Factors Affecting the Success of Construction Projects in Khyber Pakhtunkhwa, Pakistan

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Abstract: Construction industry ranks as the largest industry and imparts a significant part in developing and achieving the aims of society. Due to the involvement of larger number of stakeholders, construction industry is complex in nature. The current study is designed to identify and evaluate the factors affecting the success of construction projects in Khyber Pakhtunkhwa (KP), Pakistan. To carry out the study, a questionnaire was developed in term of interview pilot study. The data from the questionnaire survey was analyzed through SPSS software in five groups to accumulate authenticity of 44 factors. Later on the ranking was done by relative importance index (RII). According to the outcome of the research, "Project Group" stood highest among the five groups with factor of "project size" at the top rank while "Contractor Group" stood lowest with the factor of "client size" at bottom rank. From the study it is concluded that the Project Group is identified as a crucial blockade in success of construction projects. By giving pivotal attention to project group, the projects could be successfully attained from factors of project size, materials and equipment, funds and resources and project planning. To focus on the factors of project group, trust of the province people could be restored in construction of projects.

Keywords: Success Factors, Construction Projects, Project group, Khyber Pakhtunkhwa Pakistan.

I. INTRODUCTION

Construction industry ranks as the largest industry and imparts a significant part in developing and achieving the aims of society. It contributes around 10 percent of the gross national product in developed countries. Due to the involvement of large number of stakeholders, construction industry is complex in nature. National economy is affected by the construction industries' performance (Navon, 2005).

There is viable high-risk involved in the construction industry. Massive progression in technologies, budget and developing processes makes it vibrant. Construction team faces unparalleled situations due to the complexity and difficulty of the projects. The study of critical success factors is to improve the efficiency of the construction projects. Though the conception of project success is still not clearly distinct in knowledge of construction experts. No industry acknowledged the description of projects' success because the element of uniqueness in individual projects, suggesting that the success varies project to project. The topic project success is often argued but seldom concurs (Gudienė et al., 2013). As the condition differs project to project, classifying the success factors has been the focus of different research (Hanafizade and Ghafori Rayni, 2007).

By categorizing and rank success factors in research, we get the solution for the managerial development for the construction companies. It is evident that by identifying the factors and rank them accordingly, will help out in different types of construction fields like dams, irrigation,

roads, bridges, maintenance, residential and commercial buildings, mega structures in collaboration with Government (Syedsalehi, 2010). The purpose of this research is to identifying the factors which distresses on the success of construction projects.

PROBLEM STATEMENT

Trust of people in timely construction of different mega projects has been lost due to various factors. Many losses have been occurred due to the several issues which affect the duration, budget, manpower and other possessions too concerning projects. As a result, budget for project completion is commonly revised besides other site problems.

A. RESEARCH OBJECTIVES
The objectives of this research are:
  I.   To identify and evaluate the factors affecting the success of construction projects in KP, Pakistan.
  II. To investigate and rank these factors as per their importance given to them by contractors (only Stakeholder) in construction projects.
  III. To formulate guidelines for stakeholder to improve the quality performance of construction projects.

B. RESEARCH SIGNIFICANCE

The aim of this research was to identifying the critical factors affecting the success of construction projects in Pakistan. The outcome of this research is helpful in real-

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time monitoring of on-going construction projects and decision making for timely minimization of losses. Moreover would be helpful for the contractors to become attentive of the critical factors that needed to be given importance for the success of a project and to prepare competitive construction strategy. An effort has been made to include many contractors from different cities of Khyber Pakhtunkhwa, Pakistan. Project controls are an area with a growing body of knowledge, this research makes an effort to contribute towards the body of knowledge with a particular emphasis on construction practices being currently implemented. Even though the research focuses on construction projects, the findings and the outcome could be relevant to practitioners in other industries with particular emphasis on the various stages involved in project controls.

