

## ASSESSING QUALITY MANAGEMENT PRACTICES IN PAKISTANI HIGH-RISE BUILDING PROJECTS

Muhammad Waheed<sup>1</sup>, Mutahir Abbas<sup>2</sup>, Aftab Hameed Memon<sup>1</sup>

<sup>1</sup>Quaid-e-Awam University of Engineering Science & Technology, Nawabshah, Pakistan

<sup>2</sup>University of Engineering and Technology, Peshawar, Pakistan

\*Corresponding E-mail : [waheedkumboh94@gmail.com](mailto:waheedkumboh94@gmail.com), [aftabm78@hotmail.com](mailto:aftabm78@hotmail.com)

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### ABSTRACT

**Objective:** Developing countries all over the world are facing major challenges and issues in development projects such as high-rise buildings, and urban development projects. This is due to a lack of new ideas, innovation, experience, and learning from the developed world. Pakistan is among the countries facing these challenges. This study aims to identify the quality problems discovered in Pakistan during the construction of high-rise buildings. It also aims to find out how quality management methods are applied in Pakistani construction projects.

**Research Method:** For this research, a questionnaire survey method was used to collect data on the quality of high-rise building projects. The survey method is used to measure and assess the views, stances, and judgments of people. A five-point Likert scale was employed to quantify the data.

**Findings:** The studies and findings demonstrate the importance of quality to a structure's or buildings. In light of this, the study aims to determine how quality affects the success of a project and, when applicable, makes solutions.

**Originality:** The study aims to shed light on how quality assurance is applied to project procurement in the Pakistani construction sector, specifically high-rise structures, to detect and resolve quality problems.

**Keywords:** Construction Projects, Critical Success Factors, Project Performance, Project Quality, Relative Importance Index

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### 1. INTRODUCTION

Quality management is to ensuring that all necessary efforts are made to produce a well-planned and organized product that meets quality standards. From the perspective of a construction company, quality control in projects should entail upholding the necessary level of construction work quality to satisfy clients, which will increase the company's future competitiveness and viability as a business (Tan & Abdul-Rahman, 2005). Harris and McCaffer (2001) contended that quality management practices encompass all methods managers use to implement their quality policies. Planning, ensuring, controlling, and improving quality are some of these actions.

According to Naoum (1994), as stated in Olatunji et al. (2012), performance global reflects the outcomes of actions carried out. The project's performance is determined by its capacity to deliver the building or structure on schedule, under budget, with high customer loyalty, and in good condition. Thus, it can be argued that high-quality construction performance is results-driven and looks for proof of quality consciousness in a building or construction team's operations and output. Quality performance must also be specified over the long run (Yasamis et al. 2002). It is anticipated that increases in quality performance will boost contractor profitability and productivity while also raising client satisfaction.

Construction projects squander a huge amount of time, money, and resources due to ineffective or inadequate quality control processes (Rounds and Chi, 1985) as cited (Battikha, 2002). Irregularities in set specifications are another way to identify the lack of quality brought on by inadequate construction quality management. When

a project's final state or any of its constituent parts differs from the specified specifications, it is considered irregularity in the construction industry. Quality issues that arise during construction might be predicted to arise over the project's operational life. Irregularities might result in fines and time-consuming rework for the contractor, which can reduce productivity (Battikha, 2000).

The productivity and efficiency of the construction industry in comparison to other industries have drawn a lot of criticism over the past 50 years. It seems that the building sector is currently going through a period of severe introspection at the beginning of the new millennium, which is made worse by greater social and technological development. These modifications are causing the environment in which the building takes place to fluctuate in pace (Loushine et al. 2006). According to a related study by Oyegbile et al. (2012), building collapses in Nigeria have been increasingly common over the past ten years and do not appear to be decreasing. It was found that the poor quality of the building materials used during construction was one of the main potential causes of the collapse of the six-story structure (myjoyonline, 2012).

In a related occurrence, Osei Assibey (2005) discovered that there has been much concern expressed regarding the caliber of construction projects being carried out at the district level in Pakistan. Similarly, in Bangladesh, an inquiry by the government determined that the structure's collapse, which is currently recognized as the largest garment industry crisis in history, was caused by seriously inadequate construction materials combined with several wrongdoings.

The studies and findings stated above amply illustrate the importance of quality to a structure's or building's efficiency. In light of this, the study aims to determine how quality affects the success of a project and, when applicable, makes solutions.

## **2. LITERATURE REVIEW**

In the building sector, achieving acceptable standards of quality has long been problematic. Ineffective or nonexistent quality management systems result in significant annual losses in terms of time, money, and material and human resources (Arditi and Gunaydin, 2014). In comparison to other industries, the construction sector has received harsh criticism in recent years for its productivity and performance (Ashokkumar, 2014). Around the world, low-quality building projects are a typical occurrence (Aliand Wen, 2011).

Moreover, it is a severe concern because the satisfaction of the quality level in construction projects has not been attained (Memon et al. 2018; Kazaz and Birgonul 2005). Nonetheless, the majority of nations have developed to enforce quality standards to guarantee the caliber of construction. Since achieving quality is one of the basic requirements of the project owners (Memon et al. 2014), research into the significance of quality for the success of construction projects is required. Therefore, the goal of this study is to identify the quality-related concerns for high-rise building construction projects.

The needs of an expanding population are growing rapidly in line with population growth. Greater space is needed so that people can live better lifestyles. One of the fundamental needs for every industry or individual is housing. The land is covered in bituminous and concrete. In this instance, high-rise structures are the primary technological and aesthetically pleasing answer to meeting public needs. High-rise buildings are among the most advanced and sought-after constructions of our day. Nowadays, it is typically being worked on by all building businesses (Aliand Wen, 2011).

While some of the newer technologies are still being investigated, others are being used. People are unable to meet their demands because of the lack of land caused by the population's rapid growth, hence high-rise buildings are being built to meet those needs. These high-rise structures offer improved living conditions and better facilities to residents. In terms of high-rise building design, the two closest professions

associated are architecture and structural engineering. Until the end of the 20th century, high-rise structure was still constructed using solid brick masonry (Hirano and Furusaka, 2008).

When planning tall buildings, there are certain crucial guidelines regarding technology." In Pakistan, numerous high-rise structures are being built utilizing cutting-edge construction technologies. When constructing a high-rise, steel technology and reinforced cement concrete are primarily utilized. High-strength cement is employed in the same manner as regular cement for building high-rise buildings. The walls of the majority of high-rise buildings are constructed with cement blocks. The construction of high-rise building construction is made easier by the use of different machines (Ashokkumar, 2014).

Stasiowski and Burstein (2014) state that the conventional idea of quality is predicated on factors such as how well a building integrates into the environment, the emotional impact of a building on its occupants, the ability of a landscaping design to complement the theme of adjacent structures, and the use of innovative design ideas that pique people's interest. The degree to which the project complies with its specifications is another way to describe quality from the perspective of function. The idea behind quality management is to ensure that activities are organized and coordinated to attain the necessary degree of quality for the product. Nonetheless, quality in the building sector can be characterized as satisfying the needs of the owner, the architect, the constructor, and regulatory bodies (Ferguson and Clayton, 1988).

To effectively manage quality in projects, Juran's 1988 study highlights the importance of quality planning, assurance, and control. QA and QC are very important in the construction industry because they guarantee that quality standards are followed and that the total project performance is assessed, which reduces risks and improves project outcomes. Working drawings, specifications, and tender documents are essential for construction project quality control. Ensuring quality at the pre-tender stage is essential. According to Chandrasena (2013), maintaining quality control is crucial for the success and durability of a project from the beginning of design through the end of construction and into the maintenance phase.

### **3. METHODOLOGY**

For this research survey method was used to collect data about the quality of high-rise building projects. The survey method is used to measure and assess the views, stances, and judgments of people. A survey consists of a predetermined set of questions that are presented to a sample" as explained by Shaughnessy et.al. (2015).

Based on a comprehensive analysis of the literature and Pakistani high-rise construction experiences, this research study combines a variety of approaches and procedures. Seven steps can be identified in a research investigation to arrive at logical conclusions. To determine how high-rise building construction projects are