون التركيز الرئيسي في المستقبل لتطوير خدمات البلدية في مسقط؟	What should be the main focus for future municipal services development in Muscat?				
22	Economic Development	Strategy Implementation (Past)	/ ما هي العلاقة بين التنمية الاقتصادية العمانية والتنمية الحضرية في مسقط؟	What is the relationship between Oman's economic development and Muscat urban development?	Economy, vitality, growth, efficiency, performance, public investment,	Limited national market, small market, Concentration of economic activities in Muscat, Consumption patterns, low level of	provide suitable conditions for economic development, Reinforcement of economic sectors with high growth potentials,	Sustainable Development Indicators (2006, Min of National Economy), The National Report on Implementation of
23		Barriers Drivers	/ ما هي العقبات الرئيسية في التخطيط الحضري التي تؤثر على نجاح	What are the major obstacles in urban planning that impact the				

		(Current)	التنمية الاقتصادية؟	success of economic development?	Private Sector, Economic Diversification	private savings, poor productivity, insufficient development of inter-regional linkages	stable macro-economic climate, create job opportunities for Omanis better spread of job opportunities	Agenda 21 o Sustainable Development – (2002, Min Regional Municipalities), Oman Vision 2020
24		Recommendations (Future)	ما هي الجوانب الرئيسية لتحسين التوازن بين النمو الاقتصادي والاستدامة الحضرية؟	What are the key aspects to improve the balance between economic growth and urban sustainability?				
25	Environmental Protection	Strategy / Implementation (Past)	ما هي أهم العوامل البيئية التي تؤخذ في عين الاعتبار في التنمية والتخطيط الحضري في مسقط؟	What are the most important aspects of the environment that are considered in urban planning and development of Muscat?	Urban environment, planning, justice, protection, quality, closed loop systems, restoration, ecology		Maintenance and rehabilitation of the environment, ecological balance, protection, nature conservation, harmony, secure spatial environmental quality and diversity	The National Plan of Action to Combat desertification in Oman (1993), National Strategy for Environmental Protection in Oman (1995, Min of Regional Municipality), CONVENTION ON BIOLOGICAL DIVERSITY (1997)
26		Barriers / Drivers (Current)	ما هي القيود التي تحد من حماية البيئة في مسقط؟	What are the constraints that limit urban environment protection in Muscat?				
27		Recommendations (Future)	ما الذي ينبغي القيام به بطريقة مختلفة لتحقيق التوازن والانسجام بين البيئة والتنمية الحضرية في مسقط؟	What should be done differently to achieve balance and harmony between the environment and urban development in Muscat?				
28	Climate Change	Strategy / Implementation (Past)	هل كان التغير المناخي ضمن أجندة التنمية الحضرية، وكيف تم أخذه في الاعتبار؟	Was climate change in the agenda of urban development, and how was it considered?				
29		Barriers / Drivers (Current)	ما هي جوانب التنمية الحضرية القائمة المهددة من أحداث التغيرات المناخية؟	What aspects of the existing urban development are threatened by climate change events?		Desertification, soil erosion, coastal erosion, flash flooding		
30		Recommendations (Future)	كيف ينبغي للحكومة أن تتعامل مع التغير المناخي في التنمية الحضرية المستقبلية؟	How should the government address climate change in future urban developments?				
31	Public Participation	Strategy / Implementation (Past)	ما هي الفرص التي كانت متاحة للجمهور للمشاركة في تخطيط وإدارة التنمية الحضرية في مسقط؟	What were the opportunities available for public participation in the planning and managing activities of urban development in Muscat?	Self-determination & inclusion, respect for users, opportunities, good governance, democracy			
32		Barriers / Drivers (Current)	لماذا تعتقد بأن هناك محدودية في مشاركة الجمهور في عملية التخطيط؟	Why do you think there is a limited public participation in the urban planning process?		Limited Public participation in the planning process	enhancing the participation of all resources	Municipal Council,
33		Recommendations (Future)	إذا كانت مشاركة الجمهور العام جزء لا يتجزأ من الاستدامة، كيف ينبغي لنا أن نغير السياسات الحالية من أجل تحسين مشاركة الجمهور؟	If public participation is an integral part of urban sustainability, how should we change our policies to improve public participation?				
34	Social – Equity	Strategy / Implementation (Past)	كيف وجهت الحكومة التوزيع العادل للاستثمارات الوطنية بين المناطق الجغرافية؟	How did the government address the equitable distribution of national	Social benefits, equal access, attention to	lack of equality and balance in distribution of loans	Equitable distribution of National Investment among the geographic	Socio Economic Survey 1984 for Muscat, The Main Results of the

			investment among the geographic regions? What are the current measures that are used to determine the equitable distribution of national investment among the geographic regions in Oman?	deprived neighbourhoods		regions, Reduction of intra- and inter-regional disparities, fair distribution of revenue	Household Expenditure & Income Survey (2001, National Economy), Census 2003, National Population Strategy (2007, National Economy)
35		Barriers / Drivers (Current)	ما هي التدابير الحالية التي يتم استخدامها لتحديد التوزيع العادل للاستثمارات الوطنية بين المناطق الجغرافية في عمان؟				
36		Recommendations (Future)	ما هي توصياتكم من أجل توزيع متوازن للاستثمار الوطني بين المناطق الجغرافية في عمان؟				
37		Strategy / Implementation (Past)	ما هي الاستراتيجيات التي كانت تهدف إلى وسائل نقل عامة تنسم بالكفاءة، وكيف تم تنفيذها؟				
38	Transport	Barriers / Drivers (Current)	ما العقبات التي تحول دون تنفيذ ناجح للنقل العام المستدام في مسقط؟	Transportation, passenger transportation, efficient transportation, infrastructure	highway network has certain structural weaknesses, insufficient public passenger transport	developing a hierarchy of road network within the urban settlement, to establish an overall regional road network	Oman Highway Master Plan (1981, Dar Al-Handasah), Capital Area transport study (1985, Dar Al-Handasah), Muscat Area Traffic Study (1993-94, Khatib & Alami), Oman Standards for Roads (1993), Muscat Area Traffic Study Tender (2009)
39		Recommendations (Future)	ما هي عوامل النقل الأكثر أهمية لتحقيق التطوير في المستقبل للاستدامة في مسقط؟				
40	Urban Development Management	Strategy / Implementation (Past)	في إدارة (في الماضي) ما هو النهج التنمية الحضرية في مسقط؟		lack of appropriate and strategic plans/procedures, authorities consumed by legal issues/conflicts, weak urban planning and urban management capacities, Urban plan proposals are shelved/not implemented	achieve a balanced urban growth, achieve integration between planning activities and policies, to suggest an integrated development policy and implementation programme, basis for coordination and decision making	Establishment of the SCTP (Royal Decree 27/85), Approval of the SCTP General Framework for Policy making regarding Town planning (SCTP Decree 33/86), Restructuring of The SCTP (Royal Decree 31/2005)
41		Barriers / Drivers (Current)	ما هي المشاكل الحالية في إدارة التنمية الحضرية في مسقط؟	Holism, managing urban flows, official planning activities & policies			
42		Recommendations (Future)	كيف يمكننا تحقيق التكامل بين أنشطة التخطيط وسياساته؟				
43	Urban Quality	Strategy / Implementation (Past)	هل كانت الجودة في التنمية الحضرية من ضمن أجندة تخطيط المدن وكيف تم تنفيذها؟	Excellence, local outdoor air quality, building to last, quality of life, sustainable urban life, balance, place making, liveable cities		better quality of life, for a high quality of life, attractive, aesthetics and visual appearance of the urban setting	
44		Barriers / Drivers (Current)	ما هي الدوافع من أجل تحسين جودة المعيشة للمواطنين العمانيين؟				
45		Recommendations (Future)	ما هي الجوانب الرئيسية لجودة التنمية الحضرية التي ينبغي معالجتها في استراتيجيات التخطيط المكاني المستقبلية في مسقط؟				

APPENDIX F: LIST OF QUESTIONS FOR QUICK SURVEY

Towards a sustainable Urban Future in Oman: Analysis of Strategy and Implementation – Case studies from Muscat

نحو استدامة حضرية مستقبلية في عمان: تحليل الإستراتيجيات والتنفيذ – دراسة حالات من مسقط

ID	Questions	1	2	3	4	5	Arabic
44	Do you think that Muscat is growing too quickly?	Yes نعم	No لا	I don't know - لا أعرف			هل تعتقد أن مسقط تنمو بسرعة عالية؟
45	How satisfied are you with the current land distribution system in Muscat?	Very satisfied - راض جدا	satisfied راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن نظام توزيع الأراضي الحالي في مسقط؟
47	Do you think that Muscat is a good place for living?	Yes نعم	No لا	I don't know - لا أعرف			هل تعتقد بأن مسقط مكان جيد للمعيشة؟
48	How satisfied are you with the current level of air pollution in Muscat?	Very satisfied - راض جدا	satisfied راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن المستوى الحالي للتلوث الهوائي في مسقط؟
49	How satisfied are you with the current level of public participation (involvement) in the urban planning process?	Very satisfied - راض جدا	satisfied راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن المستوى الحالي لمشاركة الجمهور في التخطيط الحضري؟
50	Do you think that sustainability is important?	Yes نعم	No لا	I don't know - لا أعرف			هل تعتقد بأن التنمية المستدامة مهمة؟
52	Are you concerned about climate change?	Not concerned at all - غير قلق أبدا	Not concerned غير قلق	I don't know - لا أعرف	concerned قلق	Very concerned قلق جدا	هل أنت قلق بشأن التغير المناخي؟
53	Are there enough public parks and gardens in Muscat?	Yes - نعم	No - لا	I don't know - لا أعرف			هل هنالك منتزهات وحدائق عامة كافية في مسقط؟
64	To what extent do you agree that the public behaviour has an impact on the sustainability of Muscat?	Strongly agree - أوافق بشدة	agree - أوافق	not sure - غير متأكد	disagree - غير موافق	strongly disagree - موافق بتاتا	إلى أي مدى توافق بأن سلوك العامة له تأثير في الاستدامة في مسقط؟
65	To what extent do you agree that living in a smaller size residential plot has an impact on the sustainability of Muscat?	Strongly agree - أوافق بشدة	agree - أوافق	not sure - غير متأكد	disagree - غير موافق	strongly disagree - موافق بتاتا	إلى أي مدى توافق بأن المعيشة في مساحة أرض سكنية أصغر لها تأثير في الاستدامة في مسقط؟
66	To what extent do you agree that living in a	Strongly	agree - أوافق	not sure	disagree -	strongly	إلى أي مدى توافق بأن المعيشة في

	smaller house built up area has an impact on the sustainability of Muscat?	agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	disagree - غير موافق بشدة	مساحة بيت أصغر لها تأثير في الاستدامة في مسقط؟
67	To what extent do you agree that living in a neighbourhood with a higher population density has an impact on the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن المعيشة في منطقة ذات كثافة سكانية عالية لها تأثير في الاستدامة في مسقط؟
68	To what extent do you agree that using public transport should be adequately available to improve the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن استخدام المواصلات العامة إذا توفرت بشكل مناسب له تأثير في الاستدامة في مسقط؟
69	To what extent do you agree that reducing residential building's energy consumption should be made compulsory to improve the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن تقليل استهلاك الطاقة الكهربائية في المباني السكنية ينبغي أن يكون إجباريا من أجل تحسين الاستدامة في مسقط؟
70	To what extent do you agree that introducing energy saving measures in residential buildings should be made compulsory to improve the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن إدخال تدابير جديدة من أجل توفير الطاقة في المباني السكنية ينبغي أن يكون إجباريا من أجل تحسين الاستدامة في مسقط؟
71	To what extent do you agree that reducing water consumption in residential buildings should be made compulsory to improve the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن تقليل استهلاك المياه في المباني السكنية ينبغي أن يكون إجباريا من أجل تحسين الاستدامة في مسقط؟
72	To what extent do you agree that waste recycling should be adequately available to improve the sustainability of Muscat?	Strongly agree - أوافق بشدة	أوافق - agree	not sure - غير متأكد	disagree - غير موافق	strongly disagree - غير موافق بشدة	إلى أي مدى توافق بأن إعادة تدوير النفايات ينبغي أن تتوفر بشكل مناسب من أجل تحسين الاستدامة في مسقط؟
73	How satisfied are you with the current population density in Muscat?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن الكثافة السكانية الحالية في مسقط؟