C. SCOPE AND LIMITATION

The scope and limitations of the study are as followed:

i. The scope of this research is focused on the construction industry of Pakistan, mainly building projects.

ii. The research population includes the record obtained from the registered building contractors in KP. However, due to variations in location of the firms in operation, a generalized framework of the work based on the outcomes obtained will be proposed for the entire country. As the same contractors are carrying out construction projects all over the Pakistan.

iii. This research is aimed at focusing on contractor perspectives duly registered with Pakistan Engineering Council (PEC).

II. BACKGROUND OF STUDY

Neringa et al, (2013) described that the often occurrence of the construction failure is always highly risky, so companies should consider the factors which directly affect the success in the construction projects. The scope of the study was to evaluate and rank success factors of projects in the construction industry. Seventy one identified success factors were distributed to construction professionals and companies who have familiarity and understanding of project management. On the basis of the gather results top ten factors were identified which have direct influence on the project success, which are project management, project value, experience of project manager, technical capabilities of project manager, experience of contractor, project size, competence of project team members, clear and realistic goals, decision making effectiveness of projects management and technical capability of project management.

A project which is completed within the time limit is considered the successful (Madnoushi, 2012). Various variables influenced the project's success, for which measurement tool used was likert scale questionnaire, for its validity and reliability. It is conducted that sixty eight variables were divided into nine groups which affects the project's completion or failure.

Saqib et al, (2008) described that the rise in uncertainties in technology has made construction industry dynamic in nature. With the passing time the construction projects are becoming difficult and complex. The project team is facing novel changes. The effectiveness of the project can be improved through the study of critical success factors and project success.

Research is made in order to find the variables which affect the project during construction. Seventy seven factors were chosen which categorized into seven groups of questionnaire to collect the feedback from the respondents. Once the relationship get defined, it will be useful to make the project successful. The project team is entangled with dense changes.

Jha and Iyer (2006) mentioned that attributes which impact quality performance of project are competency and support of team manager, supervision and proper feedback of team workers, harmony among project participants and owner's decision making power as well as competency.

According to Nourfar (2006), the factors which ensure the success of projects are practical schedule, proper provision of resources, funds allocations and precise objectives etc.

The strategic significance of human resources and identified personal factors indicated success of the project (Ebtehag and Afshari, 2006).

Chan et al, (2004) discussed that for a long time a number of researchers tried to determine the factors affecting the success of construction projects. A large number of variables have been included in literature; however no consensus can be made. The five key groups identified to be important for the project success were project management actions, external environment, project-related factors, human related factors and project procedures. It's notable to differentiate between the terms success factors and bench mark of success factors. Bench mark judges the failure of project in as much as success factor indulged into the management system and display results of project directly or indirectly.

Five vital success factors highlighted by Nguyen et al, (2004) which were proficient project manager, provision of necessary economical aids to meet the ends of the project, active and multitasking personal of project, dedication to the project and approach to resources.

Pinto and Slevin (1987) presented a unique project model and determined ten factors which were project orientation, planning, technical goals, user experts, user reception, observation and report, detection of fault, supper of senior manager, personal and exchanging of information.

There are maximum three to six conclusive factors which intent the development of industries (Daniel, 1961). While seven success factors are mentioned by Ashley (1986).

Critical success factors divided into four main groups (Belassi and Icmeli, 1996) which were factors depending on project, team workers and project manager dependent

factors, institutional structure dependent factors and apparent environment dependent factors. He concluded that an organization critical success factors includes the list of project manager, managerial skills, group members, their technical field, properties of project, exterior environmental factors, after all the above mentioned factors varies from each other. While on the one hand managerial skills and project managers were considered as key stone, on the other hand exterior environment factors influence the constructional goals. There's certain relationship between the amounts of striving in determining the project tasks, job, prerequisites and technical features of product. The success of project is incomplete without the involvement of final beneficiary.

According to Sanvid et al, (1992) factors responsible for the success of the project were human related factors, project related factors, project management tasks and outer environment.

The useful predictors of the project success can be measured through given factors like type of project, number of floors of project and complications of the project and size of project (Walker at el, 1995). Acquirement of factors played significant role in the success of project, it includes selection of organizations to design and completion of project, actions followed for selection of project team and contractors.

