

Decision Making Methods at Initiation Phase for Housing Development

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Abstract— Late delivery and sick housing project problems were attributed to poor decision making. These problems are the string of housing developer that prefers to create their own approach based on their experiences and expertise with the simplest approach by just applying the obtainable standards and rules in decision making. This paper seeks to identify the decision making methods for housing development at the initiation phase in Malaysia. The research involved Delphi method by using questionnaire survey which involved 50 numbers of developers as samples for the primary stage of collect data. However, only 34 developers contributed to the second stage of the information gathering process. At the last stage, only 12 developers were left for the final data collection process. Finding affirms that Malaysian developers prefer to make their investment decisions based on simple interpolation of historical data and using simple statistical or mathematical techniques in producing the required reports. It was suggested that they seemed to skip several important decision-making functions at the primary development stage. These shortcomings were mainly due to time and financial constraints and the lack of statistical or mathematical expertise among the professional and management groups in the developer organisations.

Keywords— *Decision Making Method, Housing Development, Initiation Phase*

1. Introduction

Generally, the housing development process begins with the decision from a client (an individual or enterprise) to invest in a construction project to

satisfy a particular need [1], [2]. 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 come from various knowledge sources and specialists, especially in housing where the sector is near to the public (social) objective [3]. 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 [4]. These situations will lead to become produce a poor decision making and finally make a bad quality output in housing project [5].

2. Literature Review

The initiation phase is critical to a project's success [6]. This phase involves the establishment of the qualities of the project that are necessary to satisfy client and end user needs and expectations, once it is delivered and in use. The decision making during initiation phase needs some hard thinking and some tough decisions and application of systematic knowledge and know-how [7]. Decision maker in housing making must be particular with this phase because it is the process that formally recognising that a new project exists or that an existing project should continue into the next phase [8].

The process of housing development has been presented in many different ways from a simple model to a more detailed and comprehensive pictures. For example, Chartered Institute of Building (CIOB) showed the development process as simple picture [9] but Royal Institute of British Architects (RIBA)

presented development process by outlining detail tasks [10]. As the beginning of determining decision making process in housing development project especially stages that include at initiation phase, researcher identifies the general development process in both international and Malaysia approach.

The first phase of housing project development is the initiation phase. It is during this initial period that the project's idea of development is established and assessed. Before project moves into the second phase which is the planning phase, there are six stages that developers must implement according to sequence. The process starts with explore and assess development, followed with evaluate development, pre-feasibility study, preliminary investigation, development schedule and finally feasibility study [7]. Figure 1 shows the initiation phase process for housing development [7].

The method of decision making is divided into three categories. Firstly is descriptive method. This method analyses the way of decisions are taken and decide best alternatives based on what is or what has been done. Secondly is normative method which concludes what alternative(s). Finally is prescriptive method is directly interrelated to normative methods; determine best choices are constrained by boundaries of what can be done in reality [11].

One of the most basic distinctions is between the decision makings methods are primarily qualitative as opposed to those which are primarily quantitative. The distinction is sometimes misleading since some of the qualitative approaches will generate numerical results and some of the quantitative approaches will be based on subjective, qualitative assumptions [12].

3. Delphi Method

Delphi method (subsequently referred to as the Delphi) is in essence of a series of sequential questionnaires or 'rounds', interspersed by controlled feedback, that seek to gain the most reliable consensus of opinion of a group of experts [11], [12]. It is a technique that is useful for situations where individual judgments must be tapped and combined in order to address a lack of agreement or incomplete state of knowledge [13]. As such, the Delphi is particularly valued for its ability to structure and organise group communication and viewpoint.

Delphi method used as the research technique is to include the mode of data collection due to its ability to explore the factors influencing the current practice of decision making process in housing development projects and the information required for the different decision making points. The Delphi method is where a consensus and position of a group of experts is reached after eliciting their opinions on a defined issue and it relies on the "informed intuitive opinions of specialist" [14]. A combination of expert opinions and theoretical finding technique can achieve the research objectives. In addition the Delphi technique also produce a better quality response in this research as systematic, questionnaire, expert opinions, iterative process, i.e. 'rounds', feedback (developer opinions mediated by team) and anonymity of developers [15].

Iterative process is carried out to continue with implementation of main first round of Delphi (R1). This step depends on the research objectives. All opinions and answers from the questionnaire are generated into a list which will then be pared down in the second round of Delphi (R2). A smaller group of selected respondents were then given the second questionnaire form to summarise the answer of research objectives and help to verify the result. Refer Figure 1 to view the process.

