

Housing Decision Making Technical Information: An Approach for Improving Quality Housing Delivery during the Initiation Development Phase Process

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Abstract— Incomplete communication between decision maker, proposer and secretariat happened due to time constraint and distance's factor among them in decision making process for housing development project. Consequently convenience to information becomes limited due to the restricted amount of data given by developer. The problem is to make the best decision in construction; it must come from various information sources and specialists, especially in housing where the sector is near to the public (social) objective. Due to these decision making problems, developer faces a late delivery and sick housing project conflict. This paper aims to identify the technical decision making information for housing development at the initiation phase in Malaysia. Delphi method is employed by using questionnaire survey which involved 50 private developers for the first round of data collection. However, only 34 developers contributed to the second round of the data collection process. At the last round, only 12 developers were finalised as the main contributor in the final process. As a result, the findings are work schedule, location and size of project are most necessary information in technical information part which are required during decision making for housing development among Malaysian developers. Moreover, the advancement of skill must be improved and developers should not be easily pleased with their achievement as the information technology advances at a pace we can hardly keep up with.

Keywords— *Decision Making, Housing Development, Initiation Phase, Technical Information*

1. Decision Making Technical Information Required during Initiation Phase of Housing Development

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. [1] conclude that it is very hard to build a suitable typical housing unit since the recipients have variance on numerous problems. According to [2], inadequate communication between decision maker, proposer and secretariat happened due to restraint of time and various distance between them 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 [2] 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.

The initiation phase is critical to a project's success [3]. This phase involves the establishment of the qualities of the project that are necessary to satisfy developer 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 [4]. 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 [5].

Information is the most important aspect of decision especially in all stage at development process. Based on that, the [6] prepare the detail information of pre development in feasibility study to develop affordable housing. According to discussion on literature review of information needed in decision making of development process, there are many of types of technical information to key support when make a decision in housing development project which are basic used in methods of decision making.

An exhaustive decision making process needs many types of technical information for its investigative process before arriving to a decision. Technical information is an input for the decision making process. The stages in the initiation phase require technical information in the form of both qualitative and quantitative data. The process starts with explore and assess development, followed with evaluate development, pre-feasibility study, preliminary investigation, development schedule and finally feasibility study [7]. Appendix 1 shows the initiation phase process for housing development [7].

[6], [8], [9], [10], [11] and [12] summaries of all information required in decision making process for initiation phase in development project. According to discussion on literature review of information needed in decision making of feasibility study process, there are many of types of information to key support when make a decision in housing development project. The information in economy, environment, physical, social and risk are basic used in techniques or tools of decision making. Appendix 2 shows the information required at each of decision making process for housing development. Based on information flow, the feasibility study process need several of information especially in economy factor to support decision making process. Pre-feasibility study and preliminary investigation stage are most critical and uses information when make decision. The flow of information will made basic in this study.

According to Appendix 2, the first and second stages explore and assess development and evaluate development. They cover eight information which are project site, business/economic factors, technical design function, organisation, programme scheduling, system of control, dateline and budget. However, pre-feasibility study includes ten information which are potential demand, existing supplying, competition, existing, type of prices, other developments, authorities policies, timing, projection of expected sales and estimated. Contrastingly, the fourth stage concludes that it covers eleven types of information. There are

environmental factors, past issues, site formally used, flood, neighborhood factors, nearby school, overcrowded, local traffic, regulatory factors appropriate, zoning and density. As for the fifth stage (development schedule), it covers six information like land use study, type of development, provision of infrastructure, availability of existing services, marketing strategies and resources scheduling: financial planning. Finally, the last stage which is feasibility study have five information which are level of project need, financial, benefits of project, high demand and high profit.

2. Methodology

The research is carried out by identifying problems in the housing project development in Malaysia with respect to 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 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 of housing developers in Malaysia.

Delphi method implemented as the research technique is to comprise the mode of data gathering due to its capability to discover the factors persuading the existing practice of decision making process in housing development projects and the technical information required for the dissimilar decision making points. This method is where a agreement and place of a group of specialists is reached after producing their sentiments on a defined issue and it relies on the "informed intuitive opinions of specialist" [13]. A combination of expert opinions and theoretical finding technique can accomplish the research objectives. In addition the Delphi technique also produce a better quality answer in this research as organized questionnaire, expert opinions, iterative process, i.e. 'rounds', feedback (developer opinions mediated by team) and anonymity of developers [14]. All answers from the questionnaire are

produced 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 assistance to confirm the result. Refer Figure 1 to view the process.