Management was considered as key stone of project success (Hubbard, 1990). Proper management tools allow project administrators to plot and implement construction projects efficiently. The variables of project management consisted of update communication, control mechanism, response, operative coordination, decision making power, supervision, project organization structure, plot and list of projects (Belout, 1998; Chua et al, 1999).

Project personal plays a vital role in the success of the project i.e. investors, contractors, consultancy, supplier and workers and managers. Clients based factors depends on various features i.e. nature, experience, awareness of construction, project budget, construction concerned team, well defined scope and investors sophistication. Designers' inspection ensures the completion of project design factors includes experience of team projects, project design complications and flaws in producing design documentation. The contractors and subcontractors duties make the project successful but it depends even on expert contractors, management of sites, monitoring, participation of contractors and sub-contractors, cost control system, Cash flow from contractors and speedy information flow. Project manager is considered backbone of construction project, because its competency counts in the completion of project within given time limit. Project manager must possess qualities like good speaker, commitment, experience and scheduling and consultant. Elements for successful accomplishment of a project require efforts of team workers, contractor and sub-contractor, owner, architect and construction manager (Chan et al, 1997). It is concluded that success of a project also depends upon effective team work.

III. METHODOLOGY

This study is carried out to find and rank critical factors affecting the success of construction projects in Pakistan and to formulate guidelines for the contractors. After evolving problem statement, literature review of past research is carried out to examine the success factors which are already defined. Forty four (44) factors were identified, from extensive review of Neringa Gudienė, Laima Ramelytė, Audrius Banaitis) and adapted accordingly. Forty four (44) factors are then grouped under five major groups and coded as shown in Table 1.

TABLE I
FACTORS AFFECTING THE SUCCESS OF CONSTRUCTION PROJECTS

No	Factor	Code	Related Group
1	Project Size	F1.1	Project Related Factors
2	Project type	F1.2	Project Related Factors
3	Complexity & uniqueness	F1.3	Project Related Factors
4	Realistic Schedule	F1.4	Project Related Factors
5	Project Planning	F1.5	Project Related Factors
6	Materials & equipment	F1.6	Project Related Factors
7	Supervision	F1.7	Project Related Factors
8	Construction methods	F1.8	Project Related Factors
9	Project's Profitability	F1.9	Project Related Factors
10	Adequate funds/resources	F1.10	Project Related Factors
11	Relevant past experience	F2.1	Project Management Team Related Factors
12	Team members Competency	F2.2	Project Management Team Related Factors
13	Decision making effectiveness	F2.3	Project Management Team Related Factors
14	Project organization structure	F2.4	Project Management Team Related Factors
15	Good communication	F2.5	Project Management Team Related Factors
16	Risk identification and allocation by Team members	F2.6	Project Management Team Related Factors
17	Technical capability of team	F2.7	Project Management Team Related Factors
18	Team Personnel issues	F2.8	Project Management Team Related Factors
19	Project Manager Competence	F3.1	Project Manager Related Factors
20	Project Manager Experience	F3.2	Project Manager Related Factors
21	Technical capability	F3.3	Project Manager Related Factors
22	Leadership skills	F3.4	Project Manager Related Factors
23	Coordinating skills	F3.5	Project Manager Related Factors
24	Effective & timely conflict resolution	F3.6	Project Manager Related Factors
25	Adaptability to changes	F3.7	Project Manager Related Factors
26	Perception of role & responsibilities	F3.8	Project Manager Related Factors
27	Client Experience	F4.1	Client Related Factors
28	Client Type (Public/Private)	F4.2	Client Related Factors
29	Client Size	F4.3	Client Related Factors
30	Client's Influence	F4.4	Client Related Factors
31	Ability to make timely decision	F4.5	Client Related Factors

