

DECISION MAKING PROCESS MODEL FOR HOUSING DEVELOPERS IN
MALAYSIA

ROZLIN BINTI ZAINAL

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Doctor of Philosophy (Quantity Surveying)

Faculty of Built Environment
Universiti Teknologi Malaysia

JANUARY 2015

ABSTRACT

Housing development involves myriads of interrelated processes which include series of decision making functions. Decision making is a multi-level process that influences the success of a proposed housing project. A housing project may fail or suffer some of serious setback if the decision making function is flawed or has been made on an ad hoc basis or based on unreliable, imperfect or hazy information. Decisions have to be made empirically using scientific methods and tools based on accurate and reliable data and information in today's business environment. The main aim of this study is to develop a process model for investment decision making in housing development at the strategic phase of the project that is, initiation and feasibility stages in Malaysia. The objectives of this study are three pronged – one, to identify the decision making practiced among Malaysian housing developers, two to identify the methods and tools used by them to make decisions and three to determine the types of information required for making decisions. This research involved the development of theoretical model by synthesising the models developed by a number of prominent authors and researchers on the subject of decision making. It also uses the Delphi method to collect and analyse the appropriate data and information. For a start of the study, 50 numbers of developers were selected as samples. But only 34 responded to the second stage of the information gathering process. At the final stage of the study only 12 developers or participants were left for the final process of the study. The data was analysed using the descriptive statistical techniques. This study affirms that Malaysian developers tend to make their investment decisions based on simple interpolation of historical data and using simple statistical or mathematical techniques in deciding the investment. This study suggested that the Malaysian housing developers skipped several important decision making functions. These shortcomings were mainly due to time and financial constraints and the lack of statistical or mathematical expertise among the professionals and managers in the organisations. The findings allowed a critical review of the theoretical model which followed by the development of a revised process model of decision making for housing development at strategic phase i.e. at the initial and feasibility stages.

ABSTRAK

Pembangunan perumahan melibatkan pelbagai proses membuat keputusan. Membuat keputusan adalah proses yang mempengaruhi kejayaan projek. Projek pembangunan perumahan mungkin mengalami kegagalan sekiranya proses atau prosedur membuat keputusan tidak dilakukan dengan sempurna dan tergesa-gesa. Pembangunan boleh gagal sekiranya keputusan dibuat berdasarkan maklumat tidak sempurna, kabur atau berdasarkan gerak hati dan maklumat lepas yang tidak tepat. Keputusan baik adalah dibuat secara empirik dengan menggunakan kaedah dan alat-alat saintifik berdasarkan maklumat tepat dan boleh dipercayai dalam dunia perniagaan kini. Tujuan utama kajian ini ialah membangunkan satu model proses membuat keputusan pembangunan perumahan pada fasa strategik iaitu permulaan dan kajian kemungkinan di Malaysia. Objektif kajian terdiri daripada tiga serampang - pertama, merangka dan menentukan proses membuat keputusan yang diamalkan oleh pemaju perumahan Malaysia, kedua, mengenal pasti alat dan teknik yang digunakan oleh pemaju semasa membuat keputusan dan ketiga data dan maklumat yang diperlukan dan bersesuaian semasa membuat keputusan tersebut. Kajian melibatkan pembangunan model teori oleh sintesis model dengan menggabungkan hasil teori beberapa penulis dan penyelidik terkemuka pada subjek membuat keputusan selain menggunakan kaedah Delphi untuk mengutip, mengumpul menganalisis data dan maklumat yang sesuai. 50 pemaju telah dipilih sebagai sampel pada awalan kajian. Hanya 34 sahaja yang memberi respon dan dijadikan sampel peringkat kedua. Pada peringkat akhir kajian hanya 12 pemaju yang tinggal untuk proses akhir kajian. Data dianalisis menggunakan statistik deskriptif. Kajian ini mengesahkan pemaju Malaysia cenderung untuk membuat keputusan berdasarkan interpolasi mudah penggunaan maklumat lepas dan teknik statistik atau matematik mudah. Berbanding dengan teori kajian awalan mendapati pemaju perumahan seolah-olah melangkaui beberapa membuat keputusan penting. Kekurangan ini disebabkan oleh masa, kekangan kewangan dan kekurangan kepakaran statistik atau matematik dalam kalangan kumpulan profesional dan pengurusan dalam organisasi sampel. Penemuan mendapati kajian semula yang lebih kritikal terhadap model teori dan diikuti dengan pembangunan penyemakan model proses membuat keputusan bagi pembangunan perumahan di fasa strategik iaitu pada peringkat awalan dan kajian kemungkinan.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iv
	ACKNOWLEDGEMENTS	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENTS	viii
	LIST OF TABLES	xvi
	LIST OF FIGURES	xx
	LIST OF ABBREVIATIONS	xxvii
	LIST OF APPENDICES	xxix
1	INTRODUCTION	1
	1.1 Background of the Study	1
	1.2 Problem Statement	3
	1.3 Summary of Previous Studies	7
	1.4 Research Questions	10
	1.5 Aim and Objective of Research	10
	1.6 Scope and Limitation of Research	11
	1.7 Significant of Research	12
	1.8 Research Approach	13

1.9	Organisation of Thesis	14
1.10	Conclusion	16
2	THEORY OF DECISION MAKING	17
2.1	Introduction	17
2.2	Terms and definition	18
2.3	Model and its attributes	19
2.4	Decision making process	21
2.5	Decision making method	26
	2.5.1 Decision making tool	34
	2.5.1.1 Financial	35
	2.5.1.2 Market	39
2.6	Decision criteria	42
2.7	Conclusion	49
3	DECISION MAKING PROCESS MODEL FOR HOUSING DEVELOPMENT AT INITIATION PHASE	50
3.1	Introduction	50
3.2	What is Housing?	51
3.3	Housing Industry in Malaysia (1971–2010)	53
3.4	Housing Development Players	55
	3.4.1 The owner	55
	3.4.2 Developer	56
	3.4.3 Public Sector and Government Agencies	57
	3.4.4 Design Professional	58
	3.4.5 Contractors	58
3.5	The Objective of Housing Development	60
	3.5.1 To Developer	60
	3.5.2 To Buyer	60

3.6	Housing development process	61
3.7	Initiation phase in Housing Development	76
3.8	The Information of Decision Making at Initiation Phase	85
3.9	Conclusion	95
4	RESEARCH METHODOLOGY	98
4.1	Introduction	98
4.2	Research Flow	99
4.3	Research Design	102
	5.3.1 Delphi Method	106
4.4	Literature Review	108
4.5	Delphi Pilot Study	109
4.6	First Round Survey (R1)	110
	4.6.1 Questionnaire Survey	110
	4.6.2 Selection Sample	111
4.7	Second Round Survey (R2)	113
	4.7.1 Questionnaire Survey	113
	4.7.2 Verification Process	114
	4.7.3 Selection Sample	115
4.8	Statistical Analysis	115
	4.8.1 Frequency	116
	4.8.2 Mean	116
4.9	Theory Triangulation (Cross Validation)	118
4.10	Conclusion	120
5	RESEARCH ANALYSIS AND RESULT	121
5.1	Introduction	121
5.2	Data Analyses-Pilot Study	121
	5.2.1 Decision Maker	122

5.2.2	The Way of Decision Making	122
5.2.3	Decision Making Criteria	123
5.2.4	Decision Making Method	123
5.2.5	Problems in Decision Making	123
5.2.6	Decision Making Process	124
5.3	Data Analyses - First Round Survey (R1)	133
5.3.1	Frequency	133
5.3.1.1	Social Characteristics	133
5.3.1.2	Current Decision Making Process in Housing Project	134
5.3.1.3	Information Required for Decision Making Process	152
5.3.2	Mean	159
5.3.2.1	Current Decision Making Process in Housing Project	160
5.3.2.2	Information Required for Decision Making Process	161
5.4	Data Analyses - Second Round Survey (R2)	169
5.4.1	Mean	169
5.4.1.1	Current Decision Making Process in Housing Project	169
5.4.1.2	Information Required for Decision Making Process	174
5.5	Theory Triangulation Validation	178

6	PRACTICE OF DECISION MAKING	180
	PROCESS PROCESS	
6.1	Introduction	180
6.2	Decision Making Stage	180
6.3	Decision Making Activity	182
	6.3.1 Explore and Asses Development	182
	6.3.2 Evaluate Development	183
	6.3.3 Pre-Feasibility Study	183
	6.3.4 Preliminary Investigation	184
	6.3.5 Development Schedule	185
	6.3.6 Feasibility Study	186
6.4	Decision Making Point	186
6.5	Decision Maker	187
6.6	Critical Level of Decision Making	188
	6.6.1 Explore and Asses Development	189
	6.6.2 Evaluate Development	190
	6.6.3 Pre Feasibility Study	190
	6.6.4 Preliminary Investigation	191
	6.6.5 Development Schedule	191
	6.6.6 Feasibility Study	192
6.7	Decision Making Method	192
	6.7.1 Discussion	193
	6.7.2 Experience Judgement	193
	6.7.3 Intuition	194
	6.7.4 Comparison with Historical Data	194
	6.7.5 Multi-Attribute Utility Theory (MAUT)	194
	6.7.6 Market/Economic Report	195
	6.7.7 Decision Tree	195
	6.7.8 Mathematic Simulation (Model)	196

	6.7.9	SWOT Analysis	196
	6.7.10	Pros and Cons Analysis	197
	6.7.11	Voting/Consensus	197
	6.7.12	Operation Management (Location)	197
	6.7.13	Computer Simulation	198
	6.7.14	Financial Analysis	198
6.8		Decision Making Tool	199
	6.8.1	Financial	199
	6.8.2	Market	201
6.9		Decision Criteria	202
	6.9.1	Explore and Asses Development	202
	6.9.2	Evaluate Development	203
	6.9.3	Pre Feasibility Study	203
	6.9.4	Preliminary Investigation	204
	6.9.5	Development Schedule	204
	6.9.6	Feasibility Study	204
6.10		Conclusion	205
7		INFORMATION REQUIRED FOR DECISION MAKING PROCESS	206
	7.1	Introduction	206
	7.2	Economic Information	206
	7.2.1	Authorities Policies	207
	7.2.2	Potential Demand	207
	7.2.3	Existing Supplying	208
	7.2.4	Competition	208
	7.2.5	Housing Market	209
	7.2.6	Timing (Life Cycle Project)	209
	7.2.7	Target Customer	210
	7.2.8	Occupational of Homebuyers	210

	7.2.9	Projected Market	210
	7.2.10	Current Trade Area	211
	7.2.11	Size of Housing Product	211
	7.2.12	Past Issues	212
7.3		Technical Information	212
	7.3.1	Location	212
	7.3.2	Authorities Policies	213
	7.3.3	Infrastructure	213
	7.3.4	Facilities	214
	7.3.5	Flexibility of Productive Capacity	214
	7.3.6	Preliminary Research and Testing	214
	7.3.7	Size of Project	215
	7.3.8	Building	215
	7.3.9	Environmental	216
	7.3.10	Plant Layout	216
	7.3.11	Work Schedule	216
7.4		Financial Information	217
	7.4.1	Loan	217
	7.4.2	Capital	218
	7.4.3	Revenue of Project	218
	7.4.4	Term of Project	218
	7.4.5	Development Cost	219
	7.4.6	Construction Cost	219
	7.4.7	Operating Cost	220
	7.4.8	Pre Operating Expenses	220
	7.4.9	Working Capital	220
	7.4.10	Sunk Cost	221
7.5		Conclusion	222
8		DECISION MAKING PROCESS MODEL	223

8.1	Introduction	223
8.2	Initiation Phase Process	224
8.3	Stages Process at Initiation Phase	224
8.4	Decision Making Point	233
8.5	Decision Maker	233
8.6	Decision Making Method	236
8.7	Decision Making Tool	239
	8.7.1 Financial	239
	8.7.2 Market	241
8.8	Decision Criteria	243
8.9	Economic Information	246
8.10	Technical Information	249
8.11	Financial Information	252
8.12	Conclusion	261
9	CONCLUSION	262
9.1	Introduction	262
9.2	Summary of Research Work	263
9.3	Decision Making Process Practiced Among Malaysian Housing Developers	265
9.4	Methods and Tools Used to Make Decision	266
9.5	Types of Information Required for Making Decision	268
9.6	Significant Contributions	269
9.7	Recommendations for Future Research	269
9.8	Closure	270
	REFERENCES	271
	Appendices A-D	283 – 313

LIST OF TABLES

TABLE NO.	TITLE	PAGE
1.1	List of summary of previous studies in housing decision making	8
2.1	Literature review of decision making process elements	22
2.2	The example of format of pros and cons analysis	31
2.3	The example of format of SWOT analysis	31
2.4	Summary of decision method theory	34
2.5	NPV analysis	37
2.6	Conclusion of NPV result	38
2.7	Summary of decision tool	41
2.8	A summary of CSR elements	45
2.9	Project definition checklist	47
2.10	Literature review of housing development decision criteria	48
3.1	Housing progress by private sector of the Malaysia's Plans	53
3.2	Contractor (building) category	59
3.3	Characteristics of housing demand at various human motivation levels	61

3.4	Summary of selected literature review of decision elements, development process and initiation phase activity	82
3.5	Summaries of Theoretical of Information Required in Decision Making at Initiation Phase	92
4.1	The summary of integration research objectives with elements of data	105
4.2	Interview schedule framework	109
4.3	The summary of questionnaire (R1) form element	110
4.4	The summary of questionnaire (R2) form element	114
4.5	The description function of frequency	117
4.6	The description function of mean	117
4.7	Theories selected of decision making at initiation phase	119
4.8	Theories selected of information in decision making at initiation phase	119
4.9	Theories selected of decision criteria at initiation phase	119
5.1	Decision making concept by developer	124
5.2	The proportion of position in company	133
5.3	The proportion of experience in job	134
5.4	The proportion of number of years of the company in business	134
5.5	Value of critical level	159
5.6	Critical level of initiation phase stage	160
5.7	Critical level of explore and asses development activities	160
5.8	Critical level of evaluate development activities	160
5.9	Critical level of pre feasibility study activities	160

5.10	Critical level of preliminary investigation activities	161
5.11	Critical level of development schedule activities	161
5.12	Critical level of feasibility study activities	161
5.13	Critical level of decision making process in initiation phase stage	161
5.14	Economic information of explore and assess development stage	162
5.15	Economic information of evaluate development stage	162
5.16	Economic information of pre feasibility study stage	162
5.17	Economic information of preliminary investigation stage	163
5.18	Economic information of development schedule stage	163
5.19	Economic information of feasibility study stage	164
5.20	Technical information of explore and assess development stage	164
5.21	Technical information of evaluate development stage	164
5.22	Technical information of pre feasibility study stage	165
5.23	Technical information of preliminary investigation stage	165
5.24	Technical information of development schedule stage	166
5.25	Technical information of feasibility study stage	166
5.26	Financial information of explore and asses development stage	166
5.27	Financial information of evaluate development stage	167
5.28	Financial information of pre feasibility study stage	167
5.29	Financial information of preliminary investigation stage	167
5.30	Financial information of development schedule stage	168

5.31	Financial information of feasibility study stage	168
5.32	Value of agreement level	169
5.33	Value of acceptance level	169
5.34	Acceptance level of initiation phase activities	170
5.35	Acceptation level of critical level of initiation phase activity	171
5.36	Acceptation level of decision maker of initiation phase stage	171
5.37	Acceptation level of decision making method	172
5.38	Acceptation level of decision financial tool	173
5.39	Acceptation level of decision market tool	173
5.40	Acceptation level of decision criteria	174
5.41	Acceptance level of economic information	175
5.42	Acceptation level of technical information	176
5.43	Acceptation level of financial information	177

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.1	Statistic of housing project failure in Malaysia from 2007 until 2011	2
1.2	Contradictory objectives	5
1.3	Complaints in housing sector for year 2008 in Malaysia	6
1.4	Scope of research	12
2.1	The modelling process	20
2.2	Idea assessment and business development process	23
2.3	Conceptual design process	24
2.4	Generic diagram of the decision-making information flows in information intensive agriculture	25
2.5	Decision methods	27
2.6	Example decision tree	28
2.7	An outline Delphi process	29
2.8	ROI graphic approach	35
2.9	Future Value (FV) Formula	37
2.8	The connections of various factors in Hong Kong urban housing development process	46

3.1	Contractor hierarchy	59
3.2	Stages of the development process and their interrelationship	62
3.3	Outline plan of work	64
3.4	Project development process	65
3.5	Actors in the Development Process	66
3.6	Housing development process in Republic South Africa	67
3.7	The residential land development in Indonesia	69
3.8	Development approval	70
3.9	Planning approvals process	71
3.10	Development process	72
3.11	The development process at feasibility stage	73
3.12	Flowchart of property development in Malaysia	75
3.13	Elements of strategy stage	78
3.14	Feedback, Changes and Corrective Action	80
3.15	Project Management Process	81
3.16	The fundamental model of decision making process for housing development	84
3.17	The information required at initiation phase	94
3.18	Conceptual of decision making process model at initiation phase for housing development	96
4.1	Research flow	101
4.2	Research methodology process – Delphi method	104
4.3	Research process	108

5.1	Decision making process by D1	127
5.2	Decision making process by D2	128
5.3	Decision making process by D3	129
5.4	Decision making process by D4	130
5.5	Decision making process by D5	131
5.6	Summary of decision making process by private developer	132
5.7	The proportion of position in company	133
5.8	The proportion of experience in job	134
5.9	The proportion of number of years of the company in business	135
5.10	The frequencies of stages normally carried out during the initiation phase	136
5.11	The frequencies of explore and asses development stage activities	136
5.12	The frequencies of evaluate development stage activities	136
5.13	The frequencies of pre feasibility study stage activities	137
5.14	The frequencies of preliminary investigation stage activities	137
5.15	The frequencies of development schedule stage activities	137
5.16	The frequencies of feasibility study stage activities	138
5.17	The frequencies of decision making point at initiation phase	138
5.18	The frequencies of critical level of each stage during initiation phase	139
5.19	The frequencies of explore and assess development stage activities	139
5.20	The frequencies of evaluate development stage activities	140

5.21	The frequencies of pre feasibility study stage activities	140
5.22	The frequencies of preliminary investigation stage activities	141
5.23	The frequencies of development schedule stage activities	141
5.24	The frequencies of feasibility study stage activities	142
5.25	The frequencies of decision maker	143
5.26	The frequencies of decision making method at explore and assess development stage	144
5.27	The frequencies of decision making method at evaluate development stage	144
5.28	The frequencies of decision making method at pre feasibility stage	144
5.29	The frequencies of decision making method at preliminary investigation stage	145
5.30	The frequencies of decision making method at development schedule stage	145
5.31	The frequencies of decision making method at feasibility study stage	145
5.32	The frequencies of financial decision making tools at explore and assess development stage	146
5.33	The frequencies of financial decision making tools at evaluate development stage	146
5.34	The frequencies of financial decision making tools at pre feasibility stage	147
5.35	The frequencies of financial decision making tools at preliminary investigation stage	147
5.36	The frequencies of financial decision making tools at development schedule stage	147
5.37	The frequencies of financial decision making tools at feasibility study stage	147

5.38	The frequencies of market decision making tools at explore and assess development stage	148
5.39	The frequencies of market decision making tools at evaluate development stage	148
5.40	The frequencies of market decision making tools at pre feasibility study stage	149
5.41	The frequencies of market decision making tools at preliminary investigation stage	149
5.42	The frequencies of market decision making tools at development schedule stage	149
5.43	The frequencies of market decision making tools at feasibility study stage	149
5.44	The frequencies of decision criteria at explore and assess development stage	150
5.45	The frequencies of decision criteria at evaluate development stage	150
5.46	The frequencies of decision criteria at pre feasibility study stage	151
5.47	The frequencies of decision criteria at preliminary investigation stage	151
5.48	The frequencies of decision criteria at development schedule stage	151
5.49	The frequencies of decision criteria at feasibility study stage	151
5.50	The frequencies of economic information at explore and assess development stage	153
5.51	The frequencies of economic information at evaluate development stage	153
5.52	The frequencies of economic information at pre feasibility study stage	154
5.53	The frequencies of economic information at preliminary	

	investigation stage	154
5.54	The frequencies of economic information at development schedule stage	154
5.55	The frequencies of economic information at feasibility study stage	154
5.56	The frequencies of technical information at explore and assess development stage	155
5.57	The frequencies of technical information at evaluate development stage	155
5.58	The frequencies of technical information at pre feasibility study stage	156
5.59	The frequencies of technical information at preliminary investigation stage	156
5.60	The frequencies of technical information at development schedule stage	156
5.61	The frequencies of technical information at feasibility study stage	156
5.62	The frequencies of financial information at explore and assess development stage	157
5.63	The frequencies of financial information at evaluate development stage	157
5.64	The frequencies of financial information at pre feasibility study stage	158
5.65	The frequencies of financial information at preliminary investigation stage	158
5.66	The frequencies of financial information at development schedule stage	158
5.67	The frequencies of financial information at feasibility study stage	158
5.68	Finding result of theory triangulation validation	179