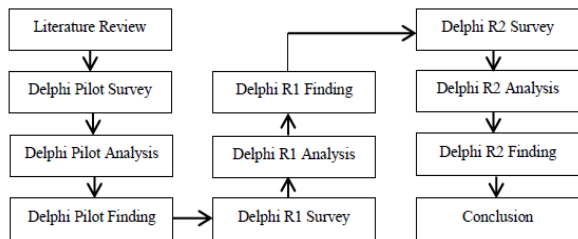


Figure 1. Research Process

3. Result and Discussion

Delphi First Round Survey (R1)

A total of 34 (*n*) replies out of 50 questionnaires were established in R1 survey (refer results in Table 1), which associates to a response rate of 68 percentage.

Table 1. R1 Finding

Stage/ Decision Method	A	B	C	D	E	F
n = 34						
1	8	9	0	5	5	9
2	27	13	5	22	0	6
3	0	1	0	20	7	0
4	0	0	0	21	13	0
5	5	5	6	13	0	9
6	0	0	0	34	18	0
7	0	11	0	5	0	5
8	0	6	25	6	9	13
9	0	5	11	22	0	0
10	12	23	0	0	0	0
11	6	6	0	22	0	0

4. Indication of stage:
A: Explore and asses development
B: Evaluate development
C: Pre-feasibility study
D: Preliminary investigation
E: Development schedule
F: Feasibility study stage
- Indication of decision method:
1: Preliminary research & testing
2: Location
3: Building
4: Plan layout
5: Flexibility of productive Capacity
6: Work schedule
7: Environmental
8: Size of project
9: Facilities
10: Authorities policies
11: Infrastructures

Second Round Survey (R2)

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

Initially, the basic of decision to accept or reject any variables in R2 survey was based on a mean (μ) value or score of 3.5000 or more (refer to Table 3). The conclusion of the analysis was referred to [15] with [16] set that the level of consensus or acceptance is 75% (\approx 3.5000 value) of 5 point Likert scale. The results of finding illustrate that all decision making technical information that is normally carried out during the initiation phase of the housing project development are accepted. Table 4 demonstrates the result.

Table 3. Value of Acceptance Level

Mean (μ) Value	Acceptance Level
\geq 3.5000	Accept
\leq 3.4999	Reject

Table 4. R2 Finding

Stage/Technical Information	μ (n=12)	Acceptance
Explore and assess development		
1. Location	5.0000	Accept
2. Authorities' policies	4.9167	Accept
3. Infrastructures	5.0000	Accept
4. Flexibility of productive capacity	4.4167	Accept
5. Preliminary research and testing	5.0000	Accept
Evaluate development		
1. Authorities' policies	4.9167	Accept
2. Environmental	5.0000	Accept
3. Location	5.0000	Accept
4. Facilities	5.0000	Accept
5. Infrastructures	5.0000	Accept
6. Size of project	4.9167	Accept
7. Flexibility of productive capacity	4.3333	Accept
8. Building	4.9167	Accept
9. Preliminary research and testing	4.9167	Accept
Pre-feasibility study		
1. Size of project	5.0000	Accept
2. Environmental	5.0000	Accept
3. Facilities	5.0000	Accept
4. Flexibility of productive capacity	4.6667	Accept
5. Location	5.0000	Accept
Preliminary investigation		
1. Infrastructures	5.0000	Accept
2. Facilities	5.0000	Accept
3. Plan layout	5.0000	Accept
4. Building	5.0000	Accept
5. Flexibility of productive capacity	4.6667	Accept
6. Location	5.0000	Accept
7. Environmental	5.0000	Accept
8. Size of project	5.0000	Accept
9. Preliminary research and	4.9167	Accept

testing			
Development schedule			
1.	Work schedule	5.0000	Accept
2.	Plant layout	5.0000	Accept
3.	Preliminary research and testing	4.8333	Accept
4.	Size of project	5.0000	Accept
5.	Building	5.0000	Accept
Feasibility study			
1.	Flexibility of productive capacity	4.5000	Accept
2.	Size of project	4.9167	Accept
3.	Preliminary research and testing	4.6667	Accept
4.	Location	5.0000	Accept
5.	Environmental	4.9167	Accept

Following is a list of technical information used at each of stages in the initiation phase according to its importance ranking.