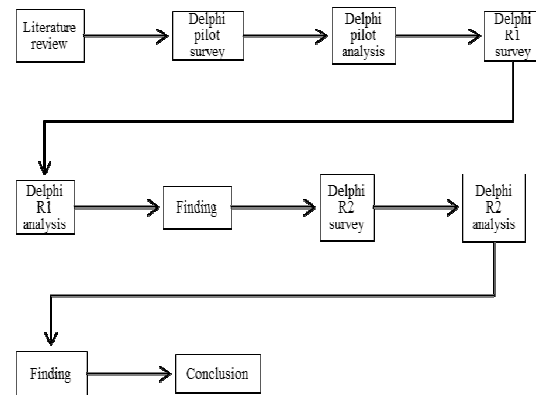


Figure 1. Research Process

Result and Discussion

First Round Survey (R1)

A total of 34 (n) responses out of 50 questionnaires were received in R1 survey (refer results in Table 1), which equates to a response rate of 68 percentage. For this survey, decision making method contributed about sixteen methods at the initiation phase produced by practical and theoretical concept.

Table 1. R1 Finding

Stage/ Decision Method	A	B	C	D	E	F
	n = 34					
1	0	0	0	0	0	28
2	6	6	15	6	0	0
3	0	0	0	0	0	0
4	0	1	18	5	0	1
5	5	1	19	0	0	0
6	0	0	0	0	0	0
7	0	0	9	5	0	9
8	0	0	5	15	0	0
9	0	6	6	10	0	0
10	6	12	21	25	6	0
11	12	2	12	11	6	0
12	9	5	1	0	0	0
13	0	0	0	0	21	0
14	0	7	0	0	12	7
15	0	12	0	0	0	6
16	34	21	7	11	11	15

Indication of stage:

A: Explore and asses development

D: Preliminary investigation

B: Evaluate development

E: Development schedule

C: Pre-feasibility study

F: Feasibility study stage

Indication of decision method:

1: Financial analysis

9: SWOT analysis

2: MAUT

10: Comparison with historical da

3: AHP

11: Experience judgment

4: Pros and cons analysis

12: Intuition

5: Market report

13: Computer simulation

6: Delphi method

14: Mathematic simulation

7: Voting

15: Decision tree

8: Operation management Method

16: Discussion

Second Round Survey (R2)

Mean analysis with $n = 12$ (12 out of 34 respondents = 35 percentage) in R2 survey is to determine acceptance level. The basic of acceptance level depends on the agreement level in questionnaire form in R2 survey. Table 2 shows the value of agreement level.

Table 2. Value of Agreement Level

Agreement Level	Value
Strongly agree	5.0000
Agree	4.0000
Neither agree nor disagree	3.0000
Disagree	2.0000
Strongly disagree	1.0000

The acceptance level depends on mean (μ) value. Initially, the basic of decision to accept or reject any variables in R2 survey on achieving was based a mean (μ) value or score of 3.5000 or more (refer to Table 3). The conclusion of the analysis was referred to Rigatto and Puntel (2008) [16] with Hsu (2007) [17] set that the level of consensus or

acceptance is 75% (≈ 3.5000 value) of 5 point Likert scale.

Table 3. Value of Acceptance Level

Mean (μ) Value	Acceptance Level
≥ 3.5000	Accept
≤ 3.4999	Reject

With regards to the mean analysis, the results show that all decision making methods that is normally carried out during the initiation phase of the housing project development are accepted. Table 4 shows the R2 Finding.

Table 4. R2 Finding

Stage/Method	μ (n=12)	Level
Explore and assess development		
1. Discussion	5.0000	Accept
2. Experience judgment	5.0000	Accept
3. Intuition	4.3333	Accept
4. Comparison with historical data	5.0000	Accept
5. Multi-Attribute Utility Theory (MAUT)	3.5000	Accept
6. Market/economic report	5.0000	Accept
Evaluate development		
1. Experience judgment	5.0000	Accept
2. Discussion	4.8333	Accept
3. Comparison with historical data	4.8333	Accept
4. Decision tree	4.7500	Accept
5. Mathematic simulation (model)	4.2500	Accept
6. SWOT analysis	4.8333	Accept
7. Multi-Attribute Utility Theory (MAUT)	3.5000	Accept
8. Intuition	4.5000	Accept
9. Market/economic report	5.0000	Accept
10. Pros & cons analysis	5.0000	Accept
Pre-feasibility study		
1. Comparison with historical data	5.0000	Accept
2. Market/economic report	5.0000	Accept
3. Pros & cons analysis	5.0000	Accept
4. Multi-Attribute Utility Theory (MAUT)	3.5833	Accept
5. Experience judgment	5.0000	Accept
6. Voting/consensus	5.0000	Accept
7. Discussion	5.0000	Accept
8. SWOT analysis	4.8333	Accept
9. Operation mgmt. method (location)	4.1667	Accept
10. Intuition	4.0000	Accept
Preliminary investigation		
1. Comparison with historical data	5.0000	Accept
2. Discussion	5.0000	Accept
3. Experience judgment	5.0000	Accept
4. SWOT analysis	4.7500	Accept
5. Operation mgmt. method (location)	4.3333	Accept
6. Voting/consensus	4.8333	Accept
7. Pros & cons analysis	5.0000	Accept
8. Multi-Attribute Utility Theory (MAUT)	4.0833	Accept

Development schedule			
1.	Computer simulation	4.3333	Accept
2.	Mathematic simulation (model)	4.4167	Accept
3.	Discussion	5.0000	Accept
4.	Experience judgment	5.0000	Accept
5.	Comparison with historical data	5.0000	Accept
Feasibility study			
1.	Financial analysis	5.0000	Accept
2.	Discussion	5.0000	Accept
3.	Voting/consensus	5.0000	Accept
4.	Mathematic simulation (model)	4.6667	Accept
5.	Decision tree	4.6667	Accept
6.	Pros & cons analysis	5.0000	Accept

Decision making process consists of various methods of exploration in order to reach the most favourable/optimal decision. All the methods are inputs for the decision making process. Each of the stages contributes combination of qualitative and quantitative methods. Refer Appendix 2 for the finding of decision method used at the initiation phase process for housing development. Following is a list of methods used at each of the stages in the initiation phase by ranking.

- Explore and assess development stage:
 1. Discussion
 2. Experienced judgment
 3. Comparison with historical data
 4. Market/economic report
 5. Intuition
 6. Multi Utility Theory (MAUT)
- Evaluate development stage
 1. Experienced judgment
 2. Market/economic report
 3. Pros & cons analysis
 4. Discussion
 5. Comparison with historical data
 6. SWOT analysis
 7. Decision tree
 8. Intuition
 9. Mathematic simulation (model)
 10. Multi Utility Theory (MAUT)
- Pre-feasibility study stage
 1. Comparison with historical data
 2. Market/economic report
 3. Pros & cons analysis
 4. Experienced judgment
 5. Voting/consensus
 6. Discussion
 7. SWOT analysis
 8. Operation management method (location)
 9. Intuition

10. Multi Utility Theory (MAUT)
 - Preliminary investigation stage
 1. Comparison with historical data
 2. Discussion
 3. Experienced judgment
 4. Pros & cons analysis
 5. Voting/consensus
 6. SWOT analysis
 7. Operation management method (location)
 8. Multi Utility Theory (MAUT)
 - Development schedule
 1. Discussion
 2. Experienced judgment
 3. Comparison with historical data
 4. Mathematic simulation (model)
 5. Computer simulation
 - Feasibility study
 1. Financial analysis
 2. Discussion
 3. Voting/consensus
 4. Pros & cons analysis
 5. Mathematic simulation (model)
 6. Decision tree

4. Discussion and Conclusion

Housing developers prefer to use a simple decision making method during initiation phase of development. They also make individual decision rooted in their own knowledge and practice and usually use a straightforward qualitative method which qualitative methods. The method decision making that they practice begins with teams' idea developing and creation and followed by discussions. However, the designated leader will make the final decision. The roles of designated leader was to calls for a meeting, presents the issue, listens to team discussions and finally announces his decision.

These methods can apply at the early stage of initiation phase such as explore and assess development stage, evaluate development and pre-feasibility study but it is not encouraged science this method can put decision on high risk. Nevertheless, comparison with historical data method is the most popular method in decision making. All stages at the initiation phase which involves explore and assess development stage, evaluate development stage, pre-feasibility study stage, preliminary investigation stage and development schedule stage are suitable and synonym with developer when to making decision for housing development. Decision making during

preliminary investigation usually use comparison with historical data method because this stage uses a lot of information and assist developer to reconsiders every input data and information.

In the other hand, some of developers use complex decision method such as MAUT, decision tree, mathematical simulation, SWOT analysis, pros and cons analysis, operation management, computer simulation and financial analysis which is more challenging when making a decision. When developer uses all the decision making methods, it can demonstrate that developer is rational, has a perfect knowledge and consistent in judgments.

By following these decision methods, housing developers can make decision accurately since the decision to develop housing project have the potential of being risky and expensive. Besides that, the decision making methods allow the housing developer to work in ontology and a complex strategy analysis. In general, developers can apply these quantitative methods at the evaluate development stage, development schedule stage and feasibility study stage. Financial analysis is the best method in analysing during these phase because they can produce the development and operating costs, level of debt service and debt service decision at the same time.

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Appendix

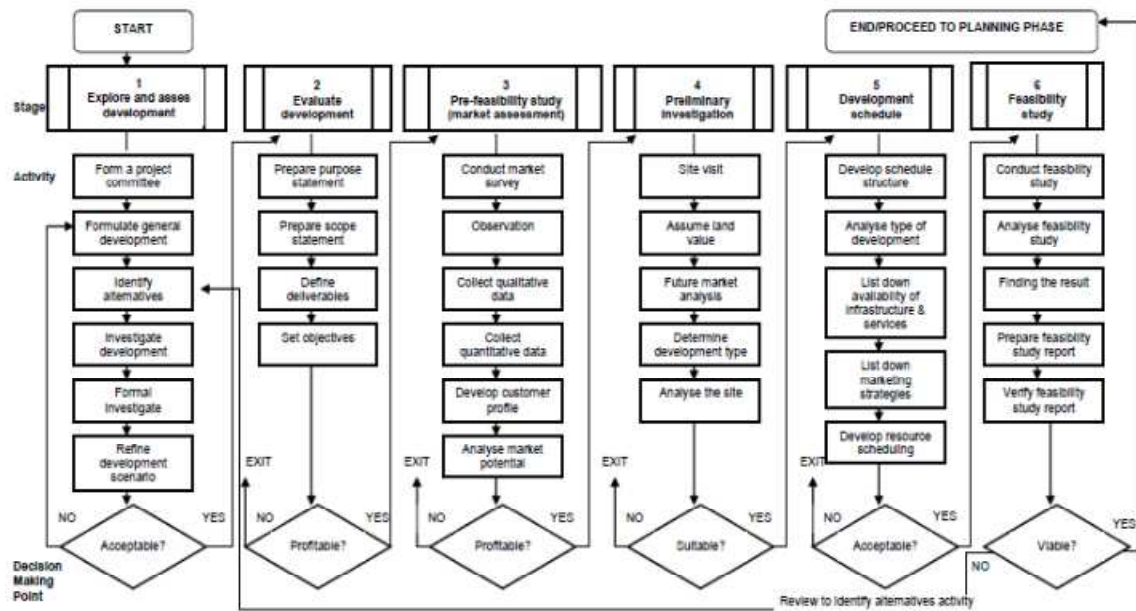
Appendix 1: Initiation phase process for housing development.

Appendix 2: Decision making method use at the initiation phase process for housing development.

References

- [1] Pryke S. and Smyth H., *The Management of Complex Projects: A Relationship Approach*. London, UK: John Wiley, 2012.
- [2] Ofori G., *The Construction Industry: Aspects of Its Economics and Management*. Singapore: Singapore University Press, 1990.
- [3] Mulliner E., Smallbone K. and Maliene V., *An Assessment of Sustainable Housing Affordability Using a Multiple Criteria Decision Making Method*. UK: Omega, 2013.
- [4] Carmona M., *Housing Design Quality: Through Policy, Guidance and Review*. London: Spon Press, 2001.
- [5] Hirschman A. O., *Development Project Observed*. Washington: Brookings Institute Press, 2014.
- [6] WBDG (Whole Building Design Guide), *Project Planning, Delivery and Controls*. Washington: National Institute of Building Sciences, 2012.
- [7] Zainal R. and Rashid R. A., *Decision Making Process At Initiation Phase In Housing Development*. in Proc. Affordable Quality Housing (CAQH2013), Selangor: Housing Research Centre, Universiti Putra Malaysia, pp. 15–28, 2013.
- [8] REHDA (The Real Estate and Housing Developer's Association of Malaysia), *The Property Development Process in Malaysia*. Kuala Lumpur: REHDA, 2010.
- [9] CIOB (Chartered Institute of Building), *Code of Practice for Project Management for Construction and Development*, England: Longman, 2002.
- [10] RIBA (Royal Institute of British Architects), *Outline Plan of Work 2013*. London: RIBA, 2013.
- [11] Keast S. and Towler M., *Rational Decision Making for Managers*. Chichester, England: John Wiley, 2009.
- [12] Wisniewski M., *Quantitative Methods for Decision Makers*. Essex, England: Prentice Hall, 2006.
- [13] Powell C., *The Delphi Technique: Myths And Realities*. Journal of Advanced Nursing, Blackwell Publishing Ltd., Vol.41, No.4, pp. 376–382, 2003.
- [14] Helmer O., *Looking Forward: A Guide to Futures Research*. Beverly Hills: Sage Publications, 1983.
- [15] Sharif M., *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, 2009.
- [16] Rigatto W. and Puntel A., *Identification of Nurses' competencies in Primary Health Care Through a Delphi Study in Southern Brazil*. Public Health Nursing, 2008.
- [17] Hsu C. and Brian A. *The Delphi Technique: Making Sense of Consensus*. Practical Assessment, Research & Evaluation, Vol.12, No.10, pp. 1–5, 2007.

Appendix 1: Initiation phase process for housing development



Appendix 2: Decision making method use at the initiation phase process for housing development