8.1	Initiation phase process for housing development	226
8.2	Explore and asses development stage process	227
8.3	Evaluate development stage process	228
8.4	Pre-feasibility study stage process	229
8.5	Preliminary investigation stage process	230
8.6	Schedule development stage process	231
8.7	Feasibility study stage process	232
8.8	Decision making point process at initiation phase for housing development	234
8.9	Decision maker involved at the initiation phase process for housing development	235
8.10	Decision method used at initiation phase process for housing development	238
8.11	Financial tools used at initiation phase process for housing development	240
8.12	Market tools used at initiation phase process for housing development	242
8.13	Decision criteria required at initiation phase process for housing development	245
8.14	Economic information required at initiation phase process for housing development	248
8.15	Technical information required at initiation phase process for housing development	251
8.16	Financial information required at initiation phase process for housing development	251
8.17	Decision making process model for housing development project	256

LIST OF ABBREVIATIONS/SYMBOLS

4P's	-	Product, price, place (distribution) and promotion
AHP	-	Analytic Hierarchy Process
APH	-	Affordable Public Housing
BERNAMA	-	Malaysian National News Agency
BOD	-	Board of Directors
BTS	-	Build-Then-Sell
CCC	-	Completion and Compliance
CEO	-	Chief Executive Officer
CHM	-	Chairman
CIDB	-	Construction Industry Development Board
CIOB	-	Chartered Institute of Building
CVI	-	Cumulative Volume Index
CSR	-	Corporate Social Responsibility
DSS	-	Decision Support System
DCF	-	Discounted Cash Flow
FV	-	Future Value
GDP	-	Gross Domestic Product
GM	-	General Manager
HDA	-	Housing Development (Control and Licensing) Act 1966
HOD	-	Head of Department
IBS	-	Industrialised Building System
IRR	-	Internal Rate of Return
MAUT	-	Multi-Attribute Utility Theory

MEC	-	Member of Executive Committee
MOT	-	Memorandum of Transfer
NDP	-	National Development Policy
NEP	-	New Economic Policy
NHP	-	National Housing Policy
NPV	-	Net Present Value
NPW	-	Net Present Worth
OLAP	-	Online Analytical Processing
OSC	-	One Stop Centre
PHP	-	People's Housing Programme
PI	-	Profitability index
PV	-	Present Value
R1	-	First Round Delphi
R2	-	Second Round Delphi
REHDA	-	Real Estate and Housing Developers' Association Malaysia
ROC	-	Rate of Cost
ROI	-	Return on Investment
SOP	-	Standard Operating Practice
SPSS	-	Statistical Package for the Social Sciences
SWOT	-	Strengths, Weaknesses, Opportunities and Threats
TVD	-	Transportation rate, Volume and Distance
I	-	Interest discount rate
N	-	Number of periods/numbers
T	-	Time of the cash flow
R_t	-	Net cash flow (the amount of cash, inflow minus outflow) at time t
μ	-	Mean
∞	-	Infinity
Σ	-	Sum

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Sample of questionnaire form for first round survey (R1)	282
B	Sample of questionnaire form for second round survey (R2)	294
C	List of respondents	307
D	Data analysis for theory triangulation validation	313

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Housing is one of the important elements for the Malaysian growth and development. In 2010, housing made up of 30% of the total output of the Malaysian construction industry which is 5.8% of the country's Gross Development Product (GDP) (CIDB, 2010). Malaysian has emphasised on home ownership as part of its economic policy since the 2nd Malaysia Plan (1971-1975). This has led to a series of implementation of housing development programmes that saw thousands of housing facilities being built annually by both the government and private sectors.

The aim of the housing policy in Malaysia is to give all Malaysian adequate, decent, affordable and accessible housing that is completely facilitated with fundamental facilities and services (Yahya, 1997), especially for the lower-income

group are able to own a house in such criteria (Ting, 2001). In this regards, the private sectors (key players in housing development) are optimistic to build more profitable houses in developers' development area.

Despite the pleasant track record of the housing development, thousands of complaints received by National Housing Department in the year 2000 about the unethical practices of some developers or criminal house developers such as late delivery, compensation, cheating, non conforming to plan, low customer high-interest, high interest loan, late produce certificate of fitness, payment, contravene act or regulation and deposit ownership. The impact will face is on the house buyers where they have to pay high-interest loan payment for a long time without owning any house. The issue becomes more critical while the demand of housing is increasing and imbalance with the total of land in the country is worsened. This situation is worsen due to land decreasing and limited (Salleh & Chai, 1997).

Figure 1.1 shows the statistic of housing project failure (late delivery project, sick project and abandoned project) in Malaysia from 2007 until 2011. According to National Housing Department (2008), late project delivery means that the project is experiencing delays of 10% to 30% compared to the proper development. Sick project refers to the project which experiences a delay of more than 30% stack up of the progress that should be or has expired Sale and Purchase Agreement. Abandoned project is a project which was not complete and no major activity at the construction site for six months and after.

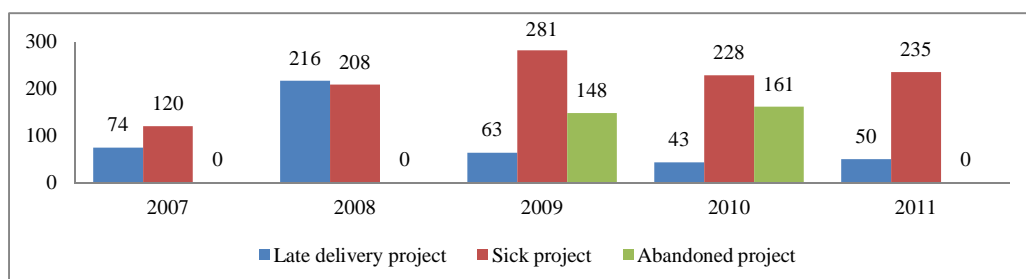


Figure 1.1 Statistic of Housing Failure in Malaysia from 2007 until 2011 (National Housing Department, 2008-2012)

There are no abandoned projects in the year 2007, 2008 and 2011 but there are still problems in the housing project such as late delivery project and sick project. As suggested by Holian (2002), much of these problems were attributed to poor decision making. Accordingly, poor decision making also exist in the case of housing development in Malaysia (Khalid, 2005).

1.2 Problem Statement

The foregoing discussion highlighted the problems associated with decision making in housing development. According to Sharipah (2011) the main issues in the Malaysian housing industry are on the unsold, overhang and oversupply of housing development throughout the country. Sharipah (2011) also find that the exceeding target of the residential sector, industrial sector and unsold shop lots with a total of RM 9.84 billion as at end of 2000, increased by 11.62% over the previous half year. The National Economic Action Council (NEAC) (1999) recognised that the cause of economy suffered poorly in the 1997 economic recession was due to property market overhang and oversupply.

These issues actually come from the developers who are responsible in making a housing development decision (Khalid, 2005). Chan (1997) highlighted that as decision maker would need to set up the uniqueness and characteristic of the unit based on various obstruction and objectives from his own side. Developer or decision maker does not automatically construct a unit that will convince the recipients, since they have their own viewpoint and mind of their needs, objectives, obstructions and necessities. Mahdi, et al., (2006) conclude that it is very hard to build a suitable typical housing unit since the recipients have variance on numerous problems.

Basi (1998) highlighted that all decision made by intuitive without scientific approach. Important decisions are probably made intuitive at the executive level, cooperation at the managerial level, and computational at the administrative level. This classification will create dissimilarity in decision making group and it causes misunderstanding between each other. When this situation occurs among them, the accurate result cannot be achieved. Again regarding to Basi (1998), integration of all levels in organisation especially those who are involved in decision making must work together and have mutual understanding; so that the issue may be disappearing in conflict group.

Generally the process begins with the decision from a client (an individual or enterprise) to invest in a construction project to satisfy a particular need (Ofori, 1990). The phenomena show that client has major involvement in decision making in construction project. The problem is to make the best decision in construction; it must comes from various knowledge sources and specialists, especially in housing where the sector is near to the public (social) objective (Mulliner, 2013). But then, the problem more often than not persists and relates both to contradictory objectives among the major stakeholders in the process, and to the particular idiosyncrasies of the speculative housing market (Carmona, 2001) as shown in Figure 1.2. These situations become produce a poor decision and finally make a bad quality output in housing project (Ziara, 1999).

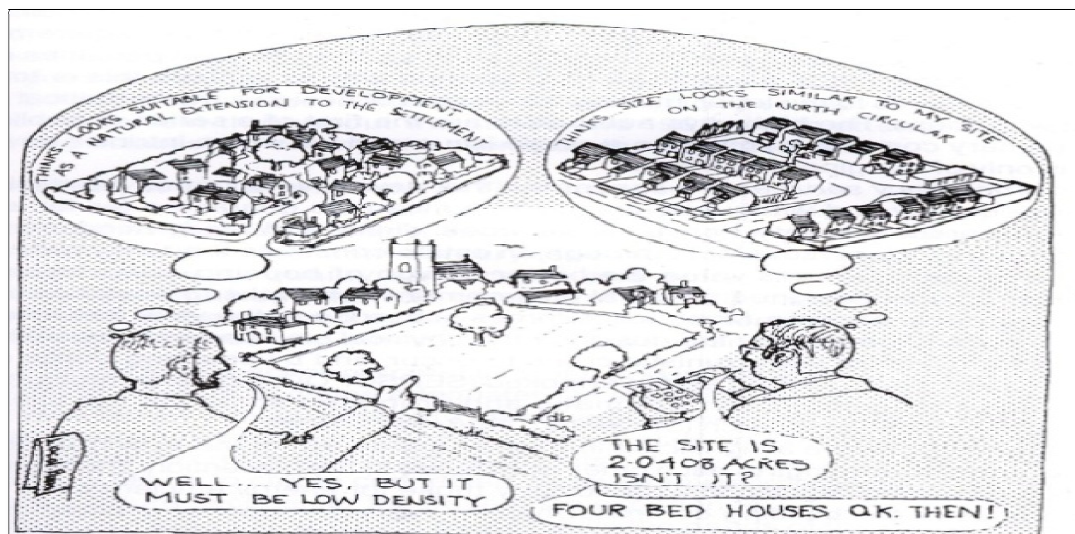


Figure 1.2 Contradictory Objectives
(Suffolk Planning Officer's, 1993 in Carmona, 2001)

There are many complaints received by National Housing Department on the lack of housing quality in Malaysia due to sequence in decision making issue. The statistics in the Figure 1.3 shows that the highest percentage of complaint is late delivery and the lowest percentage is complaint in infrastructure. The complaints (problems/issues) according to ranking; Late delivery (42%), defective workmanship (8%), contravene act/regulations (6%), interest (5%), services (4%), payment (4%), deposit ownership (3%), certificate of fitness (2%), Compensation (2%) and infrastructure (1%). Based on Basi (1998), Ziara (1999) and Holian (2002) problems may be attributed mainly to poor or wrong decision making. Poor decision making can be due to many reasons. The failures included the procedure or poor quality information or wrong the using decision techniques (Harris, 2009).