APPENDIX G: LIST OF QUESTIONS FOR PUBLIC QUESTIONNAIRE

Towards a sustainable Urban Future in Oman: Analysis of Strategy and Implementation – Case studies from Muscat

نحو استدامة حضرية مستقبلية في عمان: تحليل الإستراتيجيات والتنفيذ – دراسة حالات من مسقط

ID	Questions	1	2	3	4	5	Arabic
1	How old are you?	Less than 20 years old أقل من 20 سنة	21 to 29 years سنة 21 إلى 29	30 to 39 years من سنة 30 إلى 39	40 to 55 years سنة 40 إلى 55	over 55 years أكثر سنة 55 من	كم عمرك؟
2	What is your gender?	Male – ذكر	female – أنثى				ما نوعك؟
3	What is your employment status?	Student طالب	government employed موظف حكومي	privately employed موظف في القطاع الخاص	self employed لحسابك الخاص	unemployed لا تعمل	ما هي حالتك الوظيفية؟
4	What is the highest level of education that you have completed?	No Qualification بلا مؤهل	Elementary & Preparatory School المرحلة الابتدائية والاعدادية	Secondary School المرحلة الثانوية	Technical College Diploma دبلوم الكلية التقنية	University & Above جامعي وما فوق	ما هو أعلى مستوى دراسي أكملته؟
5	What is your total household monthly income?	Less than 199 Omani Rials أقل من 199 ريال عماني	200 to 399 Omani Rials من 200 إلى 399 ريال عماني	400 to 599 Omani Rials من 400 إلى 599 ريال عماني	600 to 799 Omani Rials من 600 إلى 799 ريال عماني	800 Omani Rials or more 800 ريال عماني أو أكثر	ما مجموع دخلك الاسري الشهري؟
6	What is your nationality?	Omani – عماني	Non-Omani – غير عماني				ما جنسيتك؟
7	Are you an original resident in Muscat?	Yes – نعم	No – لا				هل أنت من سكان مسقط الأصليين؟
8	Please indicate the name of area (city in Muscat) where your current dwelling is located						التي يقع فيها (المدينة) الرجاء ذكر اسم المنطقة مسكنك الحالي في مسقط
9	Please indicate the name of area (city) where your current workplace is located						التي تعمل (المدينة) الرجاء ذكر اسم المنطقة فيها حاليا
10	Which category best describes your current dwelling type?	Single house / Villa بيت منفرد فيلا	Attached house / Twin Villa بيت توين /متصل بأخر فيلا	Flat / Apartment شقة سكنية	single room غرفة مفردة	other (please specify) غير ذلك (الرجاء ذكره)	ما هي الفئة الأنسب في تصنيف سكنك الحالي؟
11	Which of these types best describes your dwelling?	Owned by the household ملك للعائلة	Rented مستأجر	Provided by employer موفر من قبل صاحب العمل	Student hostel سكن طلابي	other (please specify) غير ذلك (الرجاء ذكره)	أي من هذه الأنواع هو أفضل وصف لمسكنك؟
12	Which of the following best	Self-Built بناء	Housing Bank	Government Social	Real Estate	other (please	أي مما يلي أفضل وصف لطريقة بناء مسكنك؟

	describes the construction of your dwelling?	شخصي	بناء عن Loan طريق قرض إسكاني من البنك	housing program بناء عن طريق برنامج الإسكان الحكومي	بناء Development ضمن مشروع عقاري	غير ذلك (الرجاء ذكره) specify	
13	What is the approximate area of your current dwelling residential plot (land area)?	Less than 200 square meters متر أقل من 200 مربع	200 to 399 square meters 200 إلى 399 متر مربع	400 to 599 square meters 400 إلى 599 متر مربع	600 to 799 square meters 600 إلى 799 متر مربع	800 square meters or more 800 متر مربع أو أكثر	ما هي المساحة التقريبية لقطعة الأرض السكنية ؟ (مساحة الأرض) التي تسكن فيها حاليا
14	When was your current dwelling residential plot obtained?	Less than 2 years ago - أقل من سنتين	3 to 5 years ago 3 إلى 5 سنوات	6 to 10 years ago 6 إلى 10 سنوات	11 to 14 years ago 11 إلى 14 سنة	15 years ago or more 15 سنة أو أكثر لا I don't Know أكثر أعلم	منذ متى تم تملك قطعة الأرض السكنية التي تسكن فيها حاليا ؟
15	When was your current dwelling built?	2 years ago or less - منذ سنتين أو أقل	3 to 5 years ago 3 إلى 5 سنوات	6 to 10 years ago 6 إلى 10 سنوات	11 to 14 years ago 11 إلى 14 سنة	15 years ago or more 15 سنة أو أكثر لا I don't Know أكثر أعلم	منذ متى تم بناء مسكنك الحالي؟
16	Regarding your current dwelling residential plot, how was it obtained?	Government grant - منحة حكومية	it was bought - تم شراؤها	Inheritance / gift - هدية / الميراث	I don't own the plot - لا أملك القطعة I don't Know لا أعلم	other (please specify) غير ذلك (الرجاء ذكره)	بخصوص قطعة الأرض السكنية التي تسكن فيها حاليا، كيف تم الحصول عليها؟
17	How many rooms do you have in your current dwelling (excluding toilets)?	1 to 2 rooms من 1 غرفة إلى 2	3 to 4 rooms من 3 غرف إلى 4	5 to 6 rooms من 5 غرف إلى 6	7 to 8 rooms من 7 غرف إلى 8	9 rooms or more 9 غرف أو أكثر	عدى دورات (كم عدد الغرف في مسكنك الحالي ؟ (المياه
18	How many individuals are living in your dwelling (including yourself)?	1 to 3 individuals من 1 أفراد إلى 3	4 to 6 individuals من 4 أفراد إلى 6	7 to 9 individuals من 7 أفراد إلى 9	10 to 12 individuals من 10 أفراد إلى 12	13 or more 13 من 13 أفراد أو أكثر	كم عدد الأفراد الذين يسكنون في مسكنك الحالي ؟ (بالإضافة إليك)
19	Please indicate which services are connected to your property (select all that is applicable)	Electricity - الكهرباء Street Lighting - إنارة الطريق	Government Water mains - المياه الحكومية Drainage system نظام تصريف مياه الأمطار	Sewage system - نظام شبكة الصرف الصحي Garbage waste management - القمامة وإدارة النفايات	Telephone - الهاتف Internet - الانترنت	Tarmac road - طريق معبد	اختر (الرجاء ذكر الخدمات الموصولة بمسكنك (كل ما هو مناسب
20	Which criteria is the most important to you when considering the location of your dwelling?	Affordability (price) القيمة المالية	Availability توفر المسكن	Size of plot or House Area حجم القطعة أو مساحة المنزل	Accessibility to major transport links سهولة الوصول إلى طرق النقل الرئيسية	Neighbourhood (community) الجوار (المجتمع)	ما هو المعيار الأكثر أهمية عند اختيارك موقع مسكنك ؟
21	Which of these do you consider to be most important to be close to when considering the location of your dwelling?	Proximity to workplace - القرب من مكان العمل	Proximity to major public facilities - القرب من الخدمات العامة الرئيسية	Proximity to other family members - القرب من أفراد العائلة الآخرين	Proximity to schools - القرب من المدارس	Proximity to Public parks - القرب من المتنزهات العامة	أي من هذه تعتبرها الأهم في التواجد بالقرب منها عند اختيارك موقع مسكنك؟
22	How many cars are owned within your dwelling?	0	1	2	3	4 or more - أربع سيارات أو أكثر	كم عدد السيارات المملوكة في مسكنك الحالي؟