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32	Clear & Precise Goals	F4.6	Client Related Factors
33	Client's ability to participate in different phases of project	F4.7	Client Related Factors
34	Client's claim risk attitude	F4.8	Client Related Factors
35	Technical & professional capability	F5.1	Contractor Related Factors
36	Contractor Experience	F5.2	Contractor Related Factors
37	Economic & Financial situation	F5.3	Contractor Related Factors
38	Owner's management capability	F5.4	Contractor Related Factors
39	Top Management Support	F5.5	Contractor Related Factors
40	Quality issues	F5.6	Contractor Related Factors
41	Health & safety conditions	F5.7	Contractor Related Factors
42	Work Conditions	F5.8	Contractor Related Factors
43	Advanced technologies	F5.9	Contractor Related Factors
44	Extent of subcontracting	F5.10	Contractor Related Factors

Construction contractor companies includes in the research population. Respondents from all regions of Khyber Pakhtunkhwa Pakistan were the targeted population of the research. Contractors registered from Pakistan Engineering Council (PEC) were contacted for the research.

According to PEC statistical data, up to the January 2014 number of registered civil construction contractors reached to 6500. 140 questionnaires were randomly distributed to the contractors of construction companies who working on various projects in different cities of Pakistan.

The sample size for this research is calculated by using the following Equation (Dillman, 2000):

$N_s = [(N_p) (P) (1-P)] / [(N_p-1) (B / C)^2) + (P) (1 - P)]$
Eq: 1
Where;
N_s: sample size for the desired level of precision
N_p: population size i.e. 6510
P: proportion of the population that is expected to choose one of the response categories (yes/no); P = 0.5
B: acceptable sampling error; (±10% or ±0.10)
C: Z statistic associated with the confidence level
(1.96 corresponds to 95% confidence level)
Out of 140 distributed questionnaire's 100 valid responses were received showing an overall response rate of 71%. In construction industry, 30% is a good response rate (Black et al., 2000). Response rate of this research is satisfactory. Sample size for this survey comes 60 from equation 1.

The questionnaire contains two sections. First section is about general information of company such as the name of person and organization, qualification, project type, company category according to PEC, while the second section is about to rank the factors affecting the success of construction projects.

Respondents rating of factors affecting success were used to get the perspective of construction industry. Five point likert scale selected for the rating from the respondents which were made with respect to significance importance, where 1 = not important, 2 = slightly important, 3 = moderately important, 4 = very important and 5 = extremely important.

Pilot survey was conducted amid the few number of contractors covers the identified factors from literature review and structured questionnaire. To increase the consistency and rationality of questionnaire few amendments were made in questionnaire after structured interviews and pilot survey of contractors.

Statistical Package for Social Science (SPSS-20) was used to analyze the collected data from the respondents. When questionnaires are based on likert scale Cronbach's coefficient alpha method is used to check the consistency and the probability of obtaining similar results of the data.

To check whether the survey data follows normal distribution or not, normality test is carried out to ensure the application of parametric and non-parametric tests on the survey data. If sample size is less than 2000 (N < 2000), Shapiro-Wilk test will be used. In case the data fails the test for normality nonparametric test will be adopted.

Collected data did not pass normality test as shown in the Table 3, so for further analysis Kruskal-Wallis test is used. Kruskal-Wallis is nonparametric measure and is used for comparison of means of variables to test the perceptions of each group. It also determines whether two or more independent groups are the identical or diverse on some variable of interest.

The collected data are tested against obstacle of significance of 0.05, if value comes greater than 0.05 then it means that respondents have similar perception about problems.

The data was analyzed and ranked using the 'relative importance index' as used by Kometa et al. (1994). The five-point likert scale was transformed to relative importance indices for each factor, to determine the ranks of the different factors. The relative importance index (RII) was calculated using the following equation.

Relative importance index (RII) $= \sum W / (A \times N)$ Eq: 2
w = weighting given to each factor by the respondents and ranges from 1 to 5
A = highest weight (i.e. 5 in this case)
N = total number of respondents

IV. RESULTS AND DISCUSSION

The results were obtained and analyzed through SPSS (20) and MS Excel. Cronbach's coefficient alpha method used to check the reliability of the data based on likert scale. If value lies from 0.9 or above it shows excellent reliability, 0.7 to 0.9 shows high reliability, 0.5 to 0.7 shows moderate reliability and from 0.5 to below shows poor reliability. Cronbach's alpha value for this research approaches as 0.796 by using SPSS which shows that the data is acceptable for further analysis, as mentioned in Table 2.