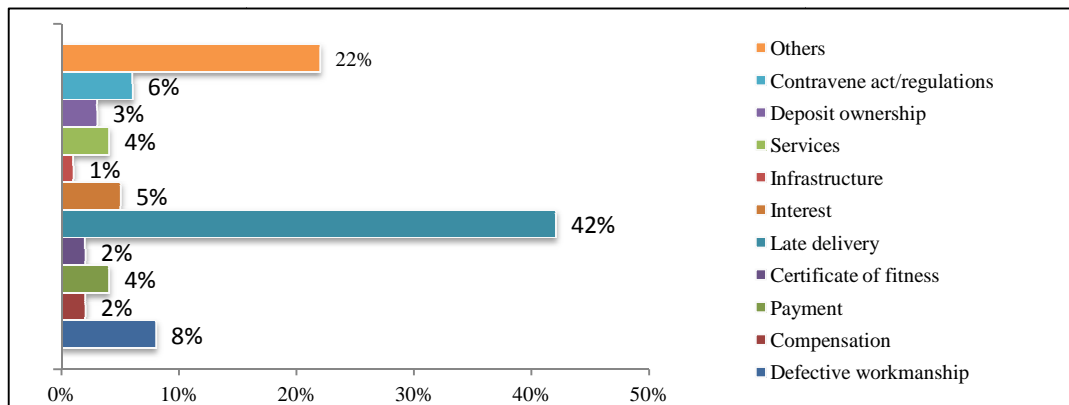


Figure 1.3 Complaints in Housing Sector for Year 2008 in Malaysia.
(National Housing Department, 2008)

According to Mat and Md. (2004), incomplete communication between decision maker, proposer and secretariat happened due to restraint of time and distance separately in decision making process for construction development project. Consequently convenience to information becomes limited due to the restricted amount of data supplied by proposer. Again Mat & Md. (2004) pointed that the decision maker may create their own approach based on their experiences and expertise with a simplest approach by just applying the obtainable standards and rules.

Whole Building Design Guides (WBDG) (2012) pointed out that the initiation phase is critical to a project's success. It is regarding to establish the qualities of the project that are necessary to satisfy client and end user needs and expectations, once it is delivered and in use. Initiation phase needs some hard thinking and some tough decisions and application of systematic knowledge and know-how (Carroll, 2004). Decision maker in housing maker must particular with this phase because it is the process of formally recognising that a new project exists or that an existing project should continue into the next phase (REHDA, 2010).

Initial survey suggested that developers in Malaysia should manage and implement housing project during decision making in a more systematic and

measurable way at initiation phase. They also need to apply the appropriate approach. The issue is majority of them prefer making decision using trial and error and experience method. They also use a simple feasibility study with simple mathematical calculation and ordinary personnel to support the decision. They must make decisions methodically or scientifically by applying the science management (Wheelen & Hunger, 1991). The aim of their housing project is more to get high profit and fulfills the high demand.

As a conclusion, based on Ziara (1999), Mat & Md. (2004), Harris (2009) and Whole Building Design Guides (WBDG) (2012), all the problems of housing development attributed mainly to poor or wrong decision making, procedure or poor quality information or wrong the using decision techniques at initiation phase. Beside that, regarding to initial survey finds that the decision making process in developer's management is straightforward. Thus, this research emphasises on the developing of decision making process model for housing projects at initiation phase.

1.3 Summary of Previous Studies

Many research works have been carried out on the housing decision making issues. However most of the researches did not emphasised on the developing of decision making process model for housing projects especially at initiation phase. Table 1.1 is a summary of three previous studies in housing decision making as a reference. Each of them touches to the tool, marketing and government roles in decision making only.

First, Ahmad *et al* (2004) came out with decision for site selection. The research raises out those decision makers usually uses own biased decision and gut feelings based on their experience in selecting the most suitable sites for development. Then, online analytical processing (OLAP) concept is employed to analyse data using just for site selection decision stage not for all stages in initiation phase.

The second is research on decision making in house marketing area. Livette (2006) highlighted issue that pleasure with the result of the decision making process is more important than the nature of the process itself, but, unsuitable that process seems to be in terms of the theory of buyer actions. The research is focusing more to house purchaser which demonstrates that most of the buyers undertake imperfect decision making not to developer effort.

The third previous study is government decision making model in housing scope. Mahdi *et al* (2006) emphasised on point of government's and recipients' perspective only. He found that the system of housing construction is proved to be efficient in making a trade off between the government purposes and recipients desires not to developer and technical player advantages in housing development.

And the last previous study is discussion on decision making method. Mulliner *et al.* (2013) suggested that decision maker must use a multiple criteria decision making method as assessment of sustainable housing affordability. The method comprises economic, environmental and social criteria to produce quality of life and community sustainability in housing development.

Table 1.1: List of Summary of Previous Studies in Housing Decision Making

Title	Author	Year	Issue	Methodology	Finding	Scope
1. Development of a Decision Support System Using Data Warehousing to Assist Builders/Developers in Site Selection.	Ahmad, I., Azharb, S. & Lukauskis, P.	2004	<ul style="list-style-type: none"> • Site selection process is a complex decision making task. • Decision makers to use their subjective judgment and gut feelings based on their experience in selecting the most appropriate site for development. 	<ul style="list-style-type: none"> • Use a decision support system (DSS). • Respondent: builders/developers of housing development. 	<ul style="list-style-type: none"> • Enhanced approach for integrating data from multiple, often very large, distributed, heterogeneous databases and other information sources. • Introduce online analytical processing (OLAP) concept which analyzes data using for any combination of variables. • Users can generate data trends over a period of time to make any forecasts. 	Decision tool for site selection
2. A Marketing Perspective of Private Sector Retirement Housing and the Effectiveness of the Buyer Behaviour of Its Purchasers	Livette, M.	2006	<ul style="list-style-type: none"> • Inappropriate decision making process of the theory of buyer behaviour. 	<ul style="list-style-type: none"> • Examines the decision making process of retirement housing purchasers. • Determine its efficiency by comparing and contrasting data. • 200 respondents with semi-structured interviews. 	<ul style="list-style-type: none"> • Majority of retirement housing purchasers undertake limited decision making: they consider only the scheme in which a property is eventually bought, and they are very satisfied with their purchase. 	Make decision in house marketing
3. Optimum House Delivery Decision Model from the Government's And Recipients' Point-Of-View.	Mahdi, I. M., Al-Reshaid, K. & Fereig, S. M.	2006	<ul style="list-style-type: none"> • Decision maker have their own perspective and imagination of their needs, objectives, constraints and requirements. • Decision making process very difficult to produce satisfactory typical housing units. 	<ul style="list-style-type: none"> • Appear into the mass production of house units and the conflict. • Proposes a decision model for deciding the optimum house delivery alternatives for both the recipients and the Government. • Use analytical hierarchy process. 	<ul style="list-style-type: none"> • Partially constructed houses enable the possibility of many alternatives by the recipients, which in turn avoids the drawbacks of rebuilding and at the same time, maintains work quality. 	Model of housing decision making for Government
4. An Assessment of Sustainable Housing Affordability Using a Multiple Criteria Decision Making Method	Mulliner, E., Smallbone, K., Maliene, V.	2013	<ul style="list-style-type: none"> • Quality of life and community sustainability the environmental and social sustainability of housing not taken into consideration. 	<ul style="list-style-type: none"> • Application of a methodology that can be applied to assess the affordability of different housing locations in a sustainable manner, taking into account a range of economic, environmental and social criteria 	<ul style="list-style-type: none"> • A range of social and environmental criteria can greatly affect the calculation of an areas affordability, in comparison to focusing solely on financial attributes. 	Decision making method

1.4 Research Questions

Regarding to problem statement, the issues need to be the reply and fully investigate as found out in the preliminary enquiry. Therefore the research requirements are stated in the questions below;

1. How do developers make decision?
2. When do they make decision?
3. Who make the decision?
4. What are the inputs (data/information)?
5. What are the criteria taken into account?

1.5 Aim and Objectives of the Research

This research aims to develop a process model for decision making in housing development at the strategic phase in Malaysia.

The objectives of this research are;

1. to identify the decision making process practiced by the Malaysian housing developers
2. to identify the methods and tools used to make decisions and
3. to determine the types of information required for making decisions.

1.6 Scope and Limitation of Research

This research is limited to a study of decision making process among large housing developers in Malaysia particularly in Peninsula. The research is also limited to the decision making process during the strategic phase which include initiation phase. It does not consider decision making in other phases.

The research focuses on strategic phase which include initiation phase (before planning phase) because it is considered to be the first step and focal point in construction process (Tan, 1996) (see Figure 1.4). Initiation phase includes explore and assess development, evaluate development, pre feasibility study (market assessment), preliminary investment, development schedule and feasibility study stage. This research also includes all types of housing development whether low cost, medium cost, high cost, terrace house, apartment, bungalow, semi detached or mix development. Researcher uses a natural view in housing development project so that it can be used by developers in whatever circumstances.

Respondents in this research include developers in Peninsular of Malaysia who submit their financial audit report to Ministry of Housing and Local Authority until 31 August 2008. This sample is selected because the developers are involved with a high probability in their work and business. It is important to determine whether the developers are in ethical or unethical decision making for housing development.