23	How much money did you spend on transport (petrol, diesel) last month?	Less than 10 Omani Rials - ريال أقل من 10 عماني	11 to 25 Omani Rials - ريال عماني 11 إلى 25	26 to 40 Omani Rials - ريال عماني 26 إلى 40	41 to 60 Omani Rials - ريال عماني 41 إلى 60	more than 60 Omani Rials - ريال عماني أكثر من 60	ما مقدار المال الذي أنفقته في المواصلات الشهر الماضي ؟ (البنترول ، الديزل)
24	Which mode of transport do you mainly use to reach your workplace (or school if you are a student)?	Walking - المشي	car - السيارة	public bus - باص النقل العام	taxi - سيارة أجرة	other (please specify) - غير ذلك (الرجاء ذكره)	ما وسيلة المواصلات التي تستخدمها في العادة أو دراستك إذا كنت (للوصول إلى مكان عملك)؟(طالب)
25	Which mode of transport do you mainly use to reach your grocery shop?	Walking - المشي	car - السيارة	public bus - باص النقل العام	taxi - سيارة أجرة	other (please specify) - غير ذلك (الرجاء ذكره)	ما وسيلة المواصلات التي تستخدمها في العادة للوصول إلى البقالة الغذائية ؟
26	Which mode of transport do you mainly use to reach you mosque?	Walking - المشي	car - السيارة	public bus - باص النقل العام	taxi - سيارة أجرة	other (please specify) - غير ذلك (الرجاء ذكره)	ما وسيلة المواصلات التي تستخدمها في العادة للوصول إلى المسجد ؟
27	How far from your dwelling is your workplace (or school if you are a student)?	Less than 1 km - كيلومتر أقل من 1	1 to 5 km - من 1 كيلومتر إلى 5	6 to 10 km - من 6 كيلومتر إلى 10	11 to 25 km - من 11 كيلومتر إلى 25	more than 25 km - أكثر من 25 كيلومتر	عن مسكنك ؟ (أو دراستك)كم يبعد مقر عملك
28	How far from your dwelling is your grocery shop?	Less than 200 meters - أقل من 200 متر	less than 500 meters - أقل من 500 متر	less than 1 km - كيلومتر أقل من 1	less than 10 km - كيلومتر أقل من 10	more than 10 km - أكثر من 10 كيلومتر	كم تبعد البقالة الغذائية عن مسكنك ؟
29	How far from your dwelling is your mosque?	Less than 200 meters - أقل من 200 متر	less than 500 meters - أقل من 500 متر	less than 1 km - كيلومتر أقل من 1	less than 10 km - كيلومتر أقل من 10	more than 10 km - أكثر من 10 كيلومتر	كم يبعد المسجد عن مسكنك ؟
30	What is the main reason that you are not using the public transport?	Public transport is not available - عدم توفر النقل العام	Public transport is too expensive - الغلاء في ثمن النقل العام	The climate is too hot - حرارة الجو	Public transport is not comfortable - عدم توفر الراحة في النقل العام	Other (please specify) - أسباب أخرى (الرجاء ذكرها)	ما هو السبب الرئيسي لعدم استخدامك مواصلات النقل العام ؟
31	How much money did your household spend on electricity last month?	Less than 10 Omani Rials - ريال أقل من 10 عماني	10 to 19 Omani Rials - ريال عماني 10 إلى 19	20 to 29 Omani Rials - ريال عماني 20 إلى 29	30 to 39 Omani Rials - ريال عماني 30 إلى 39	40 or more Omani Rials - أكثر من 40 ريال عماني Included within rent مدفوعة ضمن الإيجار	ما تكلفة خدمة الكهرباء في مسكنك خلال الشهر الماضي ؟
32	Which of these energy saving measures are installed in your dwelling?	Roof Insulation - عازل حراري - للسطح	Wall Cavity Insulation - عازل حراري للجدار	Double Glazing Windows - نوافذ ذات طبقتين من الزجاج	None - لا يوجد	Others (please specify) - أخرى (الرجاء ذكرها)	أي من تدابير توفير الطاقة هذه تم تركيبها في مسكنك ؟
33	How satisfied are you with the electricity service supply to your dwelling?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض جدا	ما مدى رضاك عن خدمة توفير الطاقة الكهربائية إلى مسكنك ؟
34	How satisfied are you with the electricity service cost?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن سعر خدمة الكهرباء ؟
35	How is your household electricity consumption?	Very high - عال جدا	high - عال	medium - متوسط	low - منخفض	Very low - منخفض جدا	ما مدى استهلاكك المنزلي للكهرباء ؟

36	What is your main source for water supply?	Government water mains system - خدمة المياه الحكومية	Water transported by tankers - ناقلات المياه	Water well (groundwater) - (مياه جوفية) عبر بئر ماء		Other (please specify) - أخرى (الرجاء ذكرها)	ما هو المصدر الرئيسي لتوفير المياه إلى مسكنك ؟
37	How much money did your household spend on water last month?	Less than 10 Omani Rials أقل ريال 10 من	10 to 19 Omani Rials - إلى 10 من ريال 19 إلى	20 to 29 Omani Rials - إلى 20 من ريال 29 إلى	30 to 39 Omani Rials - إلى 30 من ريال 39 إلى	40 or more Omani Rials - 40 ريال أو أكثر Included within rent مدفوعة ضمن الإيجار	ما تكلفة خدمة المياه في مسكنك خلال الشهر الماضي ؟
38	Which of these water saving measures are installed in your dwelling?	More efficient toilet flushing - مرحاض أكثر كفاءة	Efficient taps in sinks and basins - صنابير أكثر كفاءة في المغاسل والأحواض	Collecting rainwater - تجميع مياه المطر	None - لا يوجد	Others (please specify) - أخرى (الرجاء ذكرها)	أي من تدابير توفير المياه هذه تم تركيبها في مسكنك ؟
39	If you buy bottled water for drinking and cooking use, how much did your household spend last month?	Less than 5 Omani Rials - إريال 5 أقل من don't buy bottled water لا أشتري مياه معبأة	5 to 9 Omani Rials - إلى 5 من ريال 9 إلى	10 to 19 Omani Rials - إلى 10 من ريال 19 إلى	20 to 29 Omani Rials - إلى 20 من ريال 29 إلى	30 or more Omani Rials - 30 ريال أو أكثر	إذا كنت تشتري مياه معبأة لاستخدامات الشرب والطهي، كم من المال أنفقت في مسكنك لذلك خلال الشهر الماضي ؟
40	How satisfied are you with the water service cost to your dwelling?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن سعر خدمة المياه لمسكنك ؟
41	How satisfied are you with the water service quality (taste, odor, cleanliness) to your dwelling?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	الطعم (ما مدى رضاك عن جودة خدمات المياه الموصلة إلى منزلك ؟ (، الرائحة ، النظافة
42	How is your household water consumption?	Very high - عال جدا	high - عال	medium - متوسط	low - قليل	Very low - قليل جدا	ما مدى اسهلاكك المنزلي للمياه ؟
43	How much money did your household spend on sewage treatment service last month?	Less than 10 Omani Rials أقل ريال 10 من	10 to 19 Omani Rials - إلى 10 من ريال 19 إلى	20 to 29 Omani Rials - إلى 20 من ريال 29 إلى	30 to 39 Omani Rials - إلى 30 من ريال 39 إلى service not available الخدمة غير متوفرة	40 or more Omani Rials - 40 ريال أو أكثر I don't Know لا أعلم	ما تكلفة خدمة الصرف الصحي في مسكنك خلال الشهر الماضي ؟
44	Do you think that Muscat is growing too quickly?	Yes نعم	No لا	I don't know - لا أعرف			هل تعتقد أن مسقط تنمو بسرعة عالية ؟
45	How satisfied are you with the current land distribution system in Muscat?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن نظام توزيع الأراضي الحالي في مسقط ؟
46	How satisfied are you with the current population density in your neighbourhood?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن الكثافة السكانية الحالية في الحي الذي يقع فيه مسكنك ؟
47	Do you think that Muscat is a	Yes نعم	No لا	I don't know - لا			هل تعتقد بأن مسقط مكان جيد للمعيشة ؟

	good place for living?			أعرف			
48	How satisfied are you with the current level of air pollution in Muscat?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن المستوى الحالي للتلوث الهوائي في مسقط؟
49	How satisfied are you with the current level of public participation (involvement) in the urban planning process?	Very satisfied - راض جدا	satisfied - راض	neither - محايد	unsatisfied - غير راض	Very unsatisfied - غير راض أبدا	ما مدى رضاك عن المستوى الحالي لمشاركة الجمهور في التخطيط الحضري؟
50	Do you think that sustainability is important?	Yes نعم	No لا	I don't know - لا أعرف			هل تعتقد بأن التنمية المستدامة مهمة؟
51	To what extent do you agree that your behaviour has an impact on the sustainability of Muscat?	Strongly agree - موافق بشدة	agree - موافق	not sure - لا أعرف	disagree - غير موافق	strongly disagree - غير موافق بناتا	إلى أي مدى توافق بأن سلوكك الشخصي قد يؤثر في مستوى الاستدامة في مسقط؟
52	Are you concerned about climate change?	Not concerned at all غير قلق أبدا	Not concerned غير قلق	I don't know - لا أعرف	concerned قلق	Very concerned قلق جدا	هل أنت قلق بشأن التغير المناخي؟
53	Are there enough public parks and gardens in Muscat?	Yes - نعم	No - لا	I don't know - لا أعرف			هل هنالك منتزهات وحدائق عامة كافية في مسقط؟
54	I would consider living in a smaller size residential plot in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري استخدام قطعة سكنية أصغر من أجل تحسين الاستدامة في مسقط
55	I would consider living in a smaller house built up area in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري استخدام منزل أصغر في المساحة من أجل تحسين الاستدامة في مسقط
56	I would consider living in a neighbourhood with a higher population density in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري السكن في منطقة ذات كثافة سكانية عالية من أجل تحسين الاستدامة في مسقط
57	I would consider using public transport, if it is adequately available, in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري استخدام المواصلات العامة إذا توفرت بشكل مناسب من أجل تحسين الاستدامة في مسقط
58	I would consider reducing my energy consumption in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري تقليل استهلاك الطاقة الكهربائية من أجل تحسين الاستدامة في مسقط
59	I would consider introducing energy saving measures in my dwelling in order to improve the sustainability of Muscat	Yes - نعم	Perhaps - ربما	No - لا			قد أضع في اعتياري إدخال تدابير جديدة من أجل توفير الطاقة في مسكني من أجل تحسين الاستدامة في مسقط

60	I would consider reducing my water consumption in order to improve the sustainability of Muscat	Yes – نعم	Perhaps – ربما	No – لا			قد أضع في اعتياري تقليل استهلاكي للمياه من أجل تحسين الاستدامة في مسقط
61	I would consider participating in waste recycling, if it is adequately available, in order to improve the sustainability of Muscat	Yes – نعم	Perhaps – ربما	No – لا			قد أضع في اعتياري المشاركة في إعادة تدوير النفايات إذا توفرت بشكل مناسب من أجل تحسين الاستدامة في مسقط
62	What do you think are the major problems in Muscat city today?	Please write your comments الرجاء كتابة تعليقك –					ما هي باعتقادك أهم المشاكل في مدينة مسقط اليوم؟
63	Do you have any recommendations for improving sustainability in Muscat?	Please write your comments الرجاء كتابة تعليقك –					هل لديك توصيات بخصوص تحسين الاستدامة في مسقط؟

