Coping with Construction Project Uncertainties:
Empirical Evidences From Chinese Construction Firms

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Abstract: - Aim of this research contribution is to expose uncertainties which are faced by the project managers in the construction Industry. These uncertainties cause construction complexities. A catalogue of competencies to cope with these uncertainties and to meet the requirements of ever-changing construction industry demands has also been worked out. This research article proposes that the alignment among construction project uncertainties and competency spectrum required to cope with these uncertainties leads towards successful project execution.
An empirical research has been performed to examine the perception of the Project Managers and experts doing construction projects. These experts have been serving as project managers or consultant in various construction projects in the different geographies of China for prolonged period of time. Results depicted that ambiguous strategic priorities, delays in supply, least interest by stakeholders, ignorance of key risks, impuissance of initial assessment of customer requirements, poor governance, lack of trust among stakeholders, lack of commitment, poor communication and unrealistic timeframes are the major challenges for construction industry in China. Techno-logical Knowledge, future prediction techniques to assess the future risks, project estimation, awareness of new construction discoveries, managerial skills, expertise in designing and reading the drawings, expertise in construction software and managing the financial budget heads of all modules are the required competencies to cope with these uncertainties. Alignment among the above said factors lead to the successful project execution.

Key-Words: - Project Management, Project Complexity, Risk Management in Civil Engineering Projects, leadership

1 Introduction

Project is a sequence of tasks. These tasks are undertaken for a fixed period of time to meet the specific and unique goals [1, 2]. 19th century has been considered as the major paradigm of managing the projects, especially managing the project cost within predefined timelines. Initiating, planning, executing, controlling, and closing are the processes for project management [3]. Fayol’s [4] defined these processes in terms of project management functions with this sequence; plan, organize, command, coordinate and control. Ambiguities come into sight about the difference among routine tasks and regular projects. Nevertheless, both are entirely different. Production in of a specific item in an industry is a task but development of new product line or its design is a project. Projects are
helpful for organizations to achieve strategic goals and objectives. To meet the project specified goals, project managers need to draw specific lines and use Project Management tools to keep project on track. Considering the importance of project management in construction industry, many organizations have turned their directions to adopt new project management tools and techniques [5, 6]. Taking in practice of project management tools and techniques has increased the project managers’ knowledge but complexity of construction projects has also been increased during last few decades. Rapid developments and discoveries have expanded the technology but shortened the life span of innovations for this business. These challenges have made construction firms and organizations risk-prone. Mega construction projects with strategic and defence objectives, construction projects, IT projects and oil and petrochemical projects [7] have become more complex due to their volume and ignorance of unforecasting factors.

Projects and missions are accomplished properly only if the leadership has a strong influence over his team. Leadership is a complex but indispensable process for organizations’ manoeuvring in right way to achieve its objectives [8]. Performance of project manager directly relates with the effectiveness of project being managed [9]. Nevertheless, project manager’s appointment is not taken for instant solution [10] to manage all modules of project. Construction industry demands some specific skills as preparing, producing and understanding information as drawings and schedules [11]. A great deal of diversity in characteristics of project managers have been realized [12]. A project manager with leadership traits must be equipped with the competency spectrum. Management competency is a spectrum of competencies required by the project managers to cope with project complexities. Professional competency is the combination of knowledge based on trainings and technicalities, application of this acquired knowledge with skills developed during practice [13]. These competencies are helpful to draw a framework. Forecasting the possible risks and analyzing the available resources are performed through such frameworks [10-14]. American firms have been reported to emphasis on the competencies as performance management, training & development, staffing and compensation [10]. Construction projects require some specific competencies as state of the art aptitude, acquirements, acquaintances with other stakeholders [10] and attributes towards successful execution of the projects.

Construction projects have got much importance after the 2nd world war. A lion share of literature has raised the problems faced by this industry and solutions have been provided. Rapid technological changes and shortened innovation life span has made this domain more complex. China has been renowned as world’s great economy. Strong economical structure has encouraged China to enhance infra structure and living standards. Construction industry is at its boom in China. Great competitions and ever-growing complexities in construction industry triggered the project managers and construction mogul to adopt the scientific approaches in this arena. This research can be proved as a guiding step for construction industry to consider these challenges seriously and pay attentions on alignment with competency spectrum to avoid the project failures in future.

Lists of construction project uncertainties and competency spectrum required to cope with these uncertainties has been designed on the basis of initial interviews of the project managers doing various construction projects in China. Research instrument was designed on the bases of uncertainties for construction projects and competency spectrum. Initial part of questionnaire explored the demographic information of the respondents. Second part included the items to
verify the variables on the basis of respondents’ opinions. Responses were scaled on 5-likert scale. Detailed survey of responses has been analysed using SPSS software.

Major issue for this research was to target those project managers/consultants doing construction projects in China. Due to their busy schedules and scattered construction sites, it was not convenient to catch them in a single attempt. Professionals’ telecon helped to design questionnaire but research survey was conducted by face to face meetings.

2. Research methodology

This empirical research has been conducted based on hypothetico-deductive method where both qualitative and quantitative research methods are used. Project managers doing project for construction industry were asked about the major challenges faced during managing the projects. In the next section of interview, they were inquired about their managerial skills used to tackle the encountering complex challenges for managing construction projects. Their responses were converted into the list of factors and a research instrument had been established. This instrument had two parts. Initial part dealt with the demographic information of the respondents. Later part has main constructs and items to be evaluated by the project managers on the basis of their experiences.

