

Study on the Combination Mode of Design and Supervision in Construction Project Consulting Service in Saudi Arabia (Civil Engineering)

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Abstract—The consulting services are very important to the project life of construction projects. When owners select the contract type, they need to analyze the design work and the supervision work to be arranged. Is this service to be carried out by a single consulting firm having the required qualification and capacity? This research presents advantages and disadvantages of appointing the design consultant as construction supervision consultant in the construction industry in Saudi Arabia. A questionnaire was designed that comprised of five project phases including the project inception phase, project planning and design phase, project construction phase, project monitoring and control phase, and project closing phase. Responses of 101 valid questionnaires were collected from construction projects and analyzed by using the SPSS (Statistical Package for Social Sciences-21) for Windows software package. The results indicate that owners, consultants, contractors, and researchers strongly support appointing the same design consultant as supervision consultant. The results indicate that the number of advantages for appointing the design consultant as construction supervision consultant in the industry more than doubles the number of disadvantages of appointing the same design consultant as supervision consultant in the construction industry. Results further show that it is not appropriate to employ different professionals on a project for these two services when close coordination is generally required for the successful completion of the same. Research concludes that there is no harm to appoint a third party for proof engineering and design vetting. This work may be beneficial for owners, consultants and contractors who want good services from designers and consultants on construction projects.

Keywords—consultants, construction projects, contractors, design consultant, owners, project phases, supervision consultant

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I. Introduction

In planning and developing a construction project, feasibility studies, planning, design, procurement, construction, supervision, project commissioning, all stages are tightly linked (Yi and Xu 2011). The project consulting services can cover the entire project lifecycle. The consulting services include counseling services, feasibility studies, design, preparation of contract documents, preparation of shop drawings, supervision, project management, and program management (Bunni, 2005: 66-82). Fédération Internationale Des Ingénieurs-Conseils (FIDIC), in 'FIDIC policy statement on selection of consultants', states that consulting engineering industry (CEI) undertakes activities related to planning, designing, constructing, inspecting and managing the infrastructure required for meeting the ever-increasing demands for energy, transportation, shelter, health and water (FIDIC 2004).

During the selection process, the owner of a project needs to select a responsible consultant or a team of consultants for design and supervision of works (Bunni 2005). Correct selection of a consultant has major bearing on the quality, overall project cost, and on the success of the project as well as on the overall value of the delivered project (FIDIC 2011a). At the time of organizing the project, the owner needs to decide who will design the project and who should supervise the site construction.

'FIDIC guidelines for integrity management in consulting' states that one of the important factor in success of a project is obtaining the services of the most competent and experienced consultant (FIDIC 2011b). There are enormous investment opportunities in the construction industry of the country including heavy engineering construction: oil and gas, highways, airports, ports, power generation plants, irrigation; industrial construction: petroleum refineries, petrochemical plants, manufacturing plants; building construction: hospitals, schools, universities, commercial towers, warehouses, government buildings, recreation centers; residential construction: single-family homes, multi-unit townhouses, high-rise apartments, and condominiums (Choudhry and Iqbal 2013). Nonetheless, it is not clear how consultants are selected for construction projects. Perhaps, there is little published data available on this topic. Specifically, the objectives is to evaluate advantages and disadvantages of appointing the design consultant as supervision consultant on construction projects to draw scientific conclusions for the benefit of construction industry's stakeholders in Saudi Arabia.

II. Methodology

This study reports the results of the questionnaire survey in the construction industry in Saudi Arabia. A rigorous study was conducted to assimilate the relevant literature (e.g. Oppenheim 1992; Yin 1984) in understanding the research domain. The researcher used secondary sources such as journals, reports, previous studies related to the research topic to gather information about the questionnaire. Based on the literature review a questionnaire is designed to collect data. Many ideas about the structure and content of the questionnaire were provided by experts in the industry. The questions introduce the concept to the participants simply and smoothly to achieve the research objectives. Checklist format is used for the development of the questionnaire. Twelve (12) questions of the questionnaire are related to personal characteristics of the respondents. The rest of the questionnaire consisted of 42 questions and comprised of 5 sections outlining project phases including project inception phase, project planning & design phase, project construction phase, project monitoring & control phase, and project closing phase. Each question has five choice i.e. '1-strongly agree', '2-agree', '3-not sure', '4-disagree', and '5-strongly disagree'. Respondents are required to choose only one choice out of the five.

A pilot survey is conducted with experts to check its suitability for the construction industry. For this purpose, 12 questionnaires are presented to experts – clients (3), consultants (3), contractors (3), and universities (3). An interview was also conducted with each expert. The questionnaire is further modified by the feedback from the pilot survey to adopt it for the construction industry. A cover letter is attached to the questionnaire for each respondent in order to relay objectives of the survey. Final questionnaire is distributed to engineers, architects, owners, academics and contractors for their responses. The questionnaire solicited information about the respondents covering their qualification, designations, working experience and the group which they represent (owner, consultant, contractor, and academia). Forty two (42) questions were related to the 5 project phases and the questionnaire followed a five-point Likert-type scale for statistical analysis. Google drive was used to collect responses. The questionnaire was designed in two languages (English and Arabic) for easy understanding of respondents.

The sample for this work is selected from a population of construction companies in Saudi Arabia. For a population of 40,000 companies or over, Dillman (2000) stated that a sample size of 96 is enough with $\pm 10\%$ sampling error and 95% confidence level. The judgmental sampling method is used, and 120 questionnaires were sent to respondents. Out of the 120, 103 questionnaires received and 101 valid responses were analyzed representing a response rate of 85%. Two questionnaires are rejected because they were incomplete.

From the 101 valid responses, owners' response rate was 23.76%, consultants 32.67%, contractors 36.63%, and academia 6.93%. Approximately 45.54% had 6-10 years of experience and 19.80% had over 10 years of experience,

57.65% of the respondents belong to private organization, and 1.98% of the respondents had acquired PhD degree, 11.88% held MS degree whereas 70.30% had acquired bachelor degree and 2.97% held diploma and 12.87% had certificates. Of the organizations, 38.10% respondent's organizations employ more than 500 employees and 73.26% of respondents were used to work at buildings and infrastructure projects. For the cost of the projects, 35.62% organizations executed project worth 10-100 million, 31.51% organizations executed projects worth 100-500 million, 13.70% organizations undertook construction projects having cost more than Saudi Riyal 500 Million (1 US\$ = 3.75 SR).

Ten interviews were conducted and analyzed. These persons who had accumulated extensive working experience provided valuable information to the researcher. The study used the analytical descriptive method. The data gathered were analyzed by using the SPSS-21 (Statistical Package for Social Sciences) by analysis as explained by Pallant (2007). A 0.05% level of significance presents a statistically significant relationship in the data. The relative importance index (RII) was calculated for the 42 questions by using the formula used by researchers (Chan and Kumaraswamy 1997, Enshassi et al. 2008) as:

$$RII = \sum w / (A \times N) \quad \text{Eq. (1)}$$

Where w = weight as assigned by each respondent in a range from 1 to 5; A = highest weight i.e. '5'; N = the total number in the sample.

III. Results and Analysis

The results show that by appointing the same design consultant as supervision consultant advantages were 55.86%, disadvantages 28.28% and not-sure respondents were 15.86% (see Figure 1). The results indicate that advantages are almost 2 times to that of disadvantages of appointing the same design consultant as supervision consultant. Overall 84.14% respondents were well conversant with the involvement of designer and supervision consultant in the construction industry.

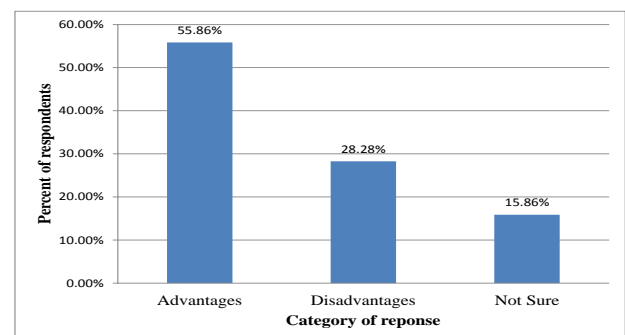


Figure 1. Overall response by respondents

Responses show that there were 31 advantages and 11 disadvantages out of 42 questions asked from the respondents. Overall response of respondents concerning

advantages was ranked. The responses with higher relative importance index (RII) were rank as “1”. The RII “by appointing the design consultant as the supervision consultant, there shall be quick decision can be made during execution by eliminating the lengthy process” was 0.34 and this factor was ranked as number 1. The RII “by appointing the design consultants as the supervision consultant, consultants become fully conversant with the project background right from the inception phase of the project” was 0.35 and this factor was ranked at number 2. The RII “by appointing the design consultants as the supervision consultant, there shall be comfortable coordination and communication between design and supervision teams” was 0.36 and this factor was ranked at number 3. The RII “by appointing the design consultants as the supervision consultant, approval of construction methodology, material approval or shop drawings takes less time” was 0.38 and this factor was ranked at number 4. The RII “by appointing the design consultants as the supervision consultant, the project scope can be arranged well” was 0.39 and this factor was ranked at number 5. All 42 factors were ranked according to the relative importance index. By appointing the design consultant as the supervision consultant, the strongest disadvantage is the domination in the consultant’s decisions making and this was ranked at number 42 with RII = 0.71.

Ratio of advantages and disadvantages for owners is 1.23, consultants 2.77, contractor 2.34, and academia and researchers 2.14. Although, the owners have little low ratio, nonetheless, all stakeholders had almost similar perceptions. The respondents consider that “by having the design consultant as the supervision consultant” at project inception phase advantages were 82.70%, and they ranked this phase at the top (see Figure 3). The respondents consider that “by having the design consultant as the supervision consultant” the advantages were 56.94%, and they ranked the construction phase at the 2nd position. Respondents ranked the planning & design phase; closing phase; and the monitoring & control phase at position 3rd, 4th, and 5th respectively.

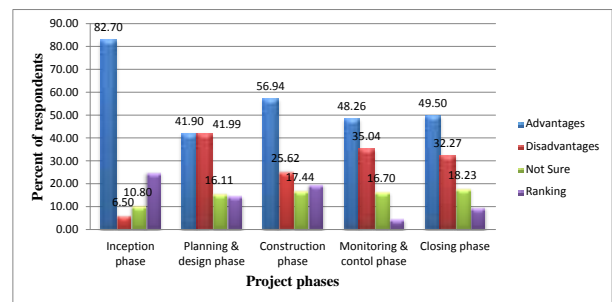


Figure 3. Project phases and ranking

A. Stakeholders Ranking

The results indicate that stakeholders (owners, consultants, contractors, academics) strongly support “appointing the design consultant as the supervision consultant”. The owners indicate that “by appointing the design consultant as the supervision consultant” advantages were 48.22%, disadvantages 39.32%, and not-sure responses were 12.46%. The consultants indicate that “by appointing the design consultant as the supervision consultant” advantages were 62.28%, disadvantages 22.51%, and not-sure responses were 15.21%. The contractors show that “by appointing the design consultant as the supervision consultant” advantages were 56.54%, disadvantages 24.20%, and not-sure responses were 20.95%. The academia and researchers indicate that “by appointing the design consultant as the supervision consultant” advantages were 58.19%, disadvantages 27.20%, and not-sure responses were 14.61% (see Figure 2). The results indicate that the advantages were more than 2 times to that of the disadvantages of “appointing the design consultant as the supervision consultant” in the construction industry in Saudi Arabia.

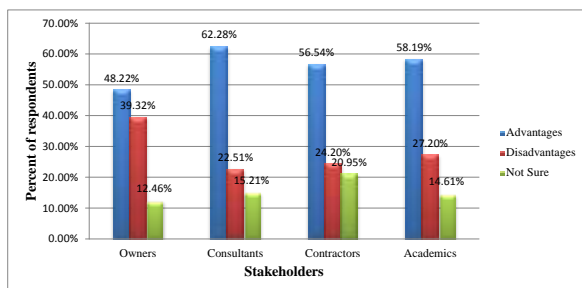


Figure 2. Response by owners, consultants, contractors and academics

IV. Discussion

Results of this study clearly indicate that it is appropriate to appoint the design consultant as the supervision consultant on construction projects. The results showed that majority of the respondents were well conversant with the involvement of consultants on the construction project. Results indicated that advantages were more than 2 times to that of disadvantages for “appointing the design consultant as the supervision consultant”. In this research, the owners score was 48.22%, consultants 62.28%, contractors 56.54%, and academia 58.19% which indicate that the stakeholders had the high perceptions for “appointing the design consultant as the supervision consultant” on construction projects.

The response of the respondents for advantages at project inception phase was 82.70%, at project planning & design phase 41.90%, at project construction phase 56.94%, at monitoring & control 48.26%, and at project closing phase 49.50%. These results indicated that respondents had high perceptions for appointing the design consultant as the supervision consultant during all phases of projects. The results showed that the trend was declining and mixed from the project incepting phase towards the project closing phase. The results indicated that it is more beneficial to have the same design consultant as the supervision consultant at the project incepting phase, construction phase, planning and design phase, and closing phase, and at the monitoring & control phase of projects. The authors postulate that there is no harm to appoint a third party for the design vetting and proof engineering, irrespective of whether the design company is appointed as the supervision consultant or vice versa.

v. Conclusions

This work was carried out to investigate whether design work and the supervision work is to be performed by a single consulting firm having the required qualification and capacity. The owners, consultants, contractors and researchers strongly support appointing the design consultant as the supervision consultant in the construction industry. Stakeholders perceived that it is quite appropriate to have the design consultant as the supervision consultant at all project phases. Results showed that by appointing the design consultant as the supervision consultant, advantages were more at the project inception phase as compared to the project monitoring & control phase. By appointing the design consultant as the supervision consultant, the strongest advantages are: 1) 'quick decisions can be made during execution by eliminating the lengthy processes' 2) 'Consultants becomes fully conversant with the project background right from inception phase of the project' 3) 'there will be the comfortable coordination and communication between the designer and the supervision teams' 4) 'approval of construction methodology and materials approval or shop drawings takes less time'. By appointing the design consultant as the supervision consultant, the strongest disadvantage is the domination in the consultant's decisions making. Results indicated that it is not appropriate to employ different professionals on a project for these 2 services when close coordination is generally required for the successful completion of the project.

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