APPENDIX H: LIST OF QUESTIONS FOR FOCUS GROUPS

#	USD	Type of Questions	Arabic	Questions	Prompt	Key concerns	Aims & Objectives	Strategy
2	Settlement Patterns	Barriers Drivers (Current)	ما هي التحديات الرئيسية التي تواجه نمط الاستيطان الحضري الحالي في مسقط؟	What are the key challenges with the current urban settlement pattern in Muscat?	Urban growth and urban sprawl	dispersed population; linear urban development; dispersal of urban functions; ribbon development; Urban Sprawl, growth & physical expansion	Development of a distinct centrality pattern; Connecting urban settlements	Muscat City Plan (1973, Makiya Assoc., John R. Harris), Greater Muttrah Plan (1972, VIAK), Muscat Struct. Plan 1977 (Llewelyn – Davies), CASP 1982, Muscat Area Structure Plan 1989, Muscat Regional Plan 1989, Oman National Spatial Strategy (ONSS)
6		Recommendations (Future)	ما هي عناصر التصميم الحضري التي تحتاج إلى تحسين من أجل تحقيق مستقبل مستدام في المناطق الحضرية في مسقط؟	What are the elements of urban design that need to be improved in order to achieve a sustainable urban future in Muscat?	Urban Planning, Density, mixed-use, urban Structure, physical structure, urban form, Spatial Development	inappropriate and unsympathetic application of Western design; design guide; The outdated of the existing spatial plans; Low density urban form	to establish size, distance & functional relationships among all old & current development areas; urban expansion possibilities; strategic development; design criteria; sustainable spatial development; balanced urban growth	Building regulations – Ministerial decision no 40/81, Planning policies (1988, SCTP), Manual for Urban Planning (دليل التخطيط) العمراني, 1991 SCTP), Building Regulations for Muscat (1992), Elevational Guidelines for Shati al Qurm Area (1992)
8	Land Use	Barriers Drivers (Current)	ما هي العيوب الرئيسية لنظام استخدام الأراضي الحالي في عمان؟	What are the major disadvantages of the current land use system in Oman?	Land distribution, land use strategy	unsuitable location; land use conflicts; Land distribution system; isolated development, non-utilization of land, underutilization of land, land use restrictions	Organization of the land use structure; to provide a solid framework for land use strategy; achieve optimization in land allocation	Land Organization Law (Royal Decree 6/72), Land ownership Law (Royal Decree 5/80), Government Land entitlement system Law (Royal Decree 81/84)
9		Recommendations (Future)	ماذا ستغير في النظام الحالي لإستخدام الأراضي من أجل تحقيق الكفاءة في تخصيص الأراضي؟	What would you change about the current land use system in order to achieve optimization in land allocation?				
11	Housing	Barriers Drivers (Current)	ما هي المشاكل الرئيسية التي تواجه قطاع الاسكان في مسقط؟	What are the main problems facing the housing sector in Muscat?	Shelter	housing demands, public housing, housing market, unsuitable housing conditions	enable housing strategies implementation; adequate housing	Housing Study for Muscat (1981, Llewelyn – Davies Weeks), Muscat Area Housing Study (1989, Weidleplan & Muamir), Consultancy Study of
12		Recommendations (Future)	ماذا ينبغي أن تكون الأهداف الرئيسية للاستراتيجيات المستقبلية	What should be the main objectives for future strategies				

			لقطاع الاسكان في مسقط؟	of the housing sector in Muscat?				development of policies Real Estate Sector in Oman (2009 Tender, لتطوير السياسات والإجراءات (في قطاع العقارات Study on Renewable Energy Resources (2008, COWI and Partners LLC, Authority for Electricity Regulation)
15	Energy (Electricity)	Recommendations (Future)	كيف يمكننا تحسين المحافظة على الطاقة في عمان؟	How could we improve energy conservation in Oman?	Conserving energy, performance, resourceful energy, efficiency	power quality; Insufficient power supply		
18	Water Service	Recommendations (Future)	كيف يمكننا تحسين المحافظة على المياه في عمان؟	How could we improve the conservation of water in Oman?	Use, efficiency	criteria used for consumption and water main dimensions; water network efficiency		
20	Municipal Services	Barriers / Drivers (Current)	ما هي المشاكل الرئيسية في توفير خدمات البلدية في مسقط؟	What are the main problems in provision of municipal services in Muscat?	Urban Services, local community services, basic human needs, amenities, telecommunication	large part of the population is still inadequately supplied with development infrastructure; deficiency in provision of infrastructure and basic services	identify the strategic needs of the country in terms of infrastructure and services; completion of the infrastructure; necessary basic services	Muscat Wastewater Scheme Project (2003, khatib & Alami)
21		Recommendations (Future)	ماذا ينبغي أن يكون التركيز الرئيسي في المستقبل لتطوير خدمات البلدية في مسقط؟	What should be the main focus for future municipal services development in Muscat?				
27	Environmental Protection	Recommendations (Future)	ما الذي ينبغي القيام به بطريقة مختلفة لتحقيق التوازن والانسجام بين البيئة والتنمية الحضرية في مسقط؟	What should be done differently to achieve balance and harmony between the environment and urban development in Muscat?	Urban environment, planning, justice, protection, quality, closed loop systems, restoration, ecology		Maintenance and rehabilitation of the environment, ecological balance, protection, nature conservation, harmony, secure spatial environmental quality and diversity	The National Plan of Action to Combat desertification in Oman (1993), National Strategy for Environmental Protection in Oman (1995, Min of Regional Municipality), CONVENTION ON BIOLOGICAL DIVERSITY (1997)
29	Climate Change	Barriers / Drivers (Current)	ما هي جوانب التنمية الحضرية القائمة المهددة من أحداث التغيرات المناخية؟	What aspects of the existing urban development are threatened by climate change events?		Desertification, soil erosion, coastal erosion, flash flooding		
30		Recommendations (Future)	كيف ينبغي للحكومة أن تتعامل مع التغير المناخي في التنمية الحضرية المستقبلية؟	How should the government address climate change in future urban developments?				
31	Public Participation	Strategy / Implementation (Past)	ما هي الفرص التي كانت متاحة للجمهور للمشاركة في تخطيط وإدارة التنمية الحضرية في مسقط؟	What were the opportunities available for public participation in the planning and managing activities of urban development	Self-determination & inclusion, respect for	Limited Public participation in the planning process	enhancing the participation of all resources	Municipal Council,

32	Barriers Drivers (Current)	/ لماذا تعتقد بأن هناك محدودية في مشاركة الجمهور في عملية التخطيط؟	Why do you think there is a limited public participation in the urban planning process?	users, opportunities, good governance, democracy			
35	Barriers Drivers (Current)	/ ما هي التدابير الحالية التي يتم استخدامها لتحديد التوزيع العادل للاستثمارات الوطنية بين المناطق الجغرافية في عمان؟	What are the current measures that are used to determine the equitable distribution of national investment among the geographic regions in Oman?	Social benefits, equal access, attention to deprived neighbourhoods	lack of equality and balance in distribution of loans	Equitable distribution of National Investment among the geographic regions, Reduction of intra- and inter-regional disparities, fair distribution of revenue	Socio Economic Survey 1984 for Muscat, The Main Results of the Household Expenditure & Income Survey (2001, National Economy), Census 2003, National Population Strategy (2007, National Economy)
36	Recommendations (Future)	ما هي توصياتكم من أجل توزيع متوازن للاستثمار الوطني بين المناطق الجغرافية في عمان؟	What are your recommendations towards a balanced distribution of national investment among the geographic regions in Oman?				
39	Recommendations (Future)	ما هي عوامل النقل الأكثر أهمية لتحقيق التطوير في المستقبل للاستدامة في مسقط؟	What aspects of transport are more critical to develop for the future sustainability in Muscat?	Transportation, passenger transportation, efficient transportation, infrastructure	highway network has certain structural weaknesses, insufficient public passenger transport	developing a hierarchy of road network within the urban settlement, to establish an overall regional road network	Oman Highway Master Plan (1981, Dar Al-Handasah), Capital Area transport study (1985, Dar Al-Handasah), Muscat Area Traffic Study (1993-94, Khatib & Alami), Oman Standards for Roads (1993), Muscat Area Traffic Study Tender (2009)
45	Recommendations (Future)	ما هي الجوانب الرئيسية لجودة التنمية الحضرية التي ينبغي معالجتها في استراتيجيات التخطيط المكاني المستقبلية في مسقط؟	What are the key aspects of urban quality that should be addressed in future strategies of spatial planning in Muscat?	Excellence, local outdoor air quality, building to last, quality of life, sustainable urban life, balance, place making, liveable cities		better quality of life, for a high quality of life, attractive, aesthetics and visual appearance of the urban setting	

APPENDIX I: INTERVIEW CONSENT FORM

Interview Consent Form

Towards a sustainable Urban Future in Oman: Analysis of Strategy and Implementation – Case studies from Muscat

Dear Respondent,

I am a PhD student at the Mackintosh School of Architecture (Glasgow School of Art), and I am conducting research about urban sustainability in Oman with specific focus on Muscat. As I believe you would be an excellent source of information, I am sincerely inviting you to participate in this research interview which should take you between 30-45 minutes to complete. Your participation is voluntary and there is no penalty if you do not participate and you may withdraw at any point. You are free to decline to answer any particular question you do not wish to answer for any reason.

If you have any questions or concerns about this research, you may contact me on my mobile phone (0096893200984). Thanking you in anticipation of your support and co-operation. Your help and participation is greatly valued.

Sincerely,

Khalfan Al Shueili

Please Tick Box

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason
3. I agree to take part in the above study
4. I agree to the interview being audio recorded
5. I agree to the use of anonymised quotes in publications

☐☐☐☐☐

Name of Participant

Date

Signature

Khalfan Al Shueili

Name of Researcher

Date

Signatur

APPENDIX J: ETHICS APPROVAL FORM

THE GLASGOW SCHOOL OF ART

ETHICS COMMITTEE

APPLICATION FORM FOR ETHICAL APPROVAL

This application form should be submitted to the School Research Developer EITHER in hard copy through the internal mail OR as a Word attachment.

All questions must be answered.

10. Name(s) of person(s) submitting research proposal:
Khalfan Al Shueili

11. Position(s) held (e.g. Lecturer, Doctoral Student etc.):
PhD student candidate

12. School:
Mackintosh School of Architecture

13. Project title:
Towards a sustainable Urban Future in Oman: Strategy vs. Implementation – Case studies from Muscat

14. Have all investigators read, understood and accepted the GSA Ethical Policy, a statement of which is available on the GSA website? Please circle or highlight:

☒ YES

NO

15. Does your proposal involve human subjects, materials or data not in the public domain? Please circle or highlight:

☒ YES

NO

16. If you answered YES to Question 6, please append a copy of your research proposal to this document.

The aim of this research is to investigate and bridge the gap between the strategy/vision and implementation of urban sustainability in Oman. It will attempt to answer the following questions: Was sustainability in the agenda of town planning in Oman? What are the main drivers and barriers towards implementation of urban sustainability?

As an outcome of the literature review, the main dimensions of urban sustainability that will be utilized throughout this study will include: urban planning, urban services, urban economy, urban environment, urban culture, urban mobility, urban management, urban quality and urban resources. Every dimension will further include a set of elements and indicators.

The methodological approach will incorporate a triangulation of the following phases: data mining (document analysis of milestone projects within the historical development of town planning in Oman), semi-structured interviews of decision making, and the assessment of behaviour and attitudes of the general public towards sustainability through the use of focus groups and questionnaires. This will revolve around a few case studies of existing districts from Muscat, the capital of Oman.