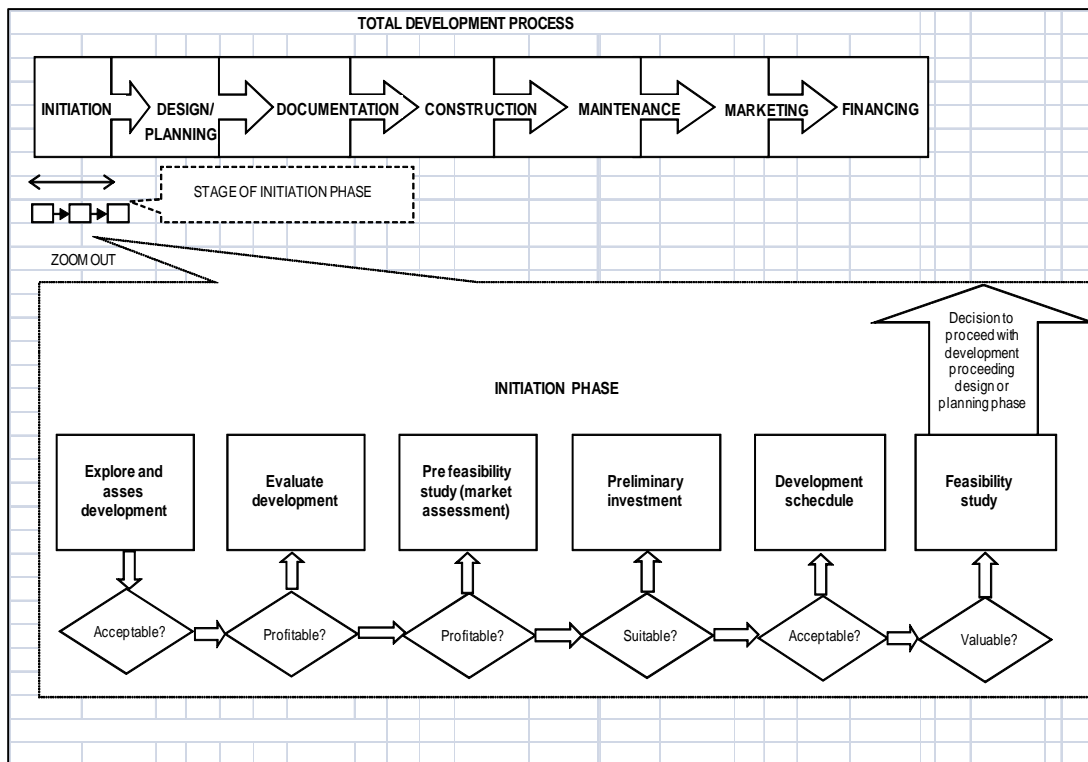


Figure 1.4 Scope of Research

1.7 Significance of Research

The main contribution of this study to the body of knowledge falls on the following aspects: First, improving the current process and technique in decision making model of initiation phase in housing project. This study has contributed to the standards definition of housing approval and the decision makers especially developers to realize the component in stage of initiation phase in housing development. In addition, this study will provide cost and time saving at the stage of preliminary development housing process and finally producing quality housing as

the final product. Finally, this research overall want to help developers make quality in their decision at each stage of initial phase of housing development.

Beside that, this study can provide an overview or idea and knowledge to academia on the developing of decision making process model for housing projects especially at initiation phase. Based on previous studies (as mentioned in sub chapter 1.2) most of them did not emphasised on this area especially at primary phase in housing development. Therefore this research will contribute to the future development of an academia.

1.8 Research Approach

A research approach is basically a research model. It has a correlation with the data collection method because it is specified by research strategy. Generally, this research has five main activities which are theoretical study, pilot study, data collection, data analysis and finally findings. The main purpose of these activities is to ensure that this research is carried systematically so that the aim and objectives of the research can be achieved.

The research is carried out by identifying problems in the housing project development in Malaysia and the decision making scenario. The idea of problem statements also comes from literature review and a pilot study. The following phase is the theoretical study which is undertaken to further strengthen the preliminary study. This part explains the theoretical aspects of housing project development with particular attention given to the decision making element of the processes and development of theoretical framework.

The third phase is data collection. In this phase, data and information are collected with three rounds survey (Delphi Pilot, Delphi 1st Round, and Delphi 2nd Round) and analysed systematically by way of scientific methods like qualitative and quantitative method. The sample of respondents is identified scientifically in order for the researcher to find a representation of the total population which is the total number housing developers in Malaysia.

Data analysed is formulated as solutions targeted to answer the objectives of the research. Generally, the decision making practice for housing development situation is discussed in detail including current decision making process in housing projects which is the normal process of decision making, critical level at each of the process, party(ies) or person making the decision, decision making methods and tools and decision criteria. Another aspect which will be discussed is the information required for the decision making process. The answers of questionnaires and opinions from selected developers will be analysed with SPSS (Statistical Package for the Social Sciences) software.

The last part of this research is a summary of findings explain the problem statement and aim and objectives achievement. Another part is the elaboration of the theoretical study and practice implication based on the findings' result. This part will be accompanied by suggestions based on further research conducted by other researchers.

1.9 Organisation of Thesis

This thesis is divided into nine chapters. Chapter 1 gives the introduction and background of the study, the aim and objectives and the process.

Chapter 2 explain the theory of decision making the associated decision making process, the various tools and techniques used and the criteria of decision making functions are discussed.

Chapter 3 provides the overview of Malaysian housing industry and its performance for the last 15 years. It also discusses some of the issues and problems facing the housing development as well as the developer. This chapter also highlights into the theoretical aspects of housing project development with particular attention given to the decision making element of the processes and information required.

Chapter 4 discusses in detail the methodology of the research. The research was discussed in accordance stages of the research. The stages includes identification of survey elements, questionnaire development, data collection process and method of analysis are the main topics described in the chapter.

Chapter 5 describes the analyses that were performed on the data collected from different stages of the research. The results are displayed, analysed and discussed in order to obtain significant findings and fulfill the research objectives.

Chapter 6 discusses the synthesis of interesting findings leading to the identification of the determinants that current practice of decision making process in housing development project. An equal emphasis on the aspects or variables and practices for each aspect that promote the practice of decision making process are highlighted in each subsequent section of the discussions.

Chapter 7 discusses the type of information required for the different decision making points at initiation phase of housing development project. The focus on usage current information practice from explore assess development until feasibility study stage that support at each of activities.

Chapter 8 discusses the aim of research. The content covers the illustration of decision making process model for housing development project during initiation phase by flow chart. Illustration of model looks into the process of housing development, the associated decision making process, the various tools and techniques used and the inputs and outputs of decision making functions.

Chapter 9 summarises the research work, provides the conclusions of this research and recommendations for future research.

1.10 Conclusion

This chapter outlined the thesis. It indicated the research background, highlighted the current issues of measuring the performance of housing development and established the research problems and objectives. The research scope and its significances addressed before the thesis organisation has outlined.

CHAPTER 2

THEORY OF DECISION MAKING

2.1 Introduction

Decision making is a process that tangled with the other planning, coordinating and controlling. It is an important element to decide the best result or solution in housing development selection and key to the success of project implementation. This chapter discusses the concept, method, tool and criteria associated with decision making. The discussion covers preliminary answer for current practices of decision making process in housing development project. Extension of this finding, development of decision making process of housing in Malaysia can be implemented.

2.2 Terms and Definition

Before further discuss the subject of the research, it must has a clear understanding of the terms used in this study. Based on Keast et al. (2009) many types of decision can be defined by situation, alternatives and outcome. Furthermore taking a decision is a process which includes a recognition process; an argumentation process and a selection from alternatives process.

According to Reason (1990) decision making is also as cognitive process. It is produced in the selection of alternative scenarios. Each of decision making process presents the last alternative. The result can be an exploit option.

For the purpose of this research, the following terms present different meaning.

1. Decision:

“Decision means that each of the potential solutions is evaluated and compared to the alternatives until the best solution is obtained”.

(Hendrickson, 1998)

2. Decision making:

“The analysis of a finite set of alternatives described in terms of some evaluative criteria.”

(Triantaphyllou, 2000)

3. Decision making process:

“Taking a judgement procedure or selecting alternatives which comprise a process of define and clarify the issue, gather all the facts and understand their causes, think about or brainstorm possible options and solutions, consider and compare the pros and cons of each option and select the best option.”

(Chapman, 1995)

4. Decision points:

“Latest moment at which a predetermined course of action is (or must be) initiated.”

(Businessdictionary.com, 2009)

As the result, decision making defined as the process of choosing and analysing alternatives, ideas and judgements with evaluate action until the best solution decided. The integration from terms and definition listed guide this research to achieve the aim. Futuremore, it fulfils all the research questions onbehalf to research objectives.

2.3 Model and Its Attributes

This section describes the component of model and select which it used in this research as final finding. A model is a simplified representation of the key elements of reality and their interaction (Golub, 1997). A model expresses what we mean when we say that we know how something works (Oxenfeldt, 2001). The characteristics of models are;

- They simplify complex reality by stripping away the non-essentials.
- They include the essential elements.
- They indicate the relationships among the component parts.

(Oxenfeldt, 2001)

Figure 2.1 shows the modelling process. Keast and Towler (2009) pointed out that, model can also be considered as ideas or abstractions whose main function is to question or stand for phenomena.

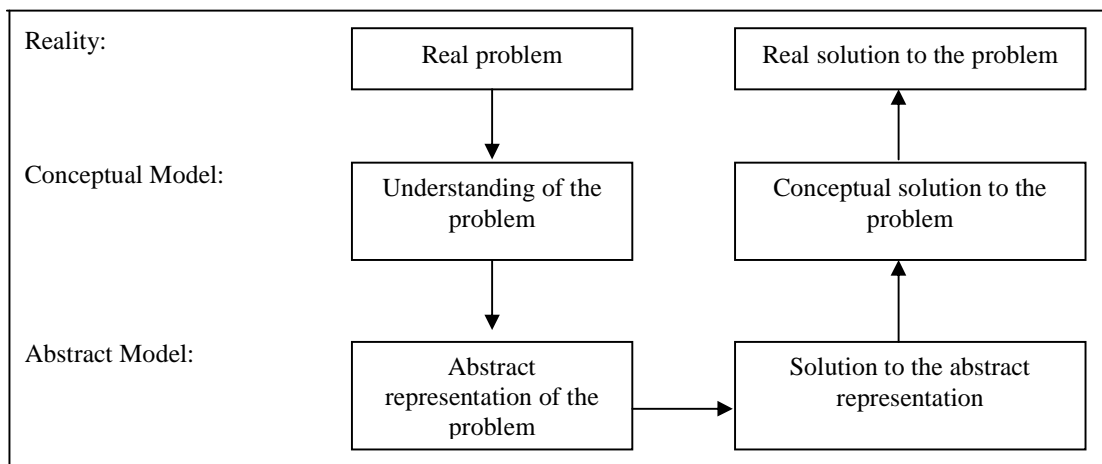


Figure 2.1 The Modelling Process (Brewer and DeLeon, 1995 in Golub, 1997).