TABLE II
CRONBACH'S ALPHA VALUE

Case Processing Summary		N	%	Cronbach's Alpha	0.796
	Valid	100	100		
Case	Excluded[a]	0	0	Number of Items	44

	Total	100	100	
a. List wise deletion based on all variables in the procedure				

Normality Test is performed to check whether the collected data is normally distributed or not, i.e. to find the nature of data is parametric or non-parametric. Shapiro Wilk normality test is conducted for testing the normal distribution of the collected data, because the sample size is less than 2000. Significance values of data were initiate 0.000 which is less than the required criteria for Normality 0.05. Hence the data cannot be consumed using normal parametric statistical techniques. Shapiro Wilk test results are shown in Table 3 which indicates that data is not normally distributed so for further analysis non-parametric tests is essential.

TABLE III
SHAPIRO WILK TEST RESULTS

Code	Shapiro-Wilk Test	Code	Shapiro- Wilk Test
	Sig.		Sig.
F1.1	.000	F3.5	.000
F1.2	.000	F3.6	.000
F1.3	.000	F3.7	.000
F1.4	.000	F3.8	.000
F1.5	.000	F4.1	.000
F1.6	.000	F4.2	.000
F1.7	.000	F4.3	.000
F1.8	.000	F4.4	.000
F1.9	.000	F4.5	.000
F1.10	.000	F4.6	.000
F2.1	.000	F4.7	.000
F2.2	.000	F4.8	.000
F2.3	.000	F5.1	.000
F2.4	.000	F5.2	.000
F2.5	.000	F5.3	.000
F2.6	.000	F5.4	.000
F2.7	.000	F5.5	.000
F2.8	.000	F5.6	.000
F3.1	.000	F5.7	.000
F3.2	.000	F5.8	.000
F3.3	.000	F5.9	.000
F3.4	.000	F5.10	.000

Table 4 of Kruskal Wallis Test shows much higher significance value (0.59>.05), which signifies that there is no major difference between the perception of different category of contractors regarding factors affecting the success of construction projects.

TABLE IV
KRUSKAL WALLIS TEST RESULTS

Code	Asymp. Sig.	Code	Asymp. Sig.
F1.1	0.46	F3.5	0.34
F1.2	0.47	F3.6	0.06
F1.3	0.27	F3.7	0.38
F1.4	0.49	F3.8	0.43
F1.5	0.21	F4.1	0.13
F1.6	0.51	F4.2	0.30
F1.7	0.57	F4.3	0.32
F1.8	0.48	F4.4	0.34
F1.9	0.32	F4.5	0.26
F1.10	0.36	F4.6	0.47
F2.1	0.49	F4.7	0.23
F2.2	0.40	F4.8	0.23
F2.3	0.45	F5.1	0.16
F2.4	0.27	F5.2	0.26
F2.5	0.15	F5.3	0.12
F2.6	0.49	F5.4	0.21
F2.7	0.61	F5.5	0.39
F2.8	0.12	F5.6	0.13
F3.1	0.14	F5.7	0.41
F3.2	0.59	F5.8	0.29
F3.3	0.40	F5.9	0.30
F3.4	0.28	F5.10	0.26

Respondents were asked to rank the factors on a scale of 1 to 5. Forty four factors were identified and categorized into five groups as mentioned in the Table 1. Relative importance index (RII) was calculated on the basis of importance level and a rank order was specified to the factors. The results were obtained using SPSS and MS Excel. Top ten factors identified by all the contractors as the most significant in their success, which include of the following: Project Size, Relevant Past Experience, Technical & Professional Capability, Project Manager Competence, Materials & Equipment, Team Members Competency, Adequate Funds/Resources, Project Planning, Quality Issues and Contractor Experience. Out of these top ten rated factors, 4 belong to project related group, 2 belong to project management team related group, 1 belong to project manager related group, 3 belong to contractor related group, None of the top ten factors belong to client related group. Ranking of the factors affecting the success of the construction projects is shown in the Table 5.