17. What, if any, in your opinion are the ethical considerations involved in this proposal?
You should consult the ethical policy statements of the AHRC and/or ESRC, and you may also wish to consider some or all of the following issues:

	Issues	Researcher Comments
1	<u>issues of safety</u> , including the experience of the investigators (subjects, investigators)	No issues of safety
2	<u>issues of consent</u> (are the subjects students, or others in a dependent relationship?)	Interviews will involve: <ol style="list-style-type: none"> 1. Political decision makers (ministers, under secretary) 2. Government technical decision makers (employed planners, architects, engineers and other managers – some may be retired from those positions) 3. Consultants (engineers that worked on urban development planning) 4. Academic researchers (university) <p>Questionnaires will focus on general public Focus groups will be a selected sample of the population</p>
3	Does the research include children or people with special needs?	No
4	Will payment or any other incentive be made	Not envisaged. However, it might be required for public questionnaires (value will be equivalent to £2 per

	to any research subject?	questionnaire)
5	How is consent to be obtained? It is expected that consent will be given in writing.)	Consent will be obtained in writing for interviews and focus groups Consent for public questionnaires will be obtained verbally and anyone that gives consent will be given the questionnaire
6	issues of confidentiality Can subjects be identified from information held by another party?	No
7	Who will have access to the data and what measures will be adopted to maintain the confidentiality of research subjects and to comply with data protection requirements, e.g. will data be anonymised?)	Interview data might be recorded and archived in external hard disk for researcher and supervisors reference only. No access will be given to any other personnel not associated with this research.
8	issues of balance (Are there any cultural, social or gender-based characteristics of the research subjects which have affected the design of the project or which may affect its conduct?)	Not applicable

18. Date of submission of form: 26 October 2010

19. Signature of person making the proposal:

Thank you for filling in this form. You should receive confirmation of ethical approval within three weeks of submitting it. IMPORTANT: lead times for applications must take into account this timescale for approval.

For office use:

DECISION:

Initials of scrutineers (if applicable):

Signature of Convenor GSA Research Ethics Group:

Date of decision (copy of this form to be returned to proposer)

APPENDIX K: INTERVIEW PARTICIPANTS PROFILES

Participants	Organization	Specialization	Years at organization	total years	Years in Oman
1	Ministry of Housing	Architect , MSc Urban Planning (Columbia Univ, NY)	1979 to 1986	7	
2	SCTP	Architecture, MSc Urban Planning	since 2006	4	since 2006
3	Ministry of Housing	Bsc urban and Regional Planning, MSc Urban Studies	1995 to now	15	
4	Expatriate consultant	MSc Coastal Zone Management, PhD Marine Biology	since 1996	14	since 1996
5	Muscat Municipality	Architecture, MSc Urban Planning	since 2008	2	
6	Ministry of Housing	Urban Planning 1974	since 1984	26	since 1984
7	Muscat Municipality	Architecture	1991 to 2009	18	
8	Ministry of Housing	Urban Planning	since 1999	11	
9	Muscat Municipality	Architect	1990 to 2007	17	
10	Academic				
11	SCTP				
12	Expatriate consultant	Architecture, Urban Design	1984 to now	26	3.5
13	Muscat Municipality	Architecture 1980	1990 to 2006	16	
14	Muscat Municipality	BSc Architecture 1999	since 1999	11	
15	Ministry of Housing	BSc Architectural Engineering 2001	since 2002	8	
16	Muscat Municipality	BSc Civil Engineering	1992 to now	18	
17	Focus group 3				
18	Focus group 3				

19	Focus group 3					
20	Ministry of Housing	BSc Civil Engr, Msc Construction Management	1980-1991	11		
21	Local consultant	Electrical Engineering				
22	Local consultant	Mechanical engineering	1995 to now	15		
23	Expatriate consultant	various engineering diplomas, now environmentalist	1970 to now	40	since 1970	
24	Local environmentalist	PhD Civil Engineering, focus on environment	1986-1998	12	since 1979	
25	Expatriate consultant	Diploma Geology, focus on environment	1993-2000 government, then consultant	17	since 1993	
26	Local consultant					
27	Local environmentalist	PhD Human Resource Development, focus on environment	1990-2010	20		
28	Ministry of Housing	BSc Civil Engineering 1981	1987-1997	10		
29	Ministry of Housing	BSc Architecture, MSc Urban Planning 1986	1986-1997	11		
30	Academic	PhD Architecture	since 1998	4	since 2009	
31	Local consultant					
32	Focus group 2					
33	Focus group 2					
34	Focus group 2					
35	Focus group 2					
36	Focus group 2					
37	Focus group 2					
38	Focus group 2					
39	Focus group 2					
40	Ministry of Housing	BSc Agriculture 1996, MBA 2008	since 1999	11		
41	Local environmentalist	Msc Conservation Biology 2003	1993-2005	12		
42	Ministry of Housing	Architecture				

43	SCTP	Bsc Civil Engineering	since 1989	21	
44	Focus group 1				
45	Focus group 1				
46	Focus group 1				
47	Focus group 1				
48	SCTP	BSc Civil Engineering, MSc Application of Remote sensing in urban planning (2002)	since 1990	20	
49	Expatriate consultant	Architect 1990, PhD Urban Design 1994	since 2006	4	4 years
50	Academic	BSc Geography (93), Msc GIS, PhD GIS in urban planning (2002)	since 1993	17	
51	Local real estate developer	Business			
52	Local real estate developer	Architectural Engineering			
53	Focus group 4				
54	Focus group 4				
55	Focus group 4				
56	Focus group 4				
57	Local real estate developer	Quantity Surveyor 1973			

