

Contents

Preface	iii
Abbreviations	x
Glossary	xi
1 Introduction	13
1.1 Chapter Opening	13
1.2 Evolution of <i>muqarnas</i>	15
1.2.1 Chronology	16
1.2.2 Form and Structure	17
1.2.3 Construction Techniques	18
1.3 Statement of the Problem	19
1.4 Research Aim and Objectives	20
1.5 Research Assumptions	21
1.6 Significance of Research.....	21
1.7 Research Scopes.....	22
1.8 Research Limitations.....	23
1.9 Summary	23
2 Physical and Theoretical Concept of Muqarnas	25
2.1 Introduction	25
2.2 Concept of <i>Muqarnas</i>	26
2.2.1 Etymology of <i>Muqarnas</i>	26

2.2.1.1	Persian and Arabic Origins	26
2.2.1.2	English and Spanish Origins	29
2.2.2	Definition of <i>Muqarnas</i>	30
2.2.3	Categorizations of <i>Muqarnas</i>	34
2.3	Theories and Models on <i>Muqarnas</i>	39
2.3.1	Pioneers of Recordings <i>Muqarnas</i>	39
2.3.2	The Origin of <i>Muqarnas</i>	42
2.3.2.1	Squinch	45
2.3.2.2	Patkaneh.....	47
2.3.3	Mathematical and Computational Studies	49
2.4	Characteristics of <i>Muqarnas</i>	50
2.4.1	Design Characteristics.....	51
2.4.1.1	Two-Dimensional Pattern Plans.....	52
2.4.1.2	Scrolls	53
2.4.1.3	Al-Kashi's Method of Drawing Muqarnas.....	57
2.4.2	Construction Characteristics	58
2.4.2.1	Construction Materials.....	61
2.4.2.2	Structural Role of Muqarnas	62
2.4.2.3	Constituent Elements of Muqarnas	62
2.5	Conclusion.....	69
3	Investigation Method	71
3.1	Introduction	71
3.2	Grounded Theory Research Approach.....	72
3.3	Research Design.....	74
3.3.1	Preliminary Study and Study of Feasibility	74
3.3.2	Gathering of Data and Evidence	75
3.3.3	Data Processing and Open Coding	76
3.3.4	Axial Coding	78
3.3.4.1	Justification of the Selected Samples.....	78
3.3.5	Selective Coding	80

3.3.5.1	Methods of Analyzing Visual Data.....	84
3.3.5.2	Validation Process	85
3.3.5.3	Matrix Analysis Approach.....	85
3.4	Research Ethics	86
3.5	Conclusion.....	87
4	Constituent Elements of Muqarnas	88
4.1	Introduction	88
4.2	Analysis of Different Types	89
4.2.1	Square Lattice	89
4.2.2	Pole Table	89
4.3	Constituent Elements	90
4.3.1	Categorizing Variables.....	90
4.3.2	Extensible Set of Constituent Elements.....	92
4.3.2.1	Taseh	92
4.3.2.2	Shaparak.....	93
4.3.2.3	Parak	94
4.3.2.4	Shamseh	95
4.3.2.5	Toranj	95
4.3.2.6	Espar	97
4.3.2.7	Tee.....	98
4.3.2.8	Takht	98
4.3.3	Famous Elemental Units	99
4.3.3.1	Susani	99
4.3.3.2	Tanoureh	99
4.3.3.3	Multiple Shaparaks	100
4.3.3.4	Double Paraks	100
4.4	Validation.....	101
4.4.1	Elements on Studied <i>Muqarnas</i>	101
4.4.2	Tier by Tier Construction Technique.....	106
4.5	Conclusion.....	112

5	Evolution of Muqarnas	113
5.1	Introduction	113
5.2	Squinch.....	115
5.2.1	Sarvestan Palace.....	116
5.2.2	Samanid Mausoleum.....	119
5.2.3	Jurjur Mosque	124
5.3	Inception of <i>Muqarnas</i>	127
5.3.1	Na'in Jame' Mosque, I and II	127
5.3.2	Davazdah Imam Shrine.....	133
5.3.3	Barsian Jame' Mosque	138
5.3.4	Bastam Minaret.....	142
5.3.5	Sin Jame' Mosque.....	146
5.3.6	Isfahan Jame' Mosque, I and II.....	150
5.3.7	Bayazid Bastami Mausoleum	159
5.3.8	Pir Bakran Mausoleum	165
5.3.9	Soltanieh Dome.....	171
5.3.10	Natanz Jame' Mosque, I and II	174
5.4	<i>Muqarnas</i>	183
5.4.1	Ashtarjan Mosque	183
5.4.2	Varamin Jame' Mosque	187
5.4.3	Imamieh School	191
5.4.4	Kerman Jame' Mosque	195
5.5	Matrix Analysis.....	200
5.5.1	Chronology Matrix.....	200
5.5.2	Form and Structure Matrix.....	201
5.5.3	Construction Technique Matrix	204
5.6	Evolution of Constituent Elements	206
5.7	Conclusion.....	208
6	Summary	212
6.1	Introduction	212

6.2	Research Findings	213
6.2.1	Historical Development of <i>Muqarnas</i>	213
6.2.2	Constituent Elements of <i>Muqarnas</i>	213
6.2.3	<i>Muqarnas</i> vs. Pseudo- <i>Muqarnas</i>	216
6.2.4	Clarification of Definitions	219
6.3	Research Contribution.....	222
6.4	Further Study.....	224
	Bibliography	225
	Appendix A	238
	Appendix B	330