**Critical Success Factor’s in Construction Industry**

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## Abstract

The construction industry is unique and complex compared to other industries as it involves many participants in all trends. With the involvement of different parties in a single project as client, consultants, contractors, subcontractors, many of whom have not work together previously, the possibility that a claim might develop should not be ignored.

The adequate planning of a construction project beforehand is inevitable for the proper execution and success of the project. But most of the construction projects worldwide are subjected to cost overruns and delays. These overruns and delays indicate the inadequacy of knowledge of the factors that are contributing towards the success or failure of the project. This study aims to identify the critical success factors for projects in the construction industry. A list of factors were identified from the existing literature and grouped into categories.

The study identified 30 success factors classified into 5 groups, which were tested using an elicitation technique. Forty-nine responses were collected from project managers, who had an average or 15 years of project management experience and had participated in more than 15 projects. From the results, the top five most important are (1) Project Organization, (2) Project Manager Competence, (3) Project Risk Management, (4) Effect of stakeholders and (5) Resources management . This lead to the conclusion that both project risk management and Resources management should be considered as critical success factors. Further analysis of the data highlights the importance of scope management and soft skills in Resources management and Project Risk Management respectively.

It is anticipated that the information gathered through the study will serve as a positive step in highlighting improvements in claim avoidance practices and will be valuable in the future. Keywords: Critical success factors (CSFs), project manager competencies, risk management, project performance, contractor

## CHAPTER No. 01

**INTRODUCTION**

**1.1 General:**

Construction industry plays an important role in the economic uplift and development of the country. In Pakistan, construction sector is an important sector. Although not working to its fullest potential, it still is of prime interest to the country. Growth in this sector is critical for growth in national income as it is among the largest sectors that generates employment within the country as well as a key indicator of the economy of Pakistan.

The construction industry is unique and complex compared to other industries as it involves many participants in all trends. With the various persons involved in the same project and the nature of a construction project itself, it will not be surprising that disputes can occur. This complex environment leads to claims and dispute causation which is totally counterproductive for the project success. The only good construction dispute is one that is avoided. Therefore, attention to claims management and avoidance must begin well before the start of a project and continue until project completion. Review and analysis of plans, specifications, and contract language early in the project can eliminate ambiguities and identify potential claim areas. Implementation of controls and procedures during the project can minimize or even eliminate many issues which later may become the basis for a claim.

Critical success factor (CSF) is a [management term](https://en.wikipedia.org/wiki/Corporate_jargon) for an element that is necessary for an organization or project to achieve its [mission.](https://en.wikipedia.org/wiki/Mission_statement) A CSF is a critical factor or activity required for ensuring the success of a company or an organization. Success criteria is defined with the objectives and may be quantified by key [performance indicators](https://en.wikipedia.org/wiki/Performance_indicator) (KPIs).There are many tools to help to implement The keys Success Factor like [Canvas](https://en.wikipedia.org/wiki/Canvas) that will help to achieve a  [Business model](https://en.wikipedia.org/wiki/Business_model) or just a goal.

The concept of "success factors" was developed by [D. Ronald Daniel](https://en.wikipedia.org/wiki/Ron_Daniel_%28businessman%29) of [McKinsey & Company](https://en.wikipedia.org/wiki/McKinsey_%26_Company) in 1961. The process was refined into critical success factors by [John F. Rockart](https://en.wikipedia.org/wiki/John_F._Rockart) between 1979 and 1981. In 1995, James A. Johnson and Michael Friesen applied it to many sector settings, including [healthcare.](https://en.wikipedia.org/wiki/Healthcare) The Critical Success Factor is basically the main system to achieve successes in a company, but to make that possible is necessary to put together the Key Success Factor that needs to be personalized depending of the department, each role has their own Key Success Area.

Critical success factors should not be confused with success criteria These factors try to achieve success for the company based in standards and rules that need to be followed step by step to guarantee a better service for the clients or partners. The success of construction project is influenced by a verity of factors. These factors involved the factors related to the project manager, planning effort, contractor, consultant, and client related factor. Some other are the issues related to the government public, economy etc. An effective plan must consider all the factors that are more important for the success of a project called the critical success factor. The understanding of these critical success factors is thus very important towards the project success. The adequate planning of the project would require the proper consideration of all these factors and evaluation of the most critical factors related to the project. So it pursued to identify and prioritize the most significant factor amongst the mildly are less significant factor. This will surely identify some factors that will further prove useful in developing and effective project plan.