Initial interviews were major problems as it takes long time and effort to explore project managers regarding their expertise and experiences. Many issues were there to conduct this research as project managers are normally very busy with their hectic schedules and meetings. Second reason was construction project sites, scattered at various geographies. Some researchers at research institutes, managing construction and electronics projects were also involved to enhance the research sample. Due to above mentioned reasons, author has used snowball data sampling techniques where respondents are selected based on their specialties and core competencies

2.1. Hypothesis

H1: Challenges as ambiguous strategic priorities, delays in supply, least interest by stakeholders, Ignorance of key risks, Impuissance of initial assessment of customer requirements, Poor governance, lack of trust among stakeholders, lack of commitment, poor communication and unrealistic timeframes lead towards construction project complexities

H2: Competencies as techno-logical construction knowledge, future prediction to assess the future risks, project estimation, awareness of new construction discoveries, leadership skills, expertise in designing and reading the drawings, expertise in construction software and managing the financial budget heads of all modules are required to cope with these complexities

2.2. Data Characteristics

Research questionnaires were sent to respondents using both online and face to face techniques. 43 online and 57 face to face questionnaires were requested. 11 online and 43 face to face responses were received. Only 54% responses were received and reason has already been mentioned in the last section. One more reason is language barrier. We had also to filter respondents only who can speak English especially for initial interviews. Responses with 20% missing values have been rejected for this research. 12 respondents didn’t provide complete information and their questionnaire were considered to be dropped. At the end, only 42 responses were included to conduct this research. Further details have been depicted in table 1.
Table 1: Response ratios

<table>
<thead>
<tr>
<th></th>
<th>Online Sent</th>
<th>Online Received</th>
<th>F ace to F ace</th>
<th>Face to Face Received</th>
<th>Total Sent</th>
<th>Total Received</th>
<th>Response %age</th>
<th>Rejected</th>
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</thead>
<tbody>
<tr>
<td>No of Responses</td>
<td>43</td>
<td>11</td>
<td>25</td>
<td>4</td>
<td>10</td>
<td>8</td>
<td>54.0</td>
<td>2</td>
</tr>
</tbody>
</table>

Respondents were selected from construction industry but these project managers were managing projects in various domains of construction business. Construction Research institutes, offices providing consultancy for construction projects and construction project sites were the targeted places to pursue the respondents. A sector-wise analysis has been shown in figure 1.

![Fig1: Respondents' Frequency Sector wise](image)

3. Results and Analysis

This research has proposed a list of uncertainties that lead construction projects towards complex scenarios. A regression analysis has been performed to check the relationship among the variables. Results indicate that all sorts of uncertainties have a positive relation with complexities in construction project where \( B \) (Unstandardized Coefficients) equals 0.165 and \( T \) is 0.178. \( R \) and \( R^2 \) values (.178 and .032 respectively) are also satisfactory to prove that above listed uncertainties are major cause to enhance construction complexities. These statistics indicate that ambiguous strategic priority, least interest by stakeholders, delays in supply, ignoring key risks, poor governance, lack of commitment, poor communication and unrealistic timeframes push projects towards complex premises. Despite anything to the contrary, impuissance of initial assessment of customer requirements and lack of trust among stakeholders have been observed having a negative relationship with complexity in construction projects. Project managers and residence engineers are of the view that these variables are not as important to enhance the project complexity. Reason of conflict for these two variables may be due to difference in the working environment and culture of respondents. Residence engineers and the project managers at project site or in the research institutes have different approaches and working scenarios. Such sorts of environmental factors influence the results and cannot be avoided in empirical research.

A spectrum of competencies was plotted based on the literature and initial interviews from project managers. A regression analysis was performed to find the effect of this competency spectrum on the project complexity in construction management domain. Competency spectrum has been observer to have a strong positive influence on project complexity. A positive relationship among these variables depicts that these competencies are necessary to be practiced in the construction industry to avoid from project complexities. Unstandardized Coefficients \( (B) \) for competency spectrum has a positive relation with complexity and equals 0.185 where \( T \) is 1.062. \( R \) and \( R^2 \) values (.178 and .032 respectively) are also satisfactory for this test to justify the hypothesis 2. Technological construction knowledge, future prediction to assess the future risks, project estimation, awareness of new construction discoveries, leadership skills, expertise in designing and reading the drawings, expertise in construction software and managing the financial budget heads of all modules are competencies in the competency spectrum required.
to overcome the complexities in construction industriousness.

5. Conclusion and Recommendations

This research is an effort to foreground those uncertainties and ambiguities which increase the project complexities and make the construction projects risk-prone. This empirical research also has blueprinted a competency spectrum to overcome these complexities. These uncertainties and competencies were derived from the literature and expert opinions of the project managers engaged to manage the projects in Chinese construction project management firms. Among all uncertainty items, ambiguous strategic priority, least interest by stakeholders, delays in supply, ignoring key risks, poor governance, lack of commitment, poor communication and unrealistic timeframes have been reported as strongly affecting items to make the project complex. All the respondents agree that Techno-logical construction knowledge, future prediction, project estimation, awareness of new construction discoveries and leadership skills are very important to overcome construction complexities. Project managers from many firms also asserted that these competencies are already being practiced in their organizations.

Aim of this article is to divert the attention of construction moguls towards these uncertainties to reduce complexity as complexity can’t be removed totally. Competency spectrum is provided by the author and verified by the experts and practitioners to overcome any unexpected complex scenarios. Alignments among uncertainties and competency spectrum can help construction tycoons to execute construction projects smoothly.

Future Work:

It is dire need of construction project management domain to find the alignment between these two spectrums. In the next phase of this research, uncertainties will be aligned with competency spectrum.

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References:


