

# Application of Delphi expert panel in joint venture projects

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**Abstract.** This study was conducted with the aim to identify the application of the Delphi Technique in validating findings obtained from questionnaire surveys and interviews done in-depth on the subject of joint venture projects in Malaysia. The Delphi technique aims to achieve a consensus of opinion amongst expert panellist that were selected on the primary factors in JV projects. To achieve research objectives, a progressive series of questions was designed where a selected panel of expert to confirm and validate the final findings. The rationale, benefits, limitations and recommendations for the use of Delphi were given in this study. From the literature review done, twenty-one factors were identified as critical factors to the making any joint venture project successful. Detail information from contractors were obtained by using the questionnaire survey method and forty-three in-depth interviews were carried out. Trust between partners, mutual understanding, partner selection criteria, agreement of contract, objective compatibility, conflict, and commitment were confirmed by the Delphi panel to be the critical success factors besides another fourteen factors which were found to be the Failure Reduction Criteria. Delphi techniques has proven to successfully assist in recognising the main factors and would be beneficial in supplementing the success of joint venture arrangements application for construction projects in Malaysia.

## 1. Introduction

Construction JVs in Malaysia have become more well-known in multinational construction and local government to achieve their individual objectives. The contractors need to know the factors, which were considered critical if they want their JVs to be successful.

Since the 1990's, there have been contractors from foreign countries involving in construction projects in Malaysia and the number has been increasing. Bumiputera Contractors have started to accept the culture of joint-venture for the reason of political stability, economic growth, and relatively low cost of labour and others resources. Foreign firms see this is a way into the Malaysian market through joint venture for projects with Malaysian and Bumiputera Contractors. Participation in the regional and global market of the local contractors were also encouraged by the Malaysian government based on the contractor's knowledge and skills on building, infrastructure, highways, power generations, ports, and airport coasts construction or development projects.

The liberalization of policies along with foreign participation in several sectors was announced in March 1988 by the Malaysian government. The foreign participation of Malaysian



sectors include privatized infrastructure projects. Apart from the completion of Petronas Twin Towers, Second Link to Singapore, and Kuala Lumpur International Airport in Sepang, there are many other projects associated with infrastructure of Malaysia that are needed to be implemented. The companies running in Malaysia have ventured with countries like China, Bosnia Herzegovina, India, and some parts of South America and Africa. These projects are likely to provide excellent opportunities to the companies in Malaysia for teaming up with the foreign contractors to explore efficient business opportunities.

## **2. Problem statements**

The Malaysian market is reducing in size due to the growing number of construction companies. Efforts to make necessary changes in these companies by means of creating new strategies, consolidating the departments, and be prepared for exit or replacement have to be thought through by these companies. Normally, the method of taking part in large infrastructure projects in Malaysia by the foreign companies is through JV with local partners. However, a minimum of 30% indigenous Malay or more commonly known as Bumiputera, is required in the said JV bids.

The welcoming of foreign participation by the Malaysian government is evident through the amount payments made for numerous contracts and professional services to them. Identification of any difficulties or inconveniences is necessary as they may be a reason for instability and prone to trouble during the execution of the project with the respective foreign venture. Establishing trust may also be a problem together with the uncertainty of partnering success factor and the existence of competitiveness strategy in international construction.

Apart from that, language, ethnics' culture and local standards were also proven to be hindrances in these joint venture projects. Cultural shock which may have impact on the organizational, working and coordination may occur when these cultures cross. Technological, financial, legal, equity control, profit margin, size compatibility, socio-cultural and political are also additional joint venture projects' other problems to be looked into. It is necessary for a planned approach by both sides of the JV agreement throughout all these aspects in order to ensure successful implementation of the project. Careful analysis of political, cultural, economic, and social environment is required for assembling the feasibility and desirability of a joint venture that needs to be managed and implemented.

## **3. Literature on Delphi background**

The name Delphi was taken from the Greek Oracle's skills of interpretation and foresight. The Delphi was developed in the 1950's by the Rand Corporation for the US Air Force concerning the use of expert opinion [1]. The procedure was designed to obtain the most reliable consensus of opinion of a group of experts by a series of intensive questionnaires interspersed with controlled opinion feedback, with the results of each round being fed into the next round [2]. It involves the selection of procedures for suitable experts, development of appropriate questions to be put to them and analysis of the answers given by them [3]. The intended outcome is that by the final round the experts will have reached a consensus of opinion on the issues put before them.

An example of iterative forecasting procedure, in this case the Delphi method, is characterized by three distinct features [4]: anonymity; iteration with controlled feedback; and statistical response. Panel members remain unknown to one another respond to a series of questionnaires. The iterative nature of the procedure generates them to modify their assessments and projects them beyond their own subjective opinions. It can represent the best forecast available from the consensus of experts [5]. The process is continued until a consensus is reached on the various issues under consideration, or until it becomes evident that no further consensus can be developed. Generally, Delphi runs to two to seven rounds of questioning, at more. The major difficulties of Delphi, however, lie in maintaining the high level of response and in reaching and implementing a consensus [1].

The aim of this paper is to report how the Delphi Technique was used to validate and confirmed a list of factors that was considered critical from the literature review, questionnaire survey

and interviews on the critical success factors on construction JV projects in Malaysia. It is also aim to derive a consensus on the most critical success factors from expert panellists for the final findings. The effectiveness of the Delphi method will be evaluated and the difficulties in conducting Delphi survey will be discussed.

#### **4. Methodology and discussion**

Following a thorough literature research, 21 factors critical to the success of construction JV projects was identified. These factors were then assembled into questionnaire survey that was distributed to 1630 local and 70 foreign contractors in Malaysia. A response rate of twenty (20%) 341 was obtained. The purpose of the questionnaire survey was to discover which companies had experience of JV projects, the extent of that experience and their views of key factors associated with joint ventures.

The 2<sup>nd</sup> part of the research involved in-depth interviews conducted in Malaysia which involved 43 participants from various foreign and local companies. It was carried out with the Chief Executive Officers, General Managers to provide detailed information in their company structure, management and experience of any JV projects undertaken in Malaysia. Results from interviews confirmed the postal survey results of having at least 90 per cent the same 12 ranking CSF.

To confirm that the CSFs discovered by this process are reliable, a Delphi Technique which involved expert panels in Malaysia was conducted to validate/confirm the final findings. A triangulation approach had been adopted for this study which enables to integrate the quantitative results (questionnaire surveys) with the results from the qualitative method (interviews). This will prove useful; as the research process will be more robust enable a much higher quality reliable data to be gathered and results to be achieved.

#### **5. Implementation of Delphi study**

In this study, 22 experts were selected based from the recommendation from the contractors involved in the previous in-depth interviews conducted in Malaysia. Experts in Malaysia were contacted via email with the intention to get their approval to participate in the Delphi group. The 19 expert panels were Chief Executive Officers, Executive Directors, and Senior General Managers with vast experience and numbers of past and present JV local and overseas works and 3 academicians from the Malaysian universities whom involved in JV projects.

##### *5.1 Delphi Round 1*

The questionnaire consisted of 21 factors critical to success of construction JV projects were sent out followed by email phone calls to encourage participation. There was 86% response with 19 experts (out of 22) returned the questions. The experts were asked to rate each statement on a 4 point Likert-type rating scale in terms of their criticality. They were encouraged to enhance the result by making additional comments on the topic after the questionnaire finishes. [6] suggested that “an expert may be defined as someone with special skills or knowledge evidence by leadership in professional organizations, holding office in professional organization, presenter at national conventions, published in recognized journals.

##### *5.2 Delphi Round 2*

On the second round of this study, the expert panel provided 21 statements of contents with some amendments received from the experts' comments during the first round. They were given the numbers of response of each factor based on the scale of criticality again. To achieve consensus in the statements added by the panel during the first round, the experts were directed to review their rating again in terms of their criticality. The second questionnaire received a 77% responses with 17 experts returned the questionnaire. A majority of the experts reviewed their score and made necessary alterations.

### 5.3 Results and Analysis

The responses that were obtained were compiled and analysed using the procedure and formula mentioned as above. The questions were analysed by providing numerical scores on each of the scale of criticality with 100 points on Extremely Critical (4), 50 points on Critical (3), 10 points on (Less Critical) and 0 points on (Not Critical). These scores were then translated into importance indices to establish their relative ranking of the attributes. A Relative Importance Index (RIX) was then developed to convert the E-Scores into a decimal figure using the following formula taken from [7]:

$$\frac{\sum W}{A \times N} \quad (1)$$

Where

W = weighting given to each factor in the evidence scale,  
A = the highest weight applied,  
N = total number in sample.

Consensus was achieved on 7 CSFs, which include inter-partner trust, criteria for partner selection, mutual understanding, agreement of contract, compatibility of objective, and management control. [8] points out that consensus can simply mean a 'group opinion, general agreement or group solidarity in sentiment and belief. The panel selected these CSFs as being high importance to the implementation of construction JV work in Malaysia.

The factors with scores of 0.80 or more on the RIX scale were considered extremely critical success factors and it shows that where the factors were included, there may be an increase of success chance but if left out, it will increase the chance of failure [9]. The factors that score less than 0.80 on the RIX scales were not considered as critical. Fourteen factors were designated as Failure Reduction Criteria (FRC) which if included in the project, might reduce the chance of failure but would not increase the chance of success [9].

In addition, to the RIX scale, the percentage of respondents scoring 4 (extremely critical) with 80% and more was used to rank the most critical success factors. If the RIX were equal, the distribution of the percentage of each scale will be taken into account. These were confirmed too by the scores of 50% to 74% from results in Round One.

There were increased on convergence of opinion among the responses agreed in the factors during the second round. Although a three round sequences seem to be the most popular and recommended method, there were two cases where two rounds were found to be satisfactory [10]. It was judged from the response of the experts to be the second round that the marginal gain from the third round may be small compared to the effort required to perform it, because of the declining participation and it was agreeable to stop the Delphi study at the second round.

This confirmed with [11] that answers are most accurate on Round Two and became less accurate on subsequent rounds. The Delphi final results confirmed the questionnaire surveys and in-depth interviews, which produced the similar results where 85% of the respondents agreed on the seven CSFs and the fourteen FRCs.

**Table 1.** Perceptions of the Finalized Project Success Factors from Round 1 and Round 2

Rank	Round 1	RIX	Round 2	RIX
1	Criteria for Partner Selection	0.87	Inter- Partner Trust	1.00
2	Mutual Understanding	0.77	Mutual Understanding	0.96
3	Inter- Partner Trust	0.74	Criteria for Partner Selection	0.94
4	Agreement of Contract	0.75	Agreement of Contract	0.91
5	Compatibility of Objectives		Compatibility of Objectives	0.88
6	Conflict		Commitment	0.85
7	Commitment		Conflict	0.82

8	Partner Experience	Communications	0.61
9	Cultural Understanding	Cultural Understanding	0.55
10	Coordination	Profit	0.54
11	Profit	Partner Experience	0.54
12	Communications	Financial Stability	0.53
13	Management Control	Cooperation	0.53
14	Cooperation	Equity Control	0.53
15	Equity Control	Management Control	0.48
16	Organizational Structure	Coordination	0.46
17	Financial Stability	Effective HRM	0.43
18	Effective HRM	Motivation	0.30
19	Motivation	Organizational Structure	0.24
20	Knowledge Transfer	Knowledge Transfer	0.17
21	Size Compatibility of Partner Firms	Size Compatibility of Partner Firms	0.12

## 6. Difficulties in conducting the Delphi techniques

It is important that panel members treat the work seriously, and devote the time necessary to provide thoughtful and reasoned responses to the questions. Secondly, the wording of the questions and the presentation format of the survey were extremely important [1]. It is very important to keep the whole panel responding to each round of Delphi and finally, the successful rounds of Delphi technique were time consuming. This study was taken with relative success in that a response rate of 77% was achieved and considered relatively high and acceptable for the purposes of this research.

## 7. Conclusion

The Delphi method was preferred to validate the final findings as it involved panellists whom are knowledgeable in their area of expertise to provide the reliable data on JV projects in Malaysia. This is because they were experts whom could confirm the results of this study. The Delphi Expert Panel resulted in the identification of seven critical success factors as being extremely high importance to the construction JV in Malaysia which require a significant level of application in order to facilitate additional success. Fourteen factors were identified as FRCs and without these elements a project will risk the significant chance of failure. The results of this study are expected to provide useful guidelines for forming and operating effective and efficient JV both in Malaysia and in other similar economies.

## 8. References

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