**1.2 PROBLEM STATEMENT:**

The construction industry is one of the most important industry upon which the welfare of the nation is dependent. The growth of the industry is dependent upon the efficiency of the construction firms. But the construction industry has to face a large number of uncertainties as every project has a unique scope and purpose. A Project is a complex, non-routine, one-time effort limited by time, budget and resource and performance specifications designed to meet customer needs (Sumesh Sudheer Babu & Dr. Sudhakar). Due to these uncertainties and uniqueness, projects often surpass their actual cost and duration. Evidences have proved most construction projects in developing countries suffer overrun in cost and time. Iyer and Tha (2006) [14] revealed that 40% of Indian Construction projects are facing time overrun ranging from 1 to 252 months. Ugandan Construction Industry experiences cost and time overruns (Mubiru, 200). The project managers must have a proper understanding of the project to plan and manage the project effectively (Sumesh Sudheer Babu & Dr. Sudhakar). They have to encompass many elements, which must be synchronized to ensure the project delivery on time (Zarina Alias, E.M.A. Zawawi, Khalid Yusof, Aris, NM, 2014). The decisions of the top management have got a unique importance towards the project success. If they posses a proper understanding of the critical success factors, the project is most likely to proceed in the right direction. Otherwise, the delays and cost overruns are inevitable. As each project is unique in its own respect, the critical success factors involved are also unique. So, the prior investigation of the critical success factors related to the project under consideration is necessary to account for the uncertainties. So, this study is vital in the sense that it will investigate the factors that will certainly be of prime importance in the planning and execution of the projects.

**1.3 RESEARCH SCOPE & OBJECTIVES:**

* To identify critical success factors in construction industry
* To investigate the importance of CSFs with respect to different Client, Consultant and Contractors

* 1. **SIGNIFICANCE OF STUDIES:**

This study will contribute to the knowledge related to the Critical Success Factors to contribute towards the successful project management. This will prioritize the most important factors. Thus, defining the goals and the direction of the project. By

* 1. **ORGANIZATION OF THE REPORT:**

The report is organized in nine components as shown in the table of contents. However, the report can be divided in to three main parts; Introduction, Main Body and the Conclusion. Introduction describes the significance of the selected topic, areas covered in the study, study scope and objectives, brief methodology and report organization. Main body of the report further covers four main components including: literature review, detailed methodology adopted to conduct the research work, study design and analysis of survey results and discussion. Conclusion describes the findings/observations, impacts, future outlook; lessons learned, conclusions from the analysis, remarks ending the paper and recommendations.

**CHAPTER No. 02**

**LITERATURE REVIEW:**

**Project and Project Management:**

Ping Wang The critical factors in managing relationship in international engineering procurement and construction (IEPC) projects of Chinese organizations. 61 sets of responses were collected, and 47 sets of responses were useable. Technique used for search was Logistic regression. Factors concluded from researches were service provided from suppliers, continuous improvement, supplier’s delivery reliability and effective problem solving.

Benedict Amade (2015) worked on critical success factors for public sector construction project delivery in Imo State. Data was collected by constructed questionnaire using Krejcie and Morgan method of sampling. Success Factors resulted from this research were efficient and effective procurement process, effective communication management, adequate planning, leaderships skills of the project manager, weather conditions, effective coordination of project activities.

Mehrdad Sarhadi (2015) searched on communication style within project teams of three projects in Iran. A questionnaire was designed for collecting data and for data analysis Excel and SPSS was used. The main result indicated was that there is a correlation between communication style of team members and project team performance.

Neringa gudiene searched on Identification and evaluation of the critical success factors for construction projects in Litunia. AHP was used and two general surveys were conducted for data collection. And important factors identified were clear and realistic goals, project planning, project manager’s competence, relevant past experience of the project management team, clear and precise objectives of the client and value of the project.

Muhammad Saqib searched Assessment of critical success factors for construction projects in Pakistan. He used questionnaire technique for collecting data. Top 5 critical success factors identified were contractor related factor, project manager related factors, procurement related factors, design team related factors and project management factors.

**HUMAN RELATED FACTORS:**

 Zarina Alias (2014) made researches on critical success factors of project management practice. The purpose of this study was to develop relationship between CFSs and project management. The tool used for this research was development of framework. She pointed out five variables for project success i.e. Management Actions, Project Procedures, Human Factors, External issues and Project Related Factors.

Muhammad Ali Shamim worked on Assessment of most critical success factors for mega construction projects in Pakistan. He used SPSS and frequency analysis for his research. After analyzing data five factors were identified i.e. Adequate funding throughout the project, planning effort and scheduling, influence of project manager’s decision, Adequacy of planning and specification of design team and timely decision of owner.

K.C lyer worked on Critical factors affecting schedule performance in India. SPSS and questionnaire survey approach were used for analysis. Two success factors and one failure factor were resulted from this research i.e. commitment of project participants, owner’s competence and conflict among project participants contribution.

D. K. H. Chau pointed out Critical Success factors for different objectives. Analytic Hierarchy process (AHP) was technique used in this research. Sixty-Seven success related factors were considered for the study. Study reveal that Project characteristics and contractual arrangements effect success of project too.

According to Brown and Adams (2010), Chan and Chan (2004), project success is an elusive term and has not been clearly defined over the years, but there are several research works that attempt to develop a framework to measure and identify some success factors within the construction industry. It must be emphasized that the ambiguity in the definition of the term project success can be traced to the fact that humans see the constituents of success from different lenses. Lim and Mohammed (1999) for example observed that there are macro and micro dimensions to project success. In their explanations, the micro success factors can be traced to the execution stage of construction projects where there is a high demand for the project to meet the requirements of quality, cost, time among others. On the other hand, the macro elements of project success entail the satisfaction of project end-users and stakeholders. It can be deduced from the observations of Lim and Mohammed that, the focus of their success factors is on timely project completion and satisfaction.

It is worth mentioning that, some researchers like Baccarini (1999) added that the impact of projects after completion and handing over should be included in the determinants of project success. For instance, Baccarini (1999) made a distinction between project management success and product success. In his view, project management success entails the project meeting the demands of the basic requirements, project management processes, and stakeholders' satisfaction. On the other hand, product success is made up of owners' strategy, satisfaction of the user's, profitability and market share. Baccarini (ibid), however, has not differentiated the strategic dimension of project success he included within product success. Chan and Chan (2004) have proposed two groups of key performance indicators for construction project success. The first group was objective measures, which were the issues of time; cost; safety; and environment. The second group was subjective measures, which comprised quality; functionality; and satisfaction of different project participants. They have tied the performance indicators with success criteria, but those indicators were limited to operational and tactical levels and did not include the strategic stages of the project.

**Project Success (PS):**

 Project success is an abstract concept and determining whether a project is successful is subjective and extremely complex (Parfitt&Sanvido, 1993; Chan, 2002).In an attempt to model project success, Elattar (2009) came out with a framework to measure construction project success. In his model, Elattar identified and put forward three (3) main criteria for project success. He observed the success criteria from the perspective of the project owners, the designers and the contractors. The success criteria from the owner's point of view entail: schedule, budget, a function for intended use, end result as envisioned, quality, aesthetically pleasing, return on investment, marketability, and minimized aggravation. The criteria from the designer's view is made up of: satisfied client, quality architectural product, meeting of design fee and profit goal, professional staff fulfillment, meeting of project budget and schedule, marketable product/ process, minimal construction problems, absence of liability claims, social acceptability of the project, payment by the client and well defined scope of work. The contractor's success criteria include the project meeting the schedule, profit, budget, quality specifications, the absence of claims, expectations of all parties clearly defined, client satisfaction, good direct communication, and minimal or no surprises during the project.

According to Thomsett (2002), the three dimensions of project success namely – time, budget and quality are not sufficient to measure project management success. Dimensions such as the quality of the project management process- leadership performance and the satisfaction of the

Project stakeholder’s expectations also need to be considered. Therefore, the traditional triangle: time + quality + cost have been extended to include the performance of the management process.

Pinto and Slevin (1989) carried out a research on 159 research and development projects to understand the factors that are critical to the success of those projects. In their research, they discovered that critical success factors change throughout the life cycle of a project. At each particular stage of the project, be it the defining, planning, executing and closing stages, there are new sets of factors that are most critical for the success of the project. In the view of Pinto and Slevin (ibid), the project success factors include project mission - clear goals and directions; top management support; a detailed specification of the tasks and the sequence of activities needed for project success. In addition, client consultation – particularly at the initial stages of the project life cycle; selection of the project team members; availability of technology and expertise to complete the required tasks and technical actions; client acceptance and the act of selling the final product to its end users; monitoring, control, feedback throughout the project implementation phase; communication among all the project stakeholders and readiness to handle the unexpected crisis and project deviation from the pre-determined plans among others.

**Three Streams of Literature Related to Project Success:**

The project management literature frequently refers to two streams of studies of project success. One stream is the project success factors; these are the independent variables that make success more likely. Other one is the project success criteria; these are the dependent variables that measure success (Morris & Hough, 1987; Wateridge, 1998; Turner, 1999 as cited in Muller &Jugdev, 2012).

In a description by Lim & Mohammed (1999), two main factors must be taken into consideration before answering what project success is made up of; the first distinction is the difference that exists between project success and project management success. Project success is measured against the general objective of the project, whereas project management success is measured by using the well-known measures like time, cost, and performance. The second distinction is the difference between project success criteria and project success factors.

According to Yang, Shen & Ho (2009: 162), the unique nature of projects dictates that critical success factors identified in one industry cannot be directly transferred to other industries. This means that every project is unique on its own and no two projects are the same in nature, no matter how close they may be. Achieving project success is becoming more important in the area of project management. There have been various arguments as regarding those factors that contribute to the total success of every project. For projects to be implemented successfully, the two different components of success must be clearly defined and reviewed thoroughly. These two components are the success criteria and success factors. Factors of project success are those elements required to deliver the criteria (Wateridge 1995). In a Similar way, Belassi and Tukel (1996) grouped the success factors listed in their literature and described the impact of these factors on project performance. They grouped the factors into four areas: factors related to the project, factors related to the project managers and the team members, factors related to the organization and factors related to the external environment. They further argued that, to come up with all the possible critical factors that might affect project outcome are impossible because of the diversity of projects. Nevertheless, identification of the groups to which the critical factors belong would be sufficient for better evaluation of projects. In their second part of the research with 57 responses, Belassi and Tukel (ibid) observed that many project manager related factors were found to be critical. In contrast with a previous finding using 91 responses, a noticeable shift in ranking from organizational factors towards factors related to project managers and team members were witnessed with project manager’s related factors dominating the organizational factors. They came out with some important relationships as well. For example, when time is used to measure project success, then a project manager’s skills and communication between the team members become critical.