Abstract Models is the first type of model. The models are the variety of mathematical models which are covered in courses on forecasting, management science and operations research. According to Golub (1997) there are three types in this brief typology of models such as deterministic models, probability models and simulation models.

Secondly is a Conceptual Models. This model is frequently criticised as subjective because the decision made by decision maker can be biased. Beside that, the models are less explicit and consequently, can be more difficult to modify. Conceptual forecasts are typically based on analogies (Golub, 1997). For the purpose of this research, the focus on the conceptual model as a method of presenting the integrated decision making process model for housing development process. It is because the method of research uses an elaboration of the theoretical study and practice implication based on the findings' result.

2.4 Decision Making Process

Chapman (1995) pointed out that decision making process includes activity that define and clarified the issue. Then, collect all the information. After that, come up with potential choices and clarifications. The following process considers and compares the advantages and disadvantages of options. Next process is selecting the best opinion and lastly explains the decision to those concerned and affected.

Monahan (2000) presented the decision making as an objective achievement process. To him the process started with the establishment, classify and place the objectives with according to importance level. Second is the development of alternative. Third is the evaluation of alternative against all the objectives and tentative decisions. Followed by evaluate tentative decision. Lastly it is the implementation of the decisive actions. Triantaphyllou (2000) described decision making involved the analysis of alternatives in evaluative criteria which have benefit and nature value

According to Harris (2009), decision making is the process of reducing uncertainty alternatives. He pointed out that the information gathering functions of decision making. He also pointed out that very few decisions are made with absolute certainty because complete knowledge about all the alternatives is seldom possible. Thus, every decision has a risk. Another side, Tan (1996) stated the result comes from combination of ideas, concept model and ideas into reality model. Table 2.1 shows the list of literature review of decision making process elements. Based on these discussions, it can be considered that decision making is consideration process of selecting a logical choice from the available options.

Table 2.1: Literature Review of Decision Making Process

Author	Year	Decision Making Process Scope
Reason	1990	Mental processes (cognitive process).
Chapman	1995	Solution process.
Monahan	2000	Process of objective achievement.
Triantaphyllou	2000	Selection alternatives process.
Harris	2009	Process of reducing uncertainty and doubt.
Tan	1996	Combination of ideas, concept model and ideas into reality model.

Further discussion focused on selected area used decision making process basically. Hofstrand (2006) discussed decision making on business area. Based on Hofstrand (2006), whether to move forward or not, a successful business development must implement a process of assess a business idea to construction project environment. He states decision making stage is the most critical action in the entire business development process. Hofstrand pointed out the steps of business which is used for development process in Figure 2.2. An advantage of Hofstrand's development process is the process is clear where we know the place of decision making process must be done. But, the process is too simple and easier in first step for understand how decision is made. In addition no decision point in the process.

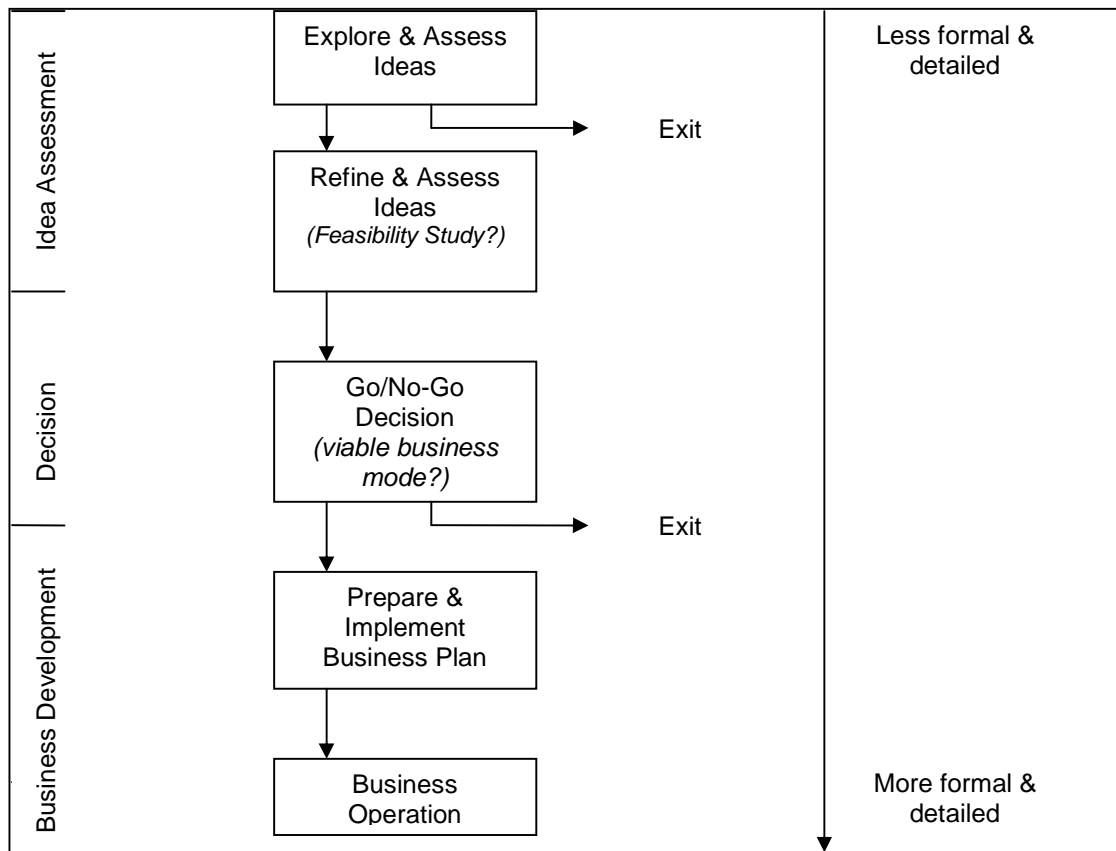


Figure 2.2 Idea Assessments and Business Development Process
(Hosfrand, 2006)

However, Hendrickson (1998) reviewed the conceptual design process in information technology (IT) area characterised by a systematic syries which started with formulation, analysis, search, decision, specification, and modification (see Figure 2.3). Though, these actions are highly interactive at the early stage in the development of a new project. The process and relationship of action and decision making has shown. Nevertheless, it is too many and crowded with relationship arrows and the decision point in each of action is not given.

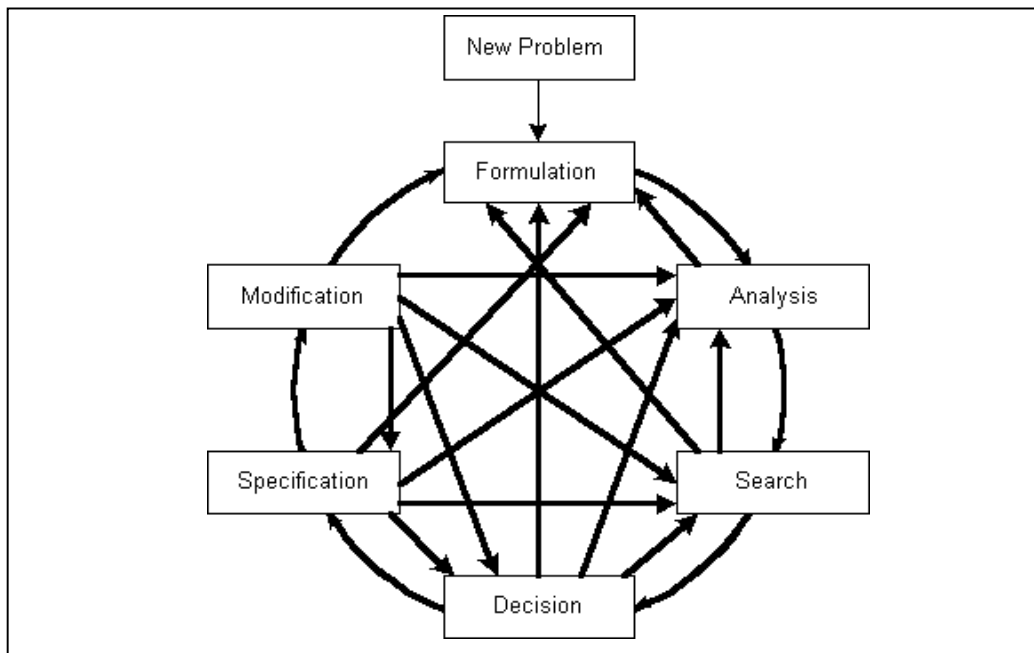


Figure 2.3 Conceptual Design Process
Adapted from R.W. Jensen and C.C. Tonies (Hendrickson, 1998)

Accordingly, in agriculture area, there is more completed decision making process practice. Figure 2.4 shows the process by Fountas et al (2004) is divided in three sections corresponding to the transformation from data to information to decision. The flow of decision making process with information required is clear. Nevertheless, the process not illustrates the decision point in the process.

REFERENCES

- Achelis, S. B. (2011) *Cumulative Volume Index*. onlinetrading-tools.com.
- Agus, M. R. (1997) *Historical Perspective on Housing Development*, Kuala Lumpur, Cagamas Berhad.
- Ahmad, I. (1990) *Expert Decision Support Systems for the Construction Industry*. ASC Proceeding of the 26th Annual Conference.
- Ahmad, I et al. (2004) *Development of A Decision Support System Using Data Warehousing to Assist Builders/Developers in Site Selection*. Automation in Construction
- Ali, S. & SALEH, M. Z. (1994) *Rancangan Malaysia Keenam: Prioriti Pengukuhan Negara*, Bangi, Selangor, Universiti Kebangsaan Malaysia.
- Altman, D. (2006) *Why do a pilot study?* London, UK, National Centre for Replacement, Refinement and Reduction of Animals in Research.
- Ambler, S. W. (2004) *The Lifecycle for the Enterprise Unified Process (EUP) v 2004*. Enterprise Unified Process (EUP) Home Page.
- Anderson, D. R., Sweeney, D. J. & Williams, T. A. (2003) *An Introduction to Management Science of Quantitative Approaches to Decision Making*, Ohio, United State, Thomson.
- Anumba, C. J., Baugh, C. & Khalfan, M. M. A. (2002) *Organisational Structures to Support Concurrent Engineering in Construction*". Industrial Management & Data Systems. 102-5.
- Arsham, H. (2003) *Tools for Decision Analysis: Analysis of Risky Decisions*. Europe Mirror Site, USA Site.

- Bakar, A. H. A., Razak, A. A., Abdullah, S. & Awang, A. (2009) *Project Management Success Factors for Sustainable Housing: A Framework eprints @ USM*.
- Baker S., Baker K. & Campbell M. (2003) *The Complete Idiot's Guide to Project Management*, United States of America, Pearson.
- Basi, R.S. (1998). *Administrative Decision Making: A Contextual Analysis*. Management Decision Journal.
- BERNAMA (2008) *Housing Policy Protect Buyer*. Utusan Malaysia Online. Kuala Lumpur.
- Betts, R. M. & Ely, S. J. (2005) *Basic Real Estate Appraisal*, United State, Thomson.
- Board, C. I. D. (2008) *Malaysian Construction Industry Master Plan*. CIDB.
- Bohari, A. M. (2005) *Sistem Sokongan Keputusan, Konsep Asas dan Aplikasi*, Kuala Lumpur, Pearson Malaysia Sdn. Bhd.
- Brecht, S. B. (2007) *Let the Buyer Be Aware: Making the Most of Feasibility Studies*. Brecht Associates.
- Bryman, A. (2010) *Triangulation*. Loughborough, UK, Loughborough University.
- Buang, S. (1997) *Bumiputera House Ownership and Participation and Other Issues Relating to the Housing Industry: Housing the Nation*, Kuala Lumpur, Cagamas Berhad.
- Businessdictionary.Com (2009) *Decision Point*. Google.
- Canada, M. A. H. C. (1996) *Housing Development Checklist — The Feasibility Phase Mortgage and Housing Corporation Canada*
- Carmona, M. (2001) *Housing Design Quality: Through Policy, Guidance and Review*, London, Spon Press.
- Center For Teaching, R. L. S. S. R. L. A. U. (2011) *Introduction to SPSS*. Washington, American University.
- Chan, L. (1997) *Housing Delivery System: The Industry Viewpoint: Housing the Nation*, Kuala Lumpur, Cagamas Berhad.
- Chapman, A. (1995) *Problem-Solving and Decision-Making*. bussinessball.com.

- Chia-Chien Hsu, B. A. S. (2007) *The Delphi Technique: Making Sense of Consensus. Practical Assessment, Research & Evaluation.*
- CIDB, M. (2008) *Construction Quarterly Statistical Bulletin.* Kuala Lumpur, Construction Industry Development Board (CIDB).
- CIDB, M. (2010) *Construction Quarterly Statistical Bulletin.* Kuala Lumpur, Construction Industry Development Board (CIDB).
- CIOB (Chartered Institute Of Building), C. (1996) *Code of Practice for Project Management for Construction and Development,* England, Longman.
- Coalition, F. (2001) *Methods for Decision Making.* Foundation Coalition.
- Communities, U. S. D. O. H. A. U. D. S. H. A. (2009) *The Housing Development Process.* Florida, U.S. Department of Housing and Urban Development's Homes and Communities.
- Connie, S., M, S. & L, A. (2005) *Multi-Stakeholder Partnerships in Affordable Rental Housing: An Investigation Using Soft Systems Framework.* Queensland University of Technology, Brisbane, Queensland, Australia, University of Melbourne, Melbourne, Victoria, Australia.
- Cooper, H. (1998) *Synthesizing Research: A Guide for Literature Reviews,* New Jersey, Prentice Hall.
- Corporation, C. M. A. H. (2004) *Decision-Making Framework.* Ontario, Canada Mortgage and Housing Corporation.
- Cuhls, K. *Delphi Method,* Germany, Fraunhofer Institute for Systems and Innovation Research.
- Department Of Human Settlement, R. S. A. (2009) *Housing Project Process Guide.* Department of Human Settlements.
- Development, N. H. (2008) *Towards Successful Housing Development in Malaysia.* Ministry of Housing and Local Government.
- Development, T. U. S. D. O. H. A. U. (2005) *Affordable Housing: Tools and Resources: Development Process Overview.* The U.S. Department of Housing and Urban Development.

- Division, W. F. L. H. (2007) *Project Development Process Flow Chart*. U.S. Department of Transportation.
- Ebrahim, G.J. (2009) *Qualitative Field Research* Journal of Tropical Pediatrics.
- Ehow, C. (1999) *How to Do a Market Segment Analysis*. eHow.com.
- Fairfax County, G. O. V. (2002) *Residential Development Criteria*. Virginia Government.
- Fisher & Collin (1999) *The Commercial Property Development Process*, Property Management Journal.
- Fountas, S., Wulfsohn, D., Blackmore, B.S. Jacobsen, H.L. & S.M. Pedersen (2004), *A model of Decision-Making and Information flows for Information-Intensive Agriculture*, Elsevier Ltd, 87-192.
- Frej, A. B. & Peiser, R. B. *Professional Real Estate Development, Second Edition: The ULI Guide to the Business*. Urban Land Institute.
- Gallimore, P., Hansz, J. A. & Gray, A. (2000) *Decision Making in Small Property Companies*. Journal of Property Investment and Finance, 18-6.
- Golub, A. L. (1997) *Decision Analysis An Integrated Approach*, Toronto, Canada, John Wiley and Sons, Inc.
- Gould, F. E. (2005) *Managing the Construction Process*, New Jersey, Pearson Prentice Hall.
- Government, M. O. H. A. L. (2008) *National Development Policy*, Ministry of Housing and Local Government.
- Hall, S. (1999) *Decision Tree Method*. eHow.
- Harris, R. (2009) *Introduction to Decision Making*. Virtual Salt.
- Harrison, E. F. (1999) *The managerial decision-making process*, Boston, Houghton Mifflin.
- Helmer, O. (1983) *Looking Forward: A Guide to Futures Research*, Beverly Hills. Sage Publications.
- Hendrickson, C. (1998) *Project Management for Construction*, Pittsburgh, Prentice Hall.

- Hofstrand, D. (2006) *Idea Assessment and Business Development Process*. Iowa State University.
- Hofstrand, D. & Holz-Clause, M. (2006) *What is a Feasibility Study?*, Iowa State University.
- Holian, R. (2002) *Management Decision Making and Ethics: Practices, Skills and Preferences*. Management Decision Journal.
- Holz-Clause, M. (2006) *Conducting Market Research*, Iowa State University.
- Hsu, C. (2007) *The Delphi Technique: Making Sense of Consensus*, Practical Assessment, Research & Evaluation, 12-10
- Hu, Y. & SHEN, Q. (2000) *Systems Thinking In the Study of Housing Development In Hong Kong New Towns*. The Hong Kong Polytechnic University.
- Humphrey, A. S. (2004) *SWOT Analysis*. Allan Chapman.
- Indiana, H. A. C. D. A. O. (2006) *Request for Proposals for Feasibility Studies*, Indiana Housing and Community Development Authority
- Inouye, K. P., MELHADO, S. B. & SOUZA, U. E. L. (2002) *Design Process at Public Companies Dealing With Housing Production: Evaluation by Means of a Case Study*. Proceedings IGLC, 10.
- J.Schmidt, M. (2011) *Internal rate of return (IRR)*. Solution Matrix Ltd. .
- J.Schmidt, M. (2011) *Net Present Value (NPV) / Discounted cash flow (DCF)*. Solution Matrix Ltd.
- J.Schmidt, M. (2011) *Payback Period*. Solution Matrix Ltd.
- J.Schmidt, M. (2011) *Return on Investment: What is ROI analysis?* , Solution Matrix Ltd.
- Janice M. Morse, M. B., Maria Mayan, Karin Olson and Jude Spiers (2002) *Verification Strategies for Establishing Reliability and Validity in Qualitative Research*. International Journal of Qualitative Methods, 1.
- Joel G. Siegel, J. K. S., Stephen W. Hartman (1992) *201 Decision-Making Tools for Business, Finance and Accounting Students* New York, Mc Graw Hill.
- Keast, S. & Towler, M. (2009) *Rational Decision Making for Managers*, Chischester, England, John Wiley.

- Khalid, M. S. (2005) *The Abandoned Housing Projects in Malaysia: An Institutional Analysis of Real Estate Development Process*. IN WHITE, D. M. J. & TIWARI, D. P. (Eds.) *The 2nd College of Arts & Socials Sciences Postgraduate Conference*. University of Aberdeen, University of Aberdeen.
- Kirkebøen, G. (2007) *Decision behaviour – Improving expert judgement*. Norwegian University of Science and Technology.
- Kvale, S. (1996) *Interviews An Introduction to Qualitative Research Interviewing* Sage Publications.
- Lake, L. (2011) *Developing Your Marketing Mix*, About.com.Marketing.
- Lewis, E. (1984) *Housing Decisions*, Goodheart-Wilcox Publisher
- Lee, L. M. & MOHAMED J. A. (2000) *Local Authority Networked Development Approval System*, Planning Digital Conference, Penang.
- Lim, B. (2007) *Property Report: Asia: A profile of Malaysia's Housing Industry*, The Region's Real Estate Portal.
- Lin, G. C. I. & Nagalingam, S. V. (2000) *CIM Justification and Optimisation*, London, Taylor & Francis.
- Linkov i, S. J. (2005) Multi-Criteria Decision Analysis. *International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB)* Sheraton Imperial Hotel & Convention Center, Durham, USA, U.S Environmental Protection Agency.
- Livette M. (2006) *A Marketing Perspective of Private Sector Retirement Housing and the Effectiveness of the Buyer Behaviour of Its Purchasers*. Property Management Journal.
- Mahdi, I. M. et al. (2006) *Optimum House Delivery Decision Model from the Government's and Recipients' Point-of-View*. Engineering, Construction and Architectural Management Journal.
- Malaysia, B. N. (2008) *Laporan Ekonomi*. Kementerian Kewangan Malaysia.
- Malaysia, N. H. D. O. (2011) *National Housing Policy*. Kuala Lumpur, Malaysia, Ministry of Housing and Local Government