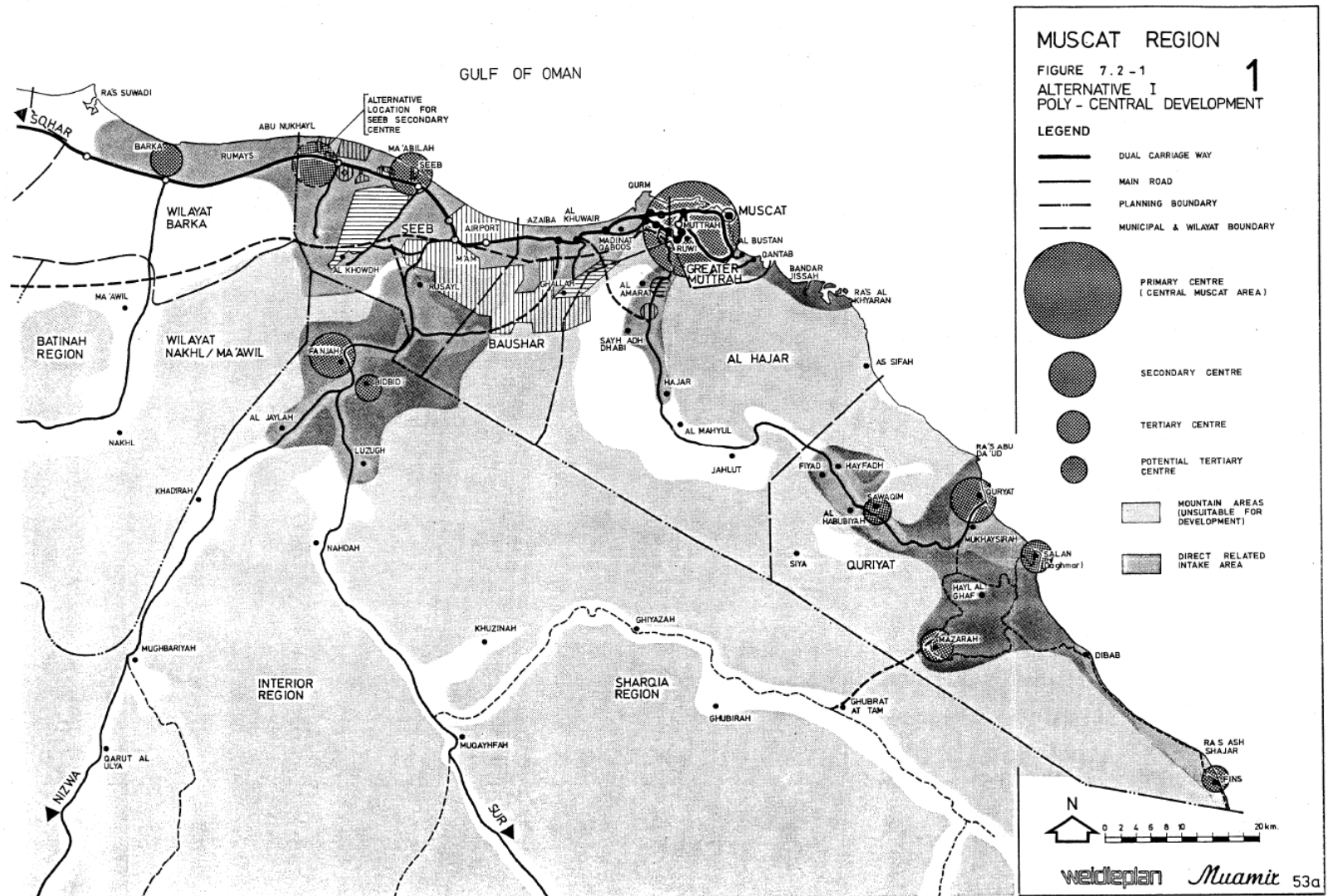
APPENDIX L: INTERVIEW QUESTIONS VS. PARTICIPANTS MATRIX

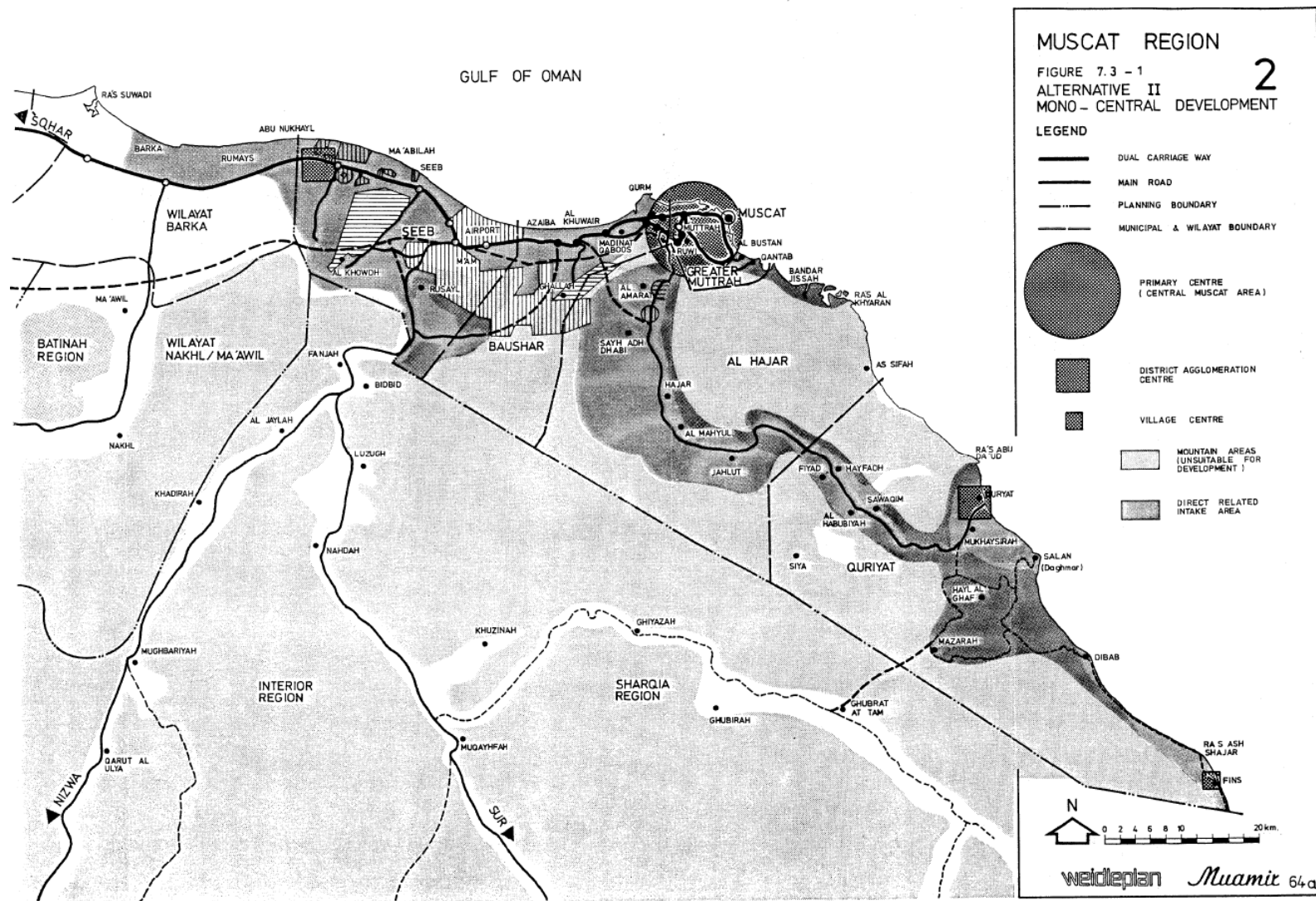
USD	Questions	MH	SCTP	MH	Exp	MM	MH	MM	MH	MM	AC		EXP	MM	MM	MH	MM	MH	ELEC	LOC	EXP	LOC	EXP	LOC	ENV	MH	MH	ACA	LOC	MH	ENV	MH	SCTP	SCTP	EXP	ACA	LOC	LOC	total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20	21	22	23	24	25	26	27	28	29	30	31	40	41	42	43	48	49	50	51-52	57	
Settle ment	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1			1				1	1	1	1		1			1	1	1	1	1	1	27
	2	1	1	1	1	1	1	1	1	1			1		1	1	1	1		1		1	1		1	1	1	1		1	1		1	1	1	1			27
	3		1	1	1	1	1	1	1	1			1			1	1	1			1	1			1			1					1		1	1			19
Urba n	4	1	1	1		1	1	1	1	1			1		1	1	1	1		1		1				1	1	1		1			1	1				1	22
	5	1	1	1	1	1	1	1		1			1	1	1			1		1			1			1							1				1		17
	6	1	1	1	1	1	1		1	1			1	1	1	1	1	1															1	1			1	1	18
Land use	7	1	1	1	1		1	1	1	1			1	1		1	1	1		1	1	1	1		1	1	1	1		1	1		1	1	1	1		1	28
	8	1	1	1	1	1	1	1					1	1	1	1	1	1				1	1		1	1	1	1		1	1		1	1		1	1	1	26
	9	1	1	1	1	1	1		1	1			1	1		1	1	1		1					1	1	1			1	1				1	1			21
Housi ng	10	1		1		1	1		1						1	1										1	1		1				1						11
	11	1	1	1	1		1	1	1	1			1	1	1	1	1	1		1	1	1	1					1					1						20
	12	1	1	1			1	1																				1					1						7
Energ y	13				1																									1									2
	14						1													1																			2
	15				1					1			1									1	1					1									1		7
Wate r	16				1																									1									2
	17																					1																	1
	18									1			1										1					1										1	5
Muni cipal	19					1		1		1				1	1		1																						6
	20							1							1			1																					3
	21				1			1		1			1				1																				1		6
Econ omic	22		1																																				2
	23							1																															1
	24																																				1		1
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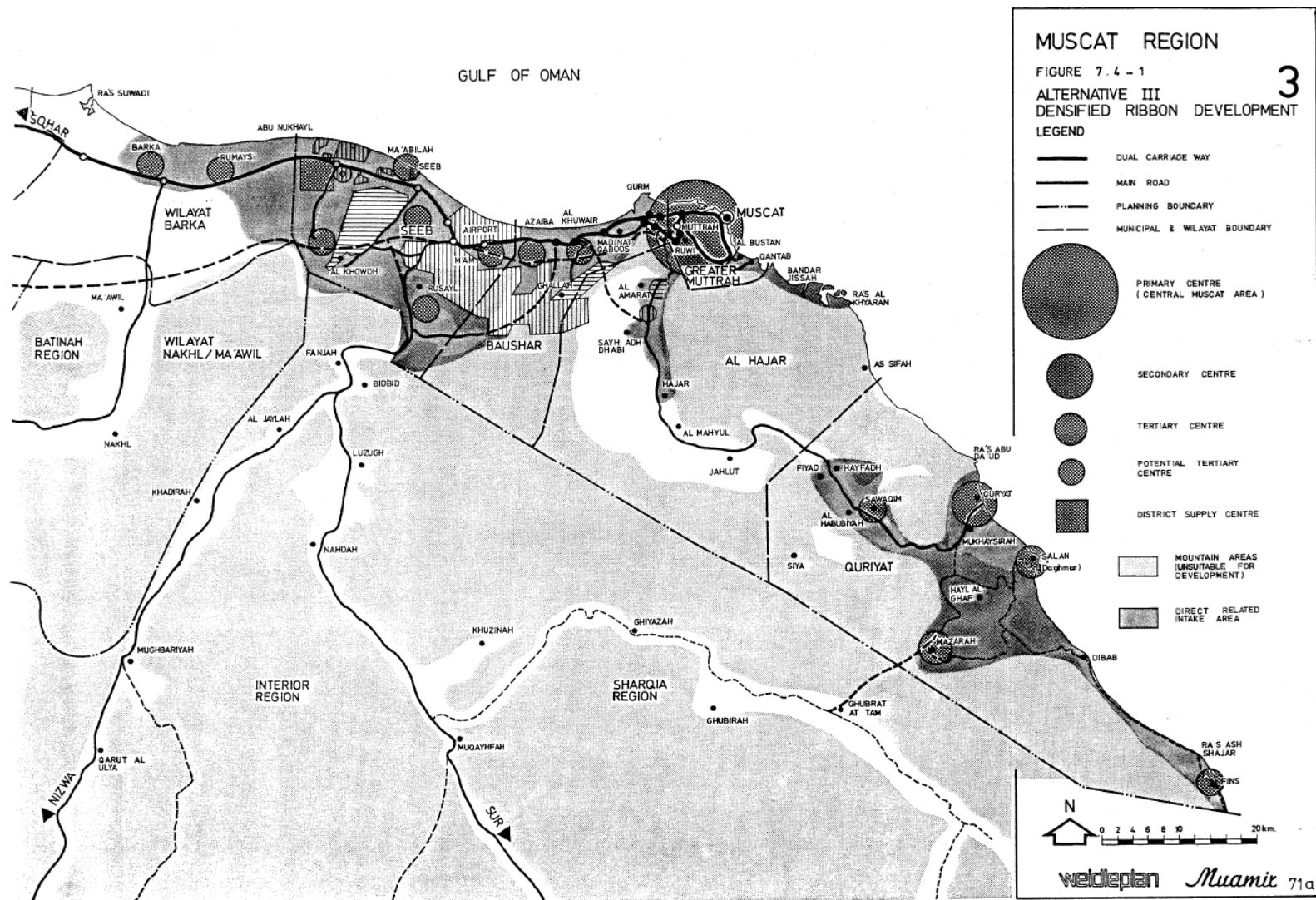
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MCT regional	49		1			1	1			1	1	1	1	1	1		1	1	1	1	1	22
Evaluation of MCT	50		1	1	1			1			1		1	1	1			1	1			15
Downtown	51		1		1		1	1			1	1			1		1	1		1	1	17
Oman National	52					1		1	1	1		1			1							7
Legislation	53								1		1	1		1	1		1	1		1		11
Strategy	54				1						1	1		1	1		1					7
The Wave	55				1									1					1		1	4

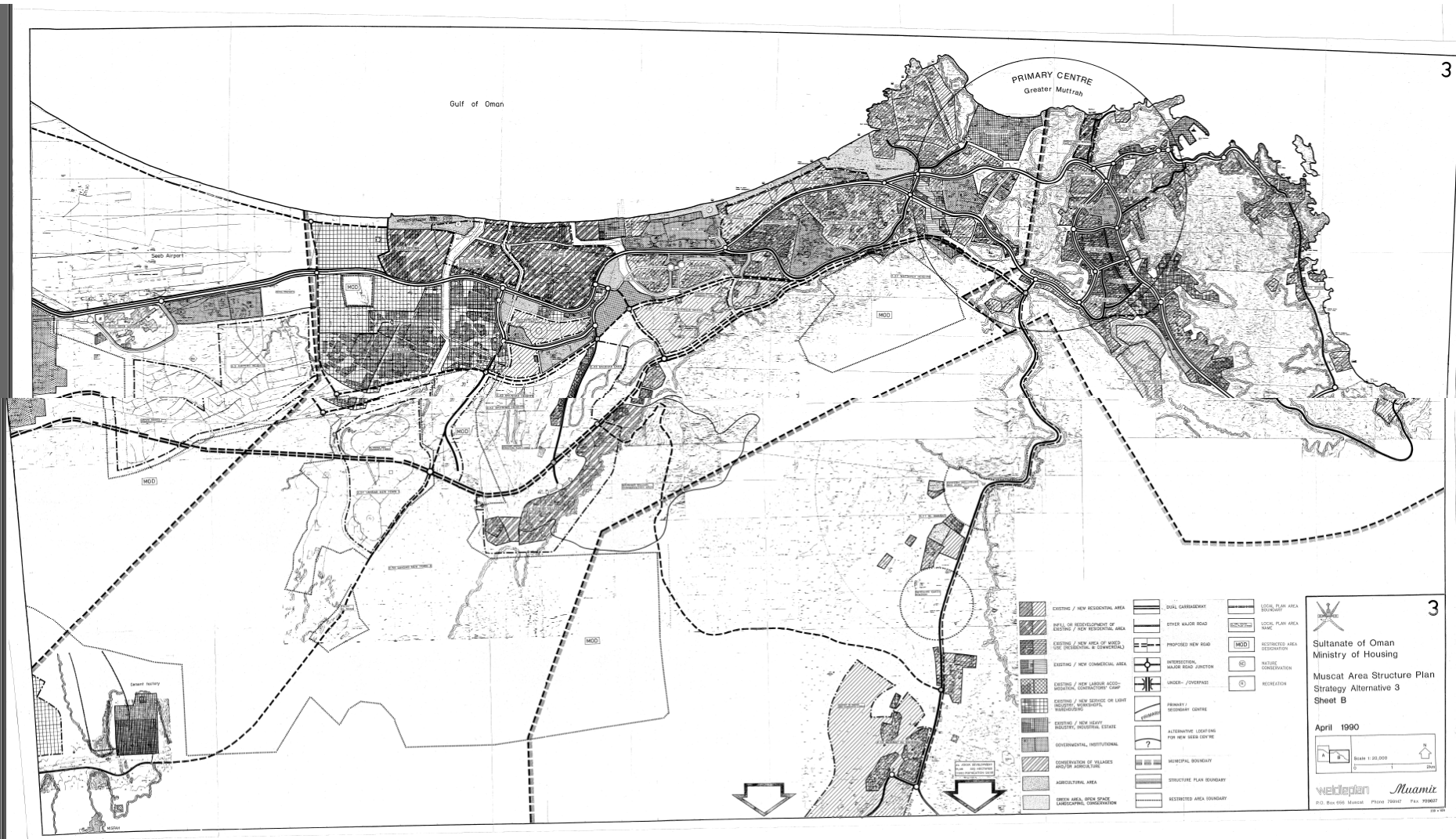
SCTP manual	56	1														1														2								
Blue City	57	1														1														1	3							
Duqm	58	1														1														1	3							
PhD Comments	59	1	1														1	1														1	1	7				
TOTAL	21	23	27	28	13	22	32	23	25	0	0	25	19	22	19	25	28	0	23	20	21	19	0	18	22	24	22	0	21	17	0	19	25	13	14	18	19	667