**Project Success Criteria (PSC):**

 Project success criteria mean the measure by which success or failure of a project will be judged (De Wit, 1988; Cooke-Davies, 2002)Another approach developed by Kerzner (2001) states that in the past (at least 20 years ago) project success was related to the completion of project activities in the due term, budget, and expected quality. Later the understanding of project success has been altered by including the limitation of minimum changes in the scope of activities without interruptions in the workflow, without shifts in the corporate culture, and with full acceptance of results by the project clients.

Ngacho and Das (2005) developed a framework for the evaluation of the performance of the construction projects that are based on the six major key indicators that were, cost, quality, time, minimum disputes, safety and environmental disputes. Researcher surveyed literature and identified characteristics of the construction projects named as CSFs of the projects. These CSFs were divided into six broad variable named as PRF, PMTMRF, PMRF, CLRF, CORF & EF. Conceptual framework was framed to calculate the overall success performance of the project with regard to the variables

Pilot survey was conducted with few of the experts of the construction industry and a questionnaire was developed. They found that these variables defined were very much related to the construction projects especially in the developing countries. Finally researcher’s concluded that the performance of the projects also effects the satisfaction of the community.

Saqib, et al. (2010) observed that the construction projects were dynamic due to the uncertainties in the budgets, technologies and the development process. And they claimed that the CSFs could lead to the effectiveness of projects. Researchers surveyed 37 construction firms in Pakistan with the help of a questionnaire. Questionnaire was based on the performance selected indicators of the construction project and 77 factors were framed in 6 variables, namely PRF, PMTMRF, PMRF, CLRF, CORF & EF and the respondents ranked and scored these variables. On the basis of the critical score, researchers found that the CORF was the most important for the success of the construction projects and CLRF was the least important. Individually, decision making ability was scored as the most important factor for the success of construction project.

Alzahrani and Emsley (2012) tried to analyze the success and causes of the cost and the time overrun in the construction industry. Researcher surveyed the vast literature and framed a questionnaire. On the data collected factor analysis was applied and nine cluster were framed namely “(i) safety and quality; (ii) past performance; (iii) environment; (iv) management and technical aspects; (v) resource; (vi) organization; (vii) experience; (viii) size/type of pervious projects; and (ix) finance”. Further logistic regression was applied and results indicated that “turnover history, quality policy, adequacy of labour and plant resources, waste disposal, size of past projects completed, and company image” were the most important factors affected the project’s success.

**Success Factors (SFs) and Critical Success Factors (CSFs):**

Han et al. (2012) define SFs as factors that influence, constitute as well as determine the success of a project. SFs are those inputs to the management system that lead directly or indirectly to the success of the project (De Wit, 1988; Cooke-Davies, 2002).

Gudiene et al (2013) developed a conceptual framework model for the construction projects in

Lihuania. They found seven major factors of success, that were institutional factors, PRF, PMTMRF, PMRF, CLRF, CORF & EF.

Muhammad, et al. (2016) suggested that the Public-private partnerships (PPP) as an alternative strategy could be utilized by the government to overcome the independent inability of public firms to meet the incremental infrastructure and services demand. While conducting literature review they found that there were mixed verdicts given on the application of PPP. For the improvement of the implementation of the PPP projects, CSFs were established. And researchers found that time were the most important factor for the successful implementation of the PPP projects. Also found that the social and political and economic environments of the county were complex and dynamic to understand which may lead to the barrier in the implementation of PPP.

Thote, et al (2017) claimed that the construction industry contributed to the economic growth of the nation. Researchers identified the success factors and the failure factors and included commercial and the residential projects in the city of Pune. They further identified 24 CSFs grouped in 5 variables and 11 failure factors. 80 respondents were interviewed and relative importance index was used to find the results. Researchers found that the “Leadership” was the most important factor and the “Good Subcontractor” was the least important success factor. “Slow decision making” was the most important and the “Price Fluctuation” was the least important failure factor

Nallathiga, et al (2017) also worked on analyzing the success/failure factors in road construction project by PPP on the basis of different stages of project. They used questionnaire to draw responses from stakeholders of the project like Government firms, Road contractors, Consultants, Financial institutions and Users. Using relative importance index, researchers found that “Traffic assessment” was the most important success factor at “Project preparation stage”, “Bid criteria (Financial Attraction of Project to Investors” was most important success factor at “Procurement stage”, at “Development stage” the most important success factor was “Infusion of Capital into Project” and finally “Availability of Contractor’s Resources” was the most important success factor at “Construction, Operation and Management stage”. Similarly researchers found that “Public Protest & Opposition” was the most important failure factor at “Project preparation stage”, “Influence of Higher Authorities & Political Parties” was most important failure factor at “Procurement stage”, at “Development stage” the most important failure factor was “Force Majeure” and finally “Maintenance Cost Overruns” was the most important failure factor at “Construction, Operation and Management stage”

Tamgadge and Shinde (2018) proposed that construction projects faces challenges due to unexpected changes therefore CSFs needed to be studied. They analyzed six major variables as PRF, PMTMRF, PMRF, CLRF, CORF & EF. Using questionnaire and Relative importance index method, researcher found that “Good leadership” in PMRF was the most critical factor related to the success of the project. And “Cost control”, “Organizing of project” was the least important factor in PMTMRF and “Clients/contractors type & experience” in CLRF & CORF.