TABLE V
FACTORS AFFECTING THE SUCCESS

S.No	Factors affecting the success	RII	Rank
1	Project Size	0.888	1st
2	Project type	0.82	11th
3	Complexity & uniqueness	0.794	27th
4	Realistic Schedule	0.816	14th
5	Project Planning	0.834	8th
6	Materials & equipment	0.85	5th
7	Supervision	0.808	19th
8	Construction methods	0.8	23rd
9	Project's Profitability	0.812	16th
10	Adequate funds/resources	0.836	7th
11	Relevant past experience	0.886	2nd
12	Team members Competency	0.842	6th
13	Decision making effectiveness	0.802	22nd
14	Project organization structure	0.762	37th
15	Good communication	0.78	35th
16	Risk identification and allocation by Team members	0.794	28th
17	Technical capability of team	0.788	30th
18	Team Personnel issues	0.744	41st
19	Project Manager Competence	0.876	4th
20	Project Manager Experience	0.818	12th
21	Technical capability	0.804	20th
22	Leadership skills	0.818	13th
23	Coordinating skills	0.8	24th
24	Effective & timely conflict resolution	0.762	38th
25	Adaptability to changes	0.782	34th
26	Perception of role & responsibilities	0.796	25th
27	Client Experience	0.794	26th
28	Client Type (Public/Private)	0.73	42nd
29	Client Size	0.668	44th
30	Client's Influence	0.706	43rd
31	Ability to make timely decision	0.774	36th

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32	Clear & Precise Goals	0.756	40th
33	Client's ability to participate in different phases of project	0.76	39th
34	Client's claim risk attitude	0.784	33rd
35	Technical & professional capability	0.886	3rd
36	Contractor Experience	0.824	10th
37	Economic & Financial situation	0.786	31st
38	Owner's management capability	0.786	32nd
39	Top Management Support	0.792	29th
40	Quality issues	0.832	9th
41	Health & safety conditions	0.804	21st
42	Work Conditions	0.812	17th
43	Advanced technologies	0.81	18th
44	Extent of subcontracting	0.814	15th

On the basis of overall perceived importance of the factors investigated, the results obtained show that the top ten critical factors affecting the success of construction projects in Pakistan are the following:

i. Project Size
ii. Relevant Past Experience
iii. Technical & Professional Capability
iv. Project Manager Competence
v. Materials & Equipment
vi. Team Members Competency
vii. Adequate Funds/Resources
viii. Project Planning
ix. Quality Issues
x. Contractor Experience

These forty four factors were categorized under five major groups, among these five major groups; the respondents identify the "Project" related factors, as the most important which affects the success of construction projects.

For each group score is computed by using the following formula:

$$\text{Group score} = \Sigma lbfg/Nfg \qquad \text{Eq: 3}$$

Where:

$\Sigma Ibfg$ Sum of all the listed factors ranking inside the group

Nfg Total number of listed factors inside the group

Group wise ranking is shown in the Table 6.

TABLE VI
GROUP WISE RANKING

Group	Avg. RII	Rank
Project	0.8258	1
Project Manager	0.807	2
Project Management Team	0.799	3
Client	0.75	4
Contractor	0.74	5

V. CONCLUSION

This research used various research methods. Interview based pilot study was carried out for development and authentication of questionnaire. According to the outcome of the research, "Project Group" stood highest among the five groups with factor of "project size" at the top rank while "Contractor Group" stood lowest with the factor of "client size" at bottom rank. From the study it is concluded that the Project Group is identified as a crucial blockade in success of construction projects. By giving pivotal attention to project group, the projects could be successfully attained from factors of project size, materials and equipment, funds and resources and project planning. To focus on the factors of project group, trust of the province people could be restored in construction of projects. Furthermore, it plays an important role in helping the managers to utilize the facilities and resources which results in bringing the reform in their use pattern.

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