APPENDIX M: MUSCAT REGIONAL PLAN (3 ALTERNATIVES)









Sultanate of Oman
Ministry of Housing

Muscat Area Structure Plan
Strategy Alternative 3
Sheet B

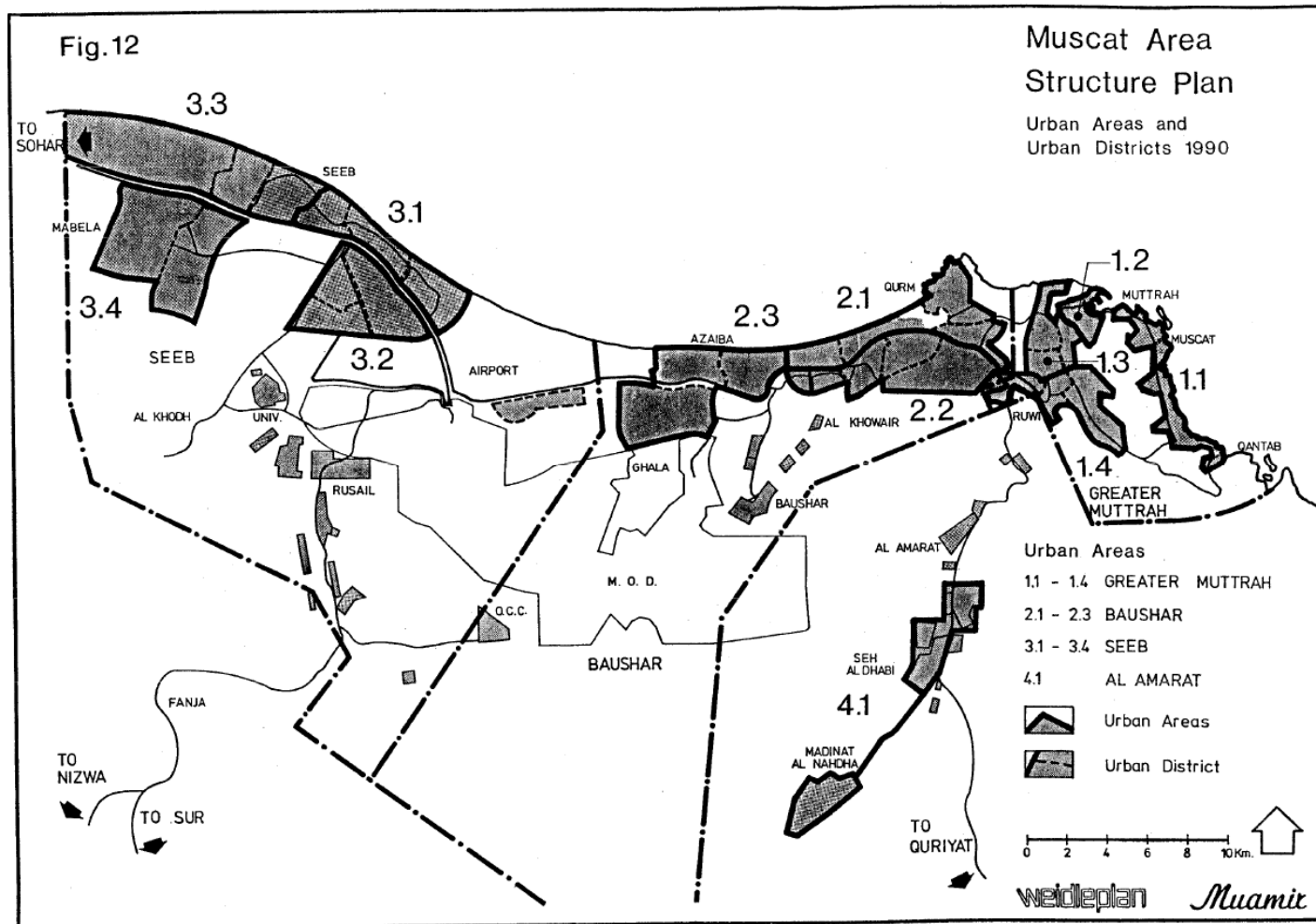
April 1990

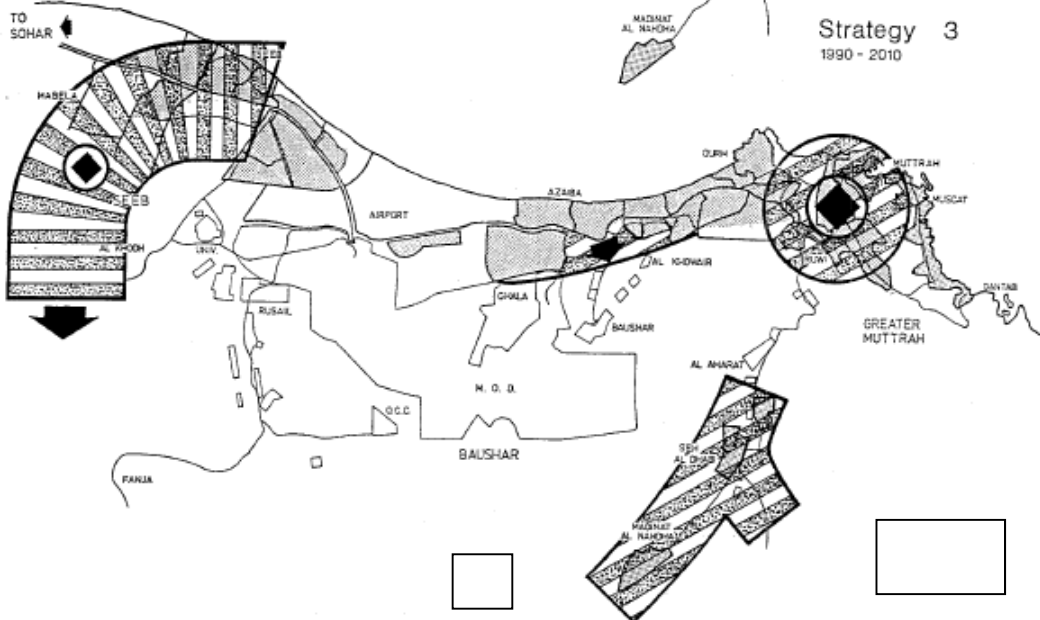
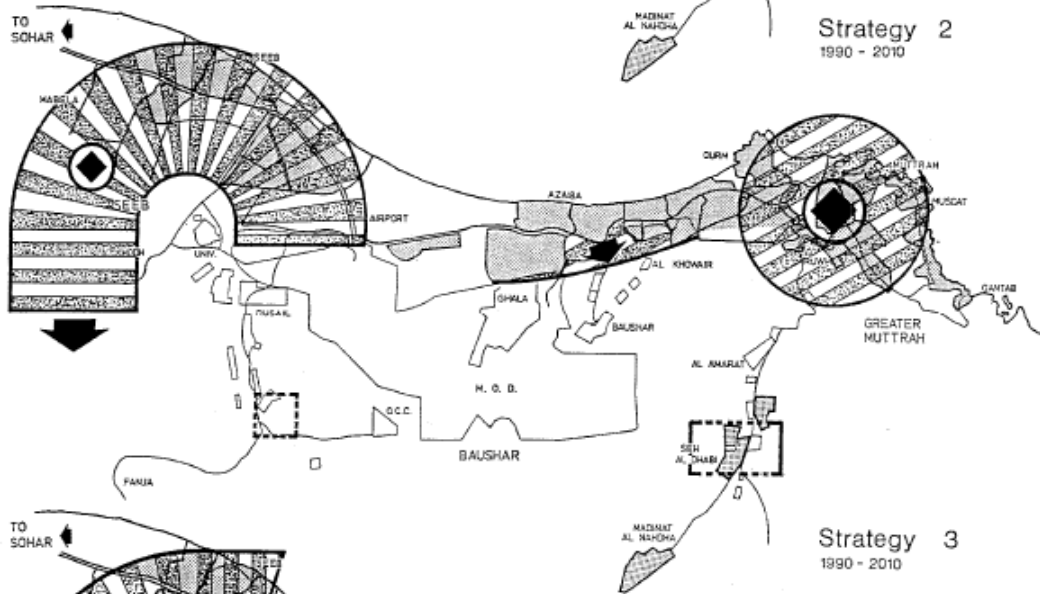
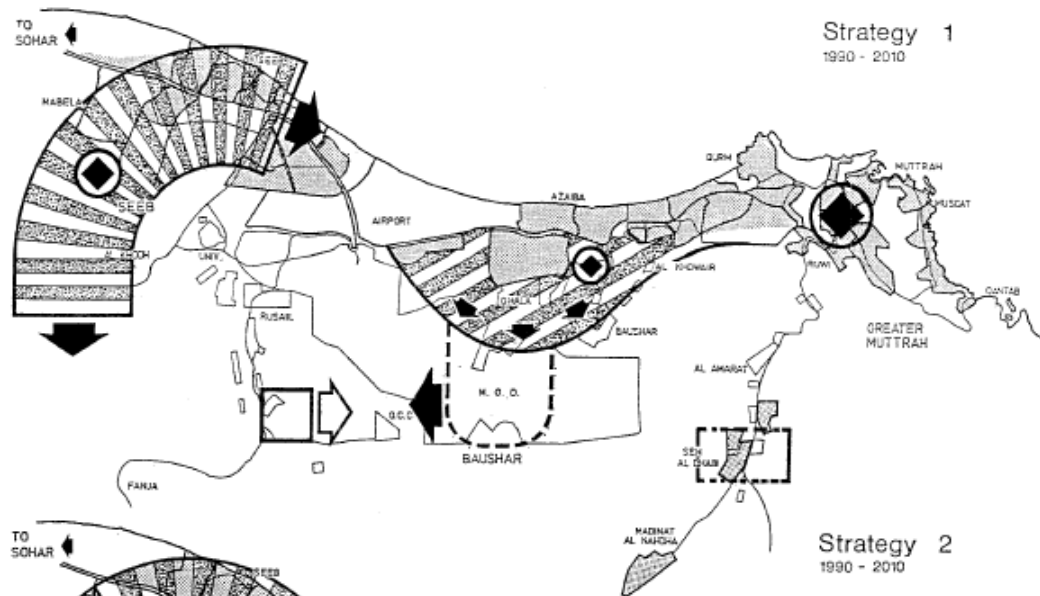
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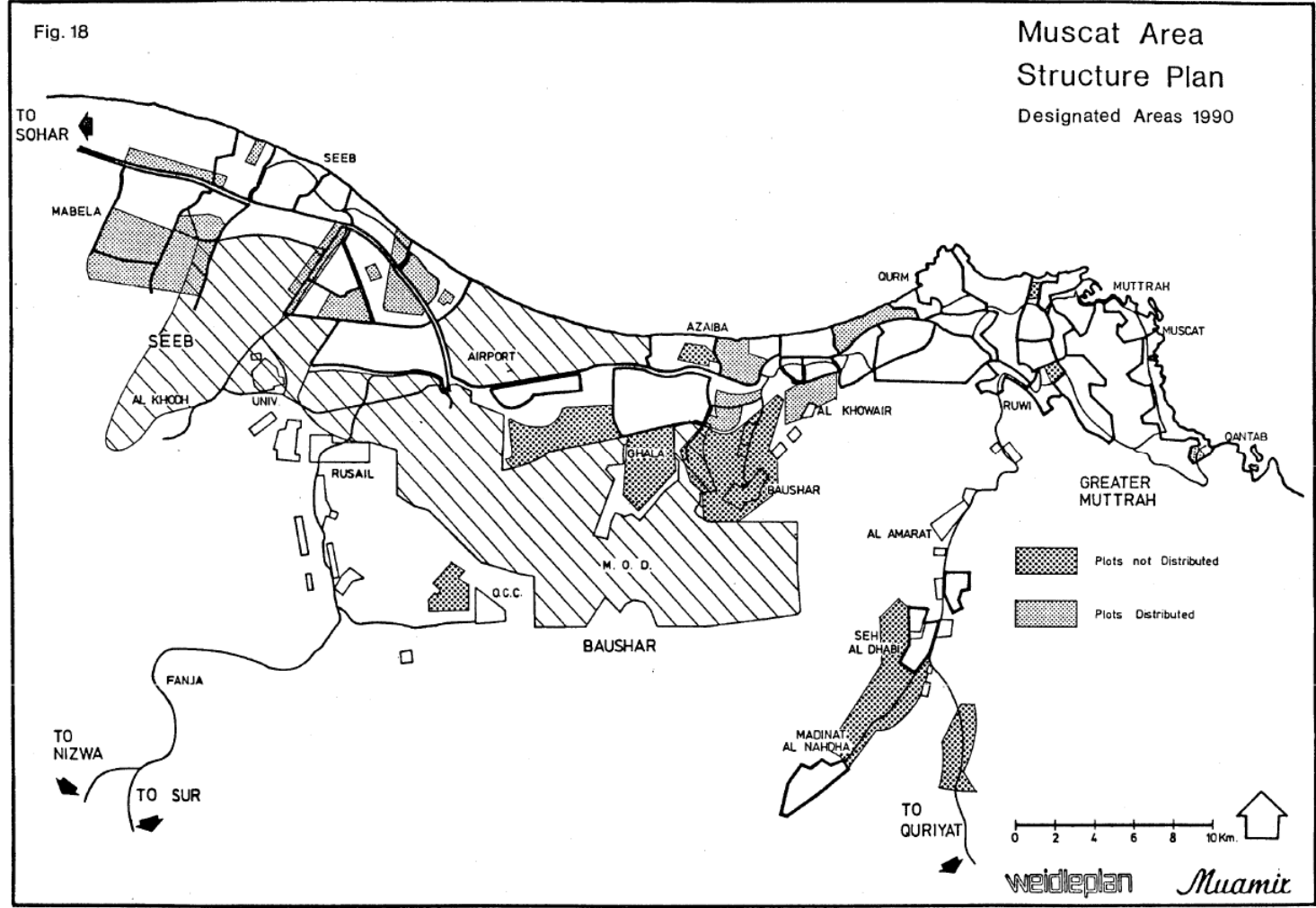
Wekaplan **Muamir**

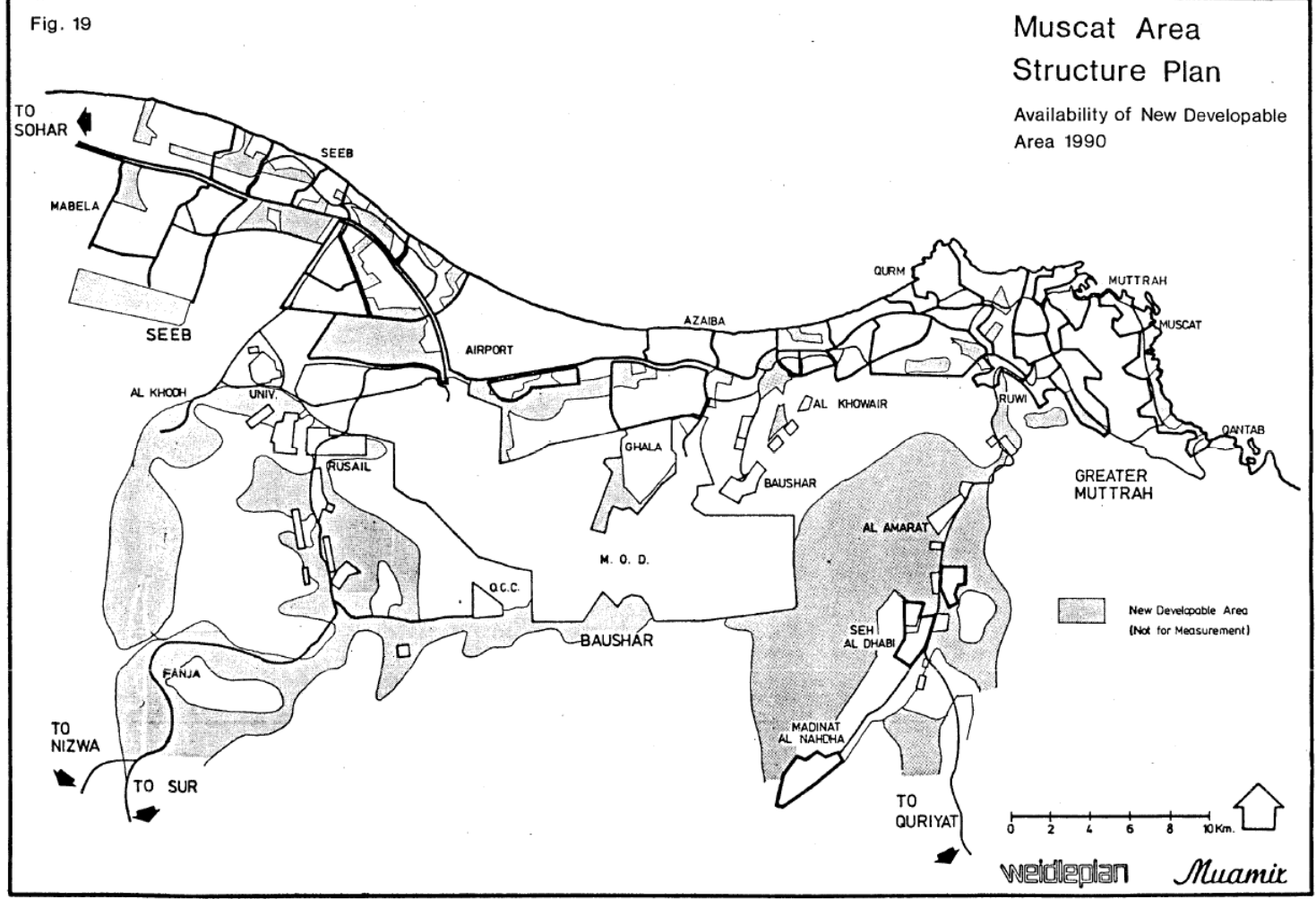
P.O. Box 556 Muscat Phone 799407 Fax 799607

APPENDIX N: MUSCAT STRUCTURAL PLAN (3 ALTERNATIVES)









APPENDIX P: HM SPEECH ON 23/7/1970 AND 27/7/1970

His Majesty Sultan Qaboos speech to his people on the day of his accession 23/7/1970:

In the name of God, the Compassionate, the Merciful

I PROMISE you to proceed forthwith in the process of creating a modern government. My first act will be the immediate abolition of all the unnecessary restrictions on your lives and activities.

My people,

I will proceed as quickly as possible to transform your life into a prosperous one with a bright future. Every one of you must play his part towards this goal. Our country in the past was famous and strong. If we work in unity and co-operation, we will regenerate that glorious past and we will take a respectable place in the world.

I call upon you to continue living as usual. I will be arriving in Muscat in the coming few days and then I will let you know of my future plans.

My people,

I and my new government will work to achieve our general objective.

My people, my brothers,

Yesterday it was complete darkness and with the help of God, tomorrow will be a new dawn on Muscat, Oman and its people.

God bless us all, and may He grant our efforts success.

His Majesty Sultan Qaboos speech on the occasion of His first arrival in Muscat after Assuming the Reins of Power 31/7/1970:

In the name of God, the Compassionate, the Merciful

WE thank you for the warm reception you have given us in the name of the family and the Omani people.

We hope that this day will mark the beginning of a new age and a great future for us all. We promise you that we shall do our duty towards the people of our dear country. We also hope that every one of you will do his duty in helping us to build the thriving and happy future that we seek for this country, because, as you know, unless there is co-operation between the government and the people we will not be able to build our country with the speed required to free her from the backwardness she has endured for so long.

The Government and the people are as one body. If one of its limbs fails to do its duty, the other part of the body will suffer. We hope that you will think well of us and at the same time we hope that we shall think of you.

We ask Allah to grant us success in that which is good. Peace be with you.

THE END