- Explore and assess development stage:

Ranking

1. Location
2. Authorities policies
3. Infrastructures
4. Flexibility of productive capacity
5. Preliminary research and testing

- Evaluate development stage:

Ranking:

1. Authorities policies
2. Environmental
3. Location
4. Facilities
5. Infrastructures
6. Size of project
7. Flexibility of productive capacity
8. Building
9. Preliminary research and testing

- Pre-feasibility study stage:

Ranking:

1. Size of project
2. Environmental
3. Facilities
4. Flexibility of productive capacity
5. Location
6. Accessibility to major highway

- Preliminary investigation stage:

Ranking:

1. Infrastructures
2. Facilities
3. Plant layout
4. Building
5. Flexibility of productive capacity
6. Location
7. Environmental
8. Size of project
9. Preliminary research and testing
10. Accessibility to major highway
11. Distance from town center

- Development schedule stage:

Ranking:

1. Work schedule

2. Plant layout
3. Preliminary research and testing
4. Size of project
5. Building
6. Land use study
7. Type of development
8. Provision for infrastructure
9. Resource scheduling

- Feasibility study stage:

Ranking:

1. Work schedule
2. Plant layout
3. Preliminary research and testing
4. Size of project
5. Building
6. Land use study
7. Type of development
8. Provision for infrastructure
9. Resource scheduling

4. Discussion and Conclusion

Housing developers prefer to use technical information as an input for the decision making process. The stages in the initiation phase require technical information in the form of both qualitative and quantitative data used in the decision making process for housing development projects which can finally help produce the most accurate decision. Actually, developers are still lacking in the skill of choosing the right technical information at the right stage but the gap is too small. Advancement of skill must be increased and developers should not be easily satisfied or contented with their achievement as the information technology world evolves quickly from year to year.

Decision making process consists of various technical exploratory information in order to reach the most favourable/optimal decision. All the technical information are important inputs for the decision making process. Appendix 3 illustrate the finding of decision making technical information required at the initiation phase process for housing development.

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Appendix

Appendix 1: Initiation phase process for housing

development.

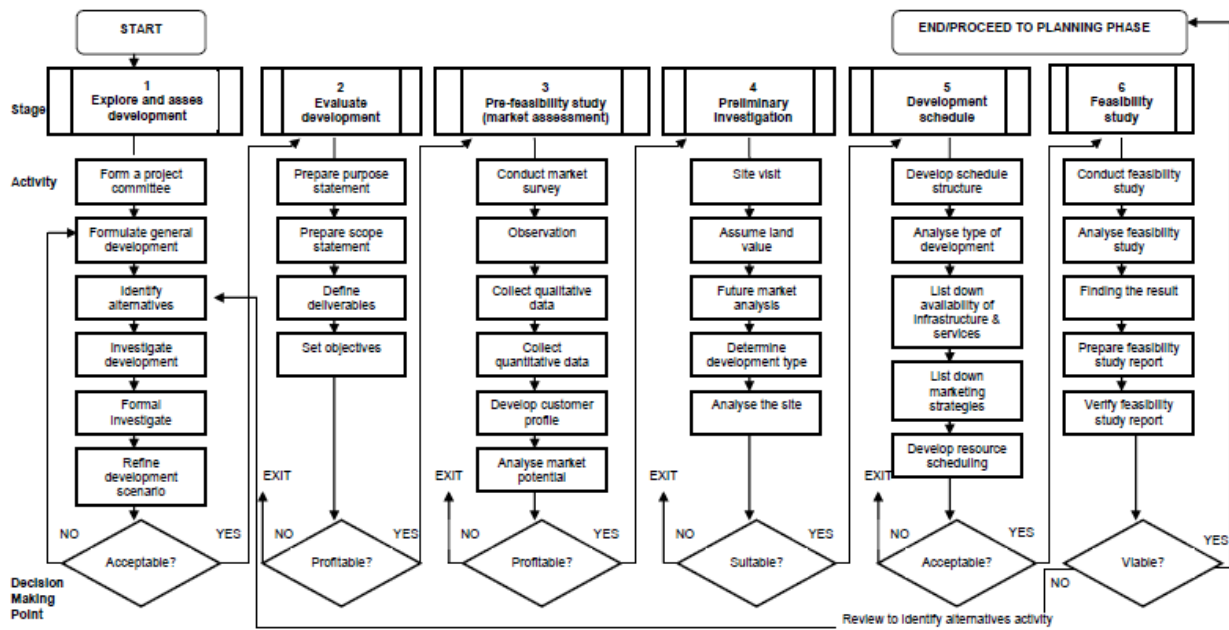
Appendix 2: The Information Required at Initiation Phase

Appendix 3: Decision technical information required at initiation phase process for housing development