Ronald Daniel was among the first experts who offered the critical success factors as the business guidance for the first time in 1961. In his opinion there are three to six critical factors which determine the success in all industries. Among the next experts, Rockart contributed in the field of introducing the critical success factors more than other researchers. In 1986 Ashley identified these seven factors as the success factors:

* Construction activities programming
* Design planning
* Project manager commitment to the goals
* Project team motivation
* Project manager technical capabilities
* Control systems
* Definition of work and its field

He also identified theses six criteria as the success criteria:

* Budget performance
* Schedule performance
* Employer satisfaction
* Task-orientation
* Contractor satisfaction
* Project manager satisfaction

It is noteworthy that the differentiation between success criteria and success factors is also important. The success criteria are the measures based on which the project success or failure is judged; while the success factors are those entered into the management systems and result in project success directly or indirectly

Project mission, scheduling, technical tasks, user consultant, user reception, feedbacks and reports, communications, fault detection, senior manager support, personnel (requirement, employment and training).

**Recent Studies on Critical Success Factors (CSFs):**

In 1996 Walid Belassi and Tukel Oya Icmeli also divided the critical success factors into four main groups in a new format:

* Project dependent factors
* Team members and project manager dependent factors
* Organizational structure dependent factors
* External environment dependent factors

Studying the results prove that the project manager, management skills, team members, teamwork, their technical filed, project properties, viable environmental factors could be considered as the organization’s critical success factors; although the degree of these factors’ significance varies from one industry to another one. While in the information system of management and construction projects, project managers, management skills are the most important key factors and the environmental factors influence and conduct the construction tasks.

Adnane Belout and Clothilde Gauvereau considered the following four dimensions as the success factors in 2003:

* Project Result
* Customers effects
* Commercial success and conduction and preparation for the future
* Identifying the beneficiary groups (stockholders, managers, customers and personnel) which are significant as well as critical success factors until different people wants to see success in different ways.

In 2004 Nguyen et al. identified five critical success factors among the twenty factors of projects success:

1. Competent project manager
2. Providing adequate financial resources to the end of the project
3. Competent and multidisciplinary project team
4. Commitment to the project
5. Access to resources

According a World Bank report (2007) the construction industry is an important sector of the economy and has multiple backward and forward linkages with other sectors. The industry contributes significantly to socio-economic development and employment. Pakistan’s construction industry significantly contributes toward the GDP of 2.4% and employs about 9% of the total labor force.

Langford et al. (1995) commented in their research that the matrix structure was initially adopted by both building firms and professional practices in their efforts to find an alternative to the purely functional approach of the classical school. It was felt that in this type of organization it would be possible to tackle project and people problems separately to avoid interference and overlapping of both the critical sections. Furthermore, a matrix organization ensures that staff deputed for various tasks and empowered for decision making gives better performance. However, there are also some problem areas in the matrix organizations, having more than one boss for receiving directions and to give compliance causes problems

Kerzner (2001) suggested three criteria from the organization perspective for a project to be successful. The first is that it must be completed "with minimum or mutually agreed upon scope changes", even though stakeholders constantly have different views about projects’ results (Maylor, 2005). Second "without disturbing the main work flow of the organization" because a project has to assist organization’s everyday operations and try to make them more efficient and effective. Finally, it should be completed "without changing the corporate culture" even though projects are "almost exclusively concerned with change – with knocking down the old and building up the new" (Baguley, 1995).

The concept of "success factors" was developed by Daniel D Ronald of McKinsey & Company in 1961 and was refined by Rockart John F. in 1981. James A. Johnson and Michael Friesen applied it in 1995 to many sector settings, including health care. "Success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business" (Cooke-Davies-2002).

According to Hutching and Christofferson (2001), a success factor is a situation where it needs special attention of management because of the importance that it brings to the organization. It gives a positive and negative effect and influences the internal and external project environment. It conveys the important characteristics such as the need for special attention or observation to prevent a great shock which is not desirable or the missing opportunity or objectives. Success factors are identified by assessing the strategy, environment, source and corporate operations.

## CHAPTER No. 03

### METHODOLOGY

**3.1 RESEARCH METHODOLOGY:**

The methodology adopted in this research is outlined in Figure-1. A thorough literature review was done and also the expert opinions from industry experts were taken, through which a number of basic kind of factors were identified which are used to manage mega construction projects.

Based on the literature review and suggestions from industry experts a detailed questionnaire has been developed. In total, 16 critical factors were finalized to made part of the survey questionnaire.

Detailed Literature

Review

Questionnaire

Design

Questionnaire

Survey

Analysis of Survey

Data

Conclusion &

Recommendations

*Figure-3.1 Brief outline of methodology*

Questionnaire consisted of two sections. Section 1consisted of two parts one for obtaining Personal Information and the other for obtaining Business Information about the respondents. Section 2 carried a total of 16 critical factors that were divided into four groups associated with construction projects and respondents were asked to review and grade the strategies according to their usage and importance.

**3.2 RATING BY USAGE & IMPORTANCE:**

Respondents were asked to grade all the factors according to their usage in the firm. The factors not suitable were ranked as zero.The ranking of the factors were marked as strongly agree, agree, somewhat agree, disagree, strongly disagree. The factor with no contribution were ranked as strongly disagree.

(Questionnaire is attached in Appendix A).

A survey was conducted through postal mail and email in which respondents were asked to rank these factors according to their experience. The information/data gathered through the survey has then been analyzed and some conclusions and recommendations have been presented on the basis of this analysis.

**3.3 DATA ANALYSIS METHOD:**

The survey feedback includes two groups of data (i) respondents’ information, (ii) rating by usage and importance.

For rating of factors the respondent was asked to mark on the basis of their personal experience .Scale 1 to 5 is selected to obtain a greater level of suppleness in choosing statistical procedures. Rank 1 is assigned to the factor that always used and essential for the success of any project in construction industry, while 5 is assigned to that factor which is unessential for the success of project or proves uneconomical for project . The rank 2 denotes a factor that would be frequently used while rank 4 shows factor that are used seldom and rank 3 shows factor used occasionally to avoid/defend claims.

**3.4 THE RELETIVE IMPORTANT INDEX:**

Method was adopted for the determination of the relative importance with respect to usage and for determining the relative importance with respect to successful stories of the firms, contributing to manage claims.

RII is determined by using the following formula:

**RII = ΣW**

 **A\*N**

Where,

W= weightage given to each factor by respondents ranging from 1-5

A= highest weightage (5 in this case)

N= total number of respondents

The RII value had ranges from (0 to1). Higher the value of RII, greater is the usage/importance of related factor to manage claims or being successful for the project.

**3.5 THE MEAN INFLUENCE LEVEL:**

For each aspect was then calculated for two criteria by using the following formula.

**MILj=∑ k=1to5 (Rk\*NRjk/TRj)**

Where,

MILj = Mean influence level of aspect J

Rk = Rating point from (1 to 5)

NRjk = Number of responses for rating point k opted for aspect j TRj =Total number of responses for aspect

## CHAPTER No. 04

### STUDY DESIGN

**4.1 DATA COLLECTION:**

This project is based on a Questionnaire Survey, which is designed to determine the critical success factors to manage and plays a vital role in Pakistan’s Construction Industry. List of questionnaire were identified from literature review and consultation with key local experts.

A draft questionnaire, with 16 factors categorize into 4 groups were discussed with one Educationalist and one Contract Engineer in order to evaluate the content validity of the questionnaire, to check readability, offensiveness of the language and to add more information if needed. Valuable feedbacks were obtained to improve the quality of the questionnaire. As a result of this process, the expert suggested an addition of some documentation which were considered in the final version of the questionnaire.

The required modifications have been introduced to the final version of the questionnaire. The final version consisted of two sections. Section 1 is related with personal information of the respondents and the information related to the organization’s business. Section 2 carried a total of 16 factors divided into four groups, which were assessed on the basis of two criteria; usage and relative importance. In order to quantitatively demonstrate the relative usage of the success factor in the construction industry, a weighing approach was adopted. The factor with more importance was assigned the largest score, while factor with less importance was given the smallest score. As factors have been ranked in five grades, five weights were applied. The respondents were asked to review and indicate the usage of critical factors in the firm as always, frequently, occasionally.

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**4.2 QUESTIONNAIRE DESIGN:**

The survey consisted of 16 questions, which were then grouped into 4 different sections. The first part of Questionnaire contained background information of the respondents such as experience and qualification. The next part had 16 questions that the respondents asked to fill according to their experience. Each 16 parts divided into four section. Each part contain almost 4 questions. each question rank into 5 options. Which are 1.strongly agree, 2.agree, 3.somewhat agree, 4.disagree, 5.strongly disagree.

After the questionnaire was designed before being distributed, a small pilot test was conducted with potential participants to get feedback on possible improvements. The recommendations gotten from the test was implemented to the design before final distribution.

**4.3 SAMPLING:**

167 people related to the field of project management including project managers, professors etc.

**4.4 DATA ANALYSIS:**

The questionnaire was used as a mean for the data collection.

**4.5 ETHICAL CONSIDERATIONS:**

The data collected from the respondents shall not be used for any other purpose and anonymity of the respondents shall be maintained.

**4.6 VARIABLE FOR CRITICAL SUCCESS FACTOR:**

* + Project Manager Competence (Experience , Commitment to meet Cost & Quality, Monitoring the Project Progress , Adaptability to changes in Project Plan, Co-ordination ability & motivating skills).
	+ Risk Management (Stakeholders, Possession of site, Release of Payment, Skilled Laboure).
	+ Contractor Related Factors (Technical Capability of Contractor, Extent of Subcontracting,

Contractor Track Record, Financial Situation & Assets)

* + Consultant Related Factors (Qualified Consultant, Track Record, Strong Monitoring &

Evaluation System)

## CHAPTER No. 05

### ANALYSIS OF RESULTS & DISCUSSION

**5.1 QUESTIONNAIRE RESPONSE RATE & SAMPLE COMPOSITION**

Questionnaire sent in hardcopy as well as softcopy by email to a total of 200 construction agents in Pakistan. Only 157 feedbacks were received in which 1 feedback was identified as invalid due to incomplete or invariable answers. This represents a valid response rate of above 58%, which is acceptable according to Moser and Kalton’s assertion (1971).

The respondents were main Contractors and Engineers having an average of 10 years’ work experience in construction sector, more details of the distribution shown in the table. It is evident that 68% of respondents have worked almost 10 years in the industry. The senior positions and long work experience infer that the respondents have adequate knowledge of construction projects.

**%**

**21**

**11**

**%**

**22**

**%**

**33**

**%**

**13**

**%**

**percentage of respondents**

Less than 5 years

5

 to 10 years

10

 to 15 years

15

 to 20 years

more than 20 year

*Fig-5.1 response rate by percentage*

**5.2. RESULTS:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Interview  | A  | B  | C  | D  | E  | F  | G  |
| Designation  | Project manager (qualified engineer)  | Project manager (qualified engineer)  | Project manager (qualified engineer)  | Project engineer (qualified engineer)  | Project manager (DAE)  | Project manager (qualified engineer)  | Project manager (DAE)  |
| Gender  | Male  | Male  | Male  | Male  | Male  | Male  | Male  |
| Years of experience  | 10-15 years  | 5-9 years  | More than 15 years  | 5-9 years  | More than 15 years  | More than 15 years  | More than 15 years  |
| No. of  | 15-18  | 5-7  | 16-21  | 4-7  | 20-21  | 17-20  | 21-24  |
| construction project handled  |  |  |  |  |  |  |  |

**5.2.1PROJECT MANAGER COMPETENCIES:**

The purpose of this factor is to determine the importance of project manager competencies across the major industries. This factor consist of different question related with **experiences,**

**Commitment to meet Cost & Quality, Monitoring the Project Progress, Adaptability to changes in Project Plan, Co-ordination ability & motivating skills.**

Duties of project manager include a range of activities from administrator of the project to team leader. Therefore, to successfully execute project its manager needs a unique set of capabilities and competencies. Since there is a strong relationship between the project’s success and the project manager’s work effectiveness, conditions ensuring that effectiveness are concern of many researchers. That initiates attempts to define competencies that have the significant impact on project manager’s effectiveness. Due to the nature of project manager work, which is largely based on cooperation and project team directing, manager’s characteristics can have a crucial impact on project’s results. Therefore a choice of a “right” person to perform a project manager role is one of the most important decisions taken by project’s sponsor/investor.

qualified engineer The respondents also had to indicate the types of projects that they are involved in. It is evident that the majority of the projects are IT-related projects, followed by 24% of the projects that focus on construction and engineering.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| project manager competencies20 19

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  | 16 | 15 |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | 9 | .4 |  | 10 |  |  |
|  |  |  |  | 7 |  |  |  | 8 |
| 5.6 | 6 |  |  |  | 5.6 |  | 6.2 |  |
| 3 | 3 |  |  |  | 3.2 |  | 4 | .6 |  |  |  |
|  | 2.4 |  |  | 2.2 |  |  |  |  |  |  | 1.8 1 | 0.8 1 |
|  | 0.6 |  |  |  |  |  |  |  |  |  |  |  | 0 |

 17.8 17.41816141210 86420 5 years 10 years 15 years 20 years 25 years strongly A agree somewhat agree disagree strongly disagree |

*Fig-5.2 project manager competencies*

The purpose of this fig is to highlight the importance of project manager competencies with different age factors. The greatest percentage of the respondents has between 5 and 10 years of experience. Close to a third of the respondents (29%) have project management experience beyond 10 years, indicating that there is a large contingent of project managers with sufficient experience. The graphical representation indicates that 5 to 10 year’s experienced person thought that project manager competencies is unessential for project success. In case of 15 year experience, some engineer’s agree with the factor’s related with project manager competencies.

From 20 to 25 year’s engineer’s thought altogether have changed. Their views shown that project manager competencies is essential for the success and betterment of project. We concluded that project manager competencies is essential for the success of project.

**5.2.2RISK RELATED MANAGEMENT:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Risk related management25 21.25

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 15.75 |  |  |  | 18.25 | 16.75 |
|  |  |  |  | 13.25 |  |  |  |  |
| 7.5 | 3.5 | 7 3.5 | 7.6 | 3.5 |  | 8 |  |  | 5 |
|  |  | 2.250.75 |  | 1.51.25 |  |  | 1.251 |  | 0.51.250.5 |  | 3.25 | 2 0.25 |

20151050 5 years 10 years 15 years 20 years 25 years strongly A agree somewhat agree disagree strongly disagree |

*Fig-5.3 risk related management*

The purpose of this figure is to highlight the importance of risk related management in construction industry. We conclude from the above results that risk related management factors is essential for the success of project. From 5 to 25 years experience, each engineer thought that project risk management takes main role for the project success.

In summary, it seems that risk management is still at its infancy, and that there is still a long way to go. More awareness, more application, better training, more tools, and additional studies, are needed to further promote the understanding, usage, and usefulness of risk management in projects. It is clear from this and other studies, that in risk management too we need to adapt different risk management techniques to different types of projects and develop better and more specific tools to manage risk in different project types. Such specific tools should become part of the common toolbox of every organization and every project manager. we need to develop different tools for high-tech projects that address the specific uncertainty issues and promote better thinking and analysis on project risks. we must also learn to distinguish among project risk management tools for simple versus more complex and large projects. Finally, since there are various risk management tools available, further research is needed to find what works best and in what circumstances and environments. As more organizations are adopting project management as part of their normal business processes, additional understanding and deeper learning of risk management will continue being at the forefront of the discipline of project management.

**5.2.3CONTRACTOR RELATED FACTORS:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| contract related factors25 20.25

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  | 15.75 | 1 | 5 |  | 14 | 15.75 |
|  | 9.25 | 9.5 |  | 9.5 |  |  |  | 9 |  |
|  | 4.25 |  | 6.53.75 |  |  |  |  | 8 |  |  |  |  |
|  |  | 1.250.25 |  |  | 1.5 | 2.25 |  | 0 0.5 | 20.25 |  |  | 1.750 0 |  |  |

20 18.5151050 5 years 10 years 15 years 20 years 25 years strongly A agree somewhat agree disagree strongly disagree |

*Fig-5.4 contractor related factors*

The purpose of this figure is to highlight the importance of contractor related factors in construction industry. We conclude from the above results that contractor related factors factors is essential for the success of project. From 5 to 10 years, graph represents that contractor related factors are essential for the progress and success of project. On the other hand, from 15 to 25 years, graph represents that contractor related factors are not useful for the progress of successful project. Collaboration is essential to the success of construction projects; the project participants are realizing that sharing of knowledge and information is one of the key elements of a successful contractual relationship. There appears to be no clear guide on the process of collaboration between main contractor and subcontractor; therefore making it difficult to effectively interact and achieve a common project goals within the bounds of cost, quality and time. The purpose of the paper is to identify the views of contractors on the importance of collaboration in construction supply chain. The results of a survey on the importance of collaboration in the construction industry will be supported by the results of semi-structured interviews.

**5.2.4CONSULTANT RELATED FACTORS:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Consultant related factor18 16

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | 13.3 |  |  |
|  |  | 12 |  |  |  | 11.4 |  |
| 10 |  |  |  |  | 10 | 10.2 |  | 10.2 |
|  |  |  |  | 8.6 |  |  |  | 8.2 |  |  |  | 7.6 |
|  |  |  |  |  |  | 5.2 |  |  |  |  |  |  |  |
| 4 |  |  |  |  | 3 |  |  |  |  |  |  |  |  |
|  |  | 2 | .4 |  |  |  |  |  |  |  |  |  |  |
|  |  | 0 |  |  | 0 |  |  | 0 0 | 0 |  | 0.666 | 0 0 | 0 |

16 15.314121086420 5 years 10 years 15 years 20 years 25 years strongly A agree somewhat agree disagree strongly disagree |

*Fig-5.5 consultant related factors*

The purpose of this figure is to highlight the importance of contractor related factors in construction industry. we concluded from the above results that the consultant related factors are essential for the project success. Almost all experienced person shows that for the project success consultancy is important and essential. Duties of consultant include a range of activities from administrator of the project to team leader. Therefore, to successfully execute project its manager needs a unique set of capabilities and competencies. Since there is a strong relationship between the project’s success and the consultancy work effectiveness, conditions ensuring that effectiveness are concern of many researchers. That initiates attempts to define consultancy that have the significant impact on project manager’s effectiveness. Due to the nature of consultant work, which is largely based on cooperation and project team directing, manager’s characteristics can have a crucial impact on project’s results. Therefore a choice of a “right” person to perform a project consultant role is one of the most important decisions taken by project’s sponsor/investor.

**CHAPTER No. 06**

### CONCLUSION & RECOMMENDATIONS

Critical success factors aid in effectively managing projects and preventing construction claims.

That’s why it is desirable to identify the key critical success factors in construction industry of Pakistan and their relative importance to manage construction claims, so that basic kinds of success factors for a claim-savvy contractor are discovered to review his basic check list before a project is commenced and set in place a project policy and to explore project basic factors benefits that how complete, accurate & timely project will manage claims.

This research work identified project needs and success factors, critical for construction projects to avoid claims as perceived by construction industry. On the basis of a survey with industry and knowledge of construction projects, top 4 key factors were highlighted on a comprehensive assessment of their needs in the projects and their significance from past experiences in order to avoid/defend construction claims. On comparing above 4 critical factors, it is concluded that project manager competencies and risk related factors are very much important for the project success and avoiding claim. Sakib (2021) suggested that for examination of risk in an improvement mission, partition the chance research of a task in three sections: the specialized chance, the financial chance and transient risk research. It is recommended to increase the usage of these two factors in construction industry of Pakistan and abroad too. So that the problems facing in construction industry may reduce with the passage of time. The other two factors, consultant and contractor related are timely use full. These results concluded from the questionnaire survey.

Construction projects are frequently used in management research, and several different tools and techniques have already been developed. However, there is a gap between claim avoidance techniques and their practical application by construction industry. As a suggestion to further study, an overall generic claim avoidance model can be developed for the Pakistan construction industry, which would help engineers to correctly identify and classify the claim avoidance factors, measure their impacts and calculate current level of their usage according to project parameters such as project delivery method, award techniques etc. The model could help decide the effective factors that should be implemented to every project to successfully avoid the expected claims. Such a model is expected to result in improved profitability and competitiveness for construction industry.

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