- Maludesly, M. J. & Thevendran, V. (2005) *Risk Management in the Construction Industry*, Kuala Lumpur, Malaysia, Eico, Educational Researchers & Consultants.
- Mat A. Z. & Md. D. H. (2004) *Collaborative Decision Making for Site Development Analysis Using Kola System*. “GeoSpatial Democracy - Map India 2004” 7th Annual International Conference and Exhibition, 28-30 January 2004, New Delhi, India.
- Matson, J. (2000) *The Cooperative Feasibility Study Process*. USA, United States Department of Agriculture Rural Business–Cooperative Service.
- Mckenna R. J. & Martin-Smith B. (2005) *Decision Making As a Simplification Process: New Conceptual Perspectives*, Management Decision Journal.
- Ministry Of Housing and Local Government, Malaysia (2008) *List of Developer Who Submit their Financial Audit Report*. Putrajaya.
- Minneapolis, C. O. (1997) *Draft Guidelines and Criteria: Workforce Ownership Housing Development Program*. Minnesota, City of Minneapolis.
- Mohammad Sharif, D. A. L. (2009) *A Review of the Delphi Technique: To Understand the Factors Influencing Adoption of Stabilised Earth Construction in Low Cost Urban Housing*. The Built & Environment Review. Salford, United Kingdom, University of Salford.
- Mohamed, E. (2002) *Macro-Economic Impact on Urbanisation Process in Malaysia*. Asian Forum. Tokyo.
- Monahan, G. (2000) *Management Decision Making*, Cambridge, Cambridge University
- Morningstar (2010) *The Discounted Cash Flow Method*, United Kingdom, Morningstar.
- Mulliner, E., Smallbone, K., Maliene, V. (2013) *An Assessment of Sustainable Housing Affordability Using a Multiple Criteria Decision Making Method*, Omega, 41-270, UK
- Nan C., Hecht L., Nelson E., Nelson E. & Ross J. (2000) *TRD- SPSS Version 11*, California, McGraw-Hill, Inc.

- Nannicini, T. & Madrid, U. C. I. D. (2006) *A Simulation-Based Sensitivity Analysis for Matching Estimators*.
- National Housing Department, M. (2008) *Annual Report*. Putrajaya, Ministry of Housing and Local Government.
- Nayab, N. (2011) *Use Decision Analysis as a Tool to Improve the Quality of Your Decisions*. Bright Hub Inc.
- Necula, S.C. (2010) *Discussions on Applied Mathematics in Decision-Making Modeling with Decision Support Systems and Knowledge Based Systems*. Proceedings MATH'10 of the 15th WSEAS International Conference on Applied Mathematics. Universiti of Iasi, Romania.
- Nedjat, S. (2010) *Triangulation as a Qualitative Research Strategy*. Tehran University of Medical Science.
- New York Times (1963) *Personality Boom is Loud for Louis Lesser*
- Novak, L. R. (1996) *Market and Feasibility Studies: A How-To Guide*. University of Oregon.
- Ofori, G. (1990) *The Construction Industry: Aspects of Its Economics and Management*, Singapore, Singapore University Press.
- Oxenfeldt, A. R. (2001) *Decision Economics*, Canterbury, U.K, Financial World Publishing.
- Powell C. (2002) *The Delphi Technique: Myths and Realities*, Journal of Advanced Nursing 41(4), Blackwell Publishing Ltd.
- PMI (PROJECT MANAGEMENT INSTITUTE STANDARD COMMITTEE)
(1996) *A Guide to the Project Management Body of Knowledge*, United State of America.
- R, D. & AL-ABED, A. (1998) *Housing Adequacy in Yemen: An Investigation into Physical Quality*. Property Management Journal, 16-1.
- Rapoport, A. (1969) *House Form and Culture*. Prentice Hall, Inc., Englewood Cliffs, New Jersey.
- Reason, J. (1990) *Human Error*, Ashgate.
- Reh, F. J. (1997) *Cost Benefit Analysis*. About.com.Management.

- REHDA (THE REAL ESTATE AND HOUSING DEVELOPER'S ASSOCIATION OF MALAYSIA) (2010) *The Property Development Process in Malaysia*.
- RIBA (ROYAL INSTITUTE OF BRITISH ARCHITECTS), (2007) *Outline Plan of Work 2007*.
- Richardson, S. (2005) *How to Research*, Singapore, Thomson.
- Rigatto W. & Puntel A. (2008). *Identification of Nurses' Competencies in Primary Health Care Through a Delphi Study in Southern Brazil*. Public Health Nursing, 25-4
- Ruckdeschel, S. (2010) *How to Cross Validate Qualitative Research Results*. eHow
- Sharipah, N. S. S. (2011) *The Different Scenarios of Housing Problem in Malaysia, Syarahan Perdana 2011*, UTHM, Johore.
- Salkind, N. J. (2006) *Exploring Research*, New Jersey, Pearson.
- Salleh, G. & CHAI, C. L. (1997) *Low Cost Housing: Issues and Problems: Housing The Nation*, Kuala Lumpur, Cagamas Berhad.
- Schmidt, M. J. (2011), *Return on Investment (ROI): Meaning and Use*, Solution Matrix Ltd.
- Sengül, H., YASEMIN, Ö. & EDA, P., (2010) *The Assessment of the Housing in the Theory of Maslow's Hierarchy of Needs*, European Journal of Social Sciences.
- Shaffer, S. M. & MEREDITH, J. R. (1998) *Operation Management*, United State, John Wiley & Sons, Inc.
- Shegos, E. H. (2001) *Family Matters: A Guide to Developing Family Supportive Housing*. New York, Corporation for Supportive Housing.
- Shehu, Z. & AKINTOYE, A. (2010) *Major Challenges to the Successful Implementation and Practice of Programme Management in the Construction Environment: A Critical Analysis*. International Journal of Project Management 28-26
- Skulmoski, H., & KRAHN (2007) *The Delphi Method for Graduate Research*. Journal of Information Technology Education, 6.

- Srinivasam, A., SUNDARAM, D. & DAVIS, J. (2000) *Implementing Decision Support Systems, Methods, Techniques and Tools*, Berkshire, England, McGraw Hill.
- Statpac, I. (2010) *StatPac Survey Software Online & Paper Questionnaires Crosstabs & Banner Tables*.
- Sudin, P. W. (2002) *Housing, Managing a Dream: Some Thoughts on the Provision of Housing in Malaysia*, Johor, Universiti Teknologi Malaysia.
- Sufian, A. & Rahman, R. A. (2008) *Quality Housing: Regulatory and Administrative, Framework in Malaysia*. Int. Journal of Economics and Management.
- Tam C.M., T. T. K. L., Leung Arthur W. T. Leung & Chiu Gerald W.C. (2002) *Site Layout Planning Using Nonstructural Fuzzy Decision Support System*. Journal of Construction Engineering and Management, May/June 220.
- Tan, A. (1996) *Project Management in Malaysia: A Comprehensive Approach for Successful Management of Property Development Projects from Inception until Completion*, Kuala Lumpur, Synergy Books International.
- Ting, O. K. (2001) *21st Century Malaysia*, Kuala Lumpur, Asian Strategy & Leadership Institute (ASLI).
- Tools, M. (1996) *Decision Trees Choosing by Projecting "Expected Outcomes"*. Mind Tools (Ltd).
- Triantaphyllou, E. (2000) *Multi-Criteria Decision Making: A Comparative Study*. Dordrecht, The Netherlands, Springer.
- Turner, J.F.C., (1976) *Housing by People: Towards Autonomy in Building Environment*. Marion Boyars, London.
- U.S., D. O. H. A. U. D. S. H. A. C. (2009) *The Housing Development Process*. U.S. Department of Housing and Urban Development's Homes and Communities.
- United Kingdom, H.S.E. (2012) *Are You a Client?* Health and Safety Executive, Government of United Kingdom, Merseyside.

- United Nation (1977) *The Social Impact of Housing: Goals, Standards, Social Indicators and Population Participation*. Department of Economic and Social Affairs, New York.
- United Nation (1978). *The Role of Housing in Promoting Social Interaction*. Department of Economic and Social Affairs, New York.
- University, C. F. S. A. U. R. (2005) *Housing Resource Panel – SWOT Analysis*. IN PLAN, T. A. C. C. (Ed.) *SWOT Report*. University of Pittsburgh.
- Uwex, University of Wisconsin-Extension (2011) *Evaluate Housing Opportunities*, United States of America.
- Verzuh E. (1999) *The Portable MBA – The FAST FORWARD MBA in Project Management*, Willey, United States of America.
- Washington, D. O. I. S. O. S. O. (2000) *Feasibility Study Guidelines for Information Technology Investments*. Washington, Washington State Department of Information Services.
- WBDG (WHOLE BUILDING DESIGN GUIDE) (2012) *Project Planning, Delivery and Controls*. Washington, National Institute of Building Sciences,
- Westchester, G. O. (2010) *Westchester County Fair and Affordable Housing Implementation Plan*. Government of Westchester
- Wheelen T. L. & Hunger J. D. (1991) *Strategic Management and Business Policy*.
- Winarso, H. (2002) *Residential Land Development in Jabotabek, Indonesia*, Habitat International Journal.
- Wisniewski, M. (2006) *Quantitative Methods for Decision Makers*, Essex, England, Prentice Hall.
- Woodruff, J. (2013) *Advantages & Disadvantages of Payback Capital Budgeting Method*, Texas, United State of America, Demand Media.
- Yahya, A. Z. (1997) *Government Housing Policies and Incentives: The Government Viewpoint*, Kuala Lumpur, Cagamas.
- Yam, L. H. S. (2008) *Corporate Social Responsibility in Malaysia Housing Developments House-Buyers' Perspectives*. Pacific Rim Property Research Journal.

Yellow, P. (2010) *701 Panduan- Malaysia Online Directory, Search Map and City Guide Yellow Pages.*

Ziara, Mohamed M. (1999) *Decision Analysis for Housing-Project Development.*
Journal of Urban Planning and Development

8th Malaysian Plan (2001) *8th Malaysian Plan 2001 -2005*, Kuala Lumpur,
Economic Plan Unit, Prime Ministers Development.

9th Malaysian Plan (2006) *9th Malaysian Plan 2001 -2005*, Kuala Lumpur,
Economic Plan Unit, Prime Ministers Development