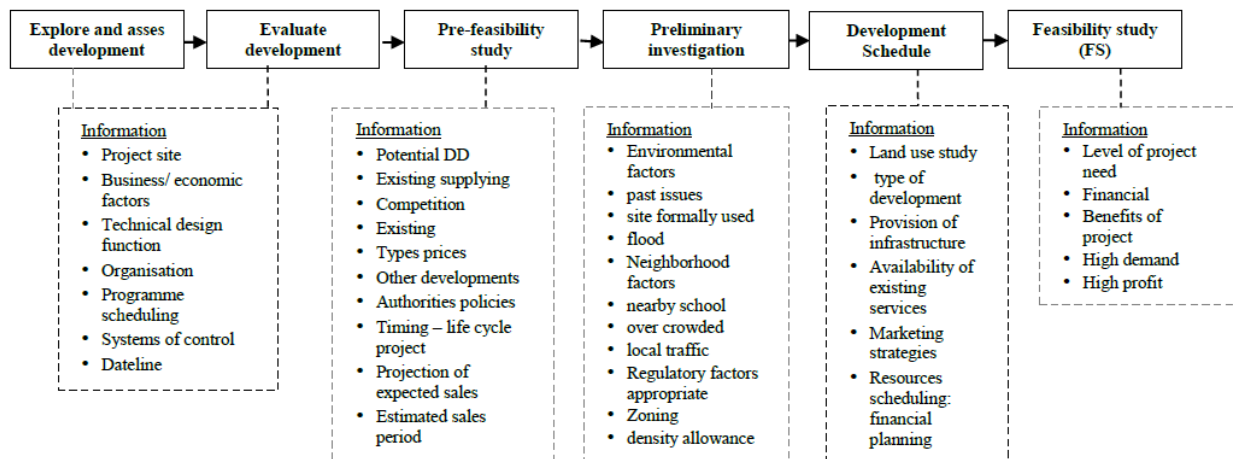
References

- [1] I. M. Mahdi, K. Al-Rashed and S. M. Fereig, *Optimum House Delivery Decision Model from the Government's and Recipients' Point Of View*, Engineering, Construction and Architectural Management, Vol 13, No. 4, pp.413-430, 2006.
- [2] A. Z. Mat and H. D. Md., *Collaborative Decision Making for Site Development Analysis Using Kola System*, Proceeding 7th Annual International Conference and Exhibition, New Delhi, India, 2004.
- [3] E. Mulliner, K. Smallbone and V. Maliene, *An Assessment Of Sustainable Housing Affordability Using A Multiple Criteria Decision Making Method*, UK: Omega, 2013.
- [4] R. Zainal, N. Kasim, N. Sarpin, T. W. Seow, Z. Shamsudin and I. S. M. Radzuan, "Decision Making Methods at Initiation Phase for Housing Development," International Journal of Supply Chain Management, Vol 6, No. 2, pp.177-182, 2017.
- [5] M. Carmona, *Housing Design Quality: through Policy, Guidance and Review*, London: Spon Press, 2001.
- [6] D. O. H. A. U. D. S. H. A. C. United State, *The Housing Development Process*, U.S. Department Of Housing And Urban Development's Homes And Communities, United State, 2009.
- [7] R. Zainal and R. A. Rashid, *Decision Making Process at Initiation Phase in Housing Development*, Proceeding Affordable Quality Housing (CAQH2013), Selangor: Housing Research Centre, Universiti Putra Malaysia, pp. 15–28. 2013.
- [8] M. Holz-Clause, *Conducting Market Research*, Iowa State University, 2006.
- [9] Housing H. A. C. D. A. O. Indiana, "Request for Proposals for Feasibility Studies, Indiana Housing and Community Development Authority, 2006.
- [10] A. Tan, *Project Management in Malaysia: A Comprehensive Approach for Successful Management of Property Development Projects from Inception until Completion*", Kuala Lumpur, Synergy Books International, 1996.
- [11] J. Matson, *The Cooperative Feasibility Study Process*, USA, United States Department of Agriculture Rural Business–Cooperative Service, 2000.
- [12] S. B. Brecht, *Let The Buyer Be Aware: Making The Most Of Feasibility Studies*, Brecht Associates, 2007.
- [13] O. Helmer, *Looking Forward: A Guide to Futures Research*, Beverly Hills: Sage Publications, 1983.
- [14] M. Sharif, *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.
- [15] W. Rigatto and A. Puntel, *Identification of Nurses' competencies in Primary Health Care through a Delphi Study in Southern Brazil*, Public Health Nursing, 2008.
- [16] C. Hsu and A. Brian, *The Delphi Technique: Making Sense of Consensus*, Practical Assessment, Research and Evaluation, Vol 12, No. 10, pp. 1–5, 2007.

Appendix 1: Initiation phase process for housing development



Appendix 2: The Information Required at Initiation Phase



Appendix 3: Decision technical information required at initiation phase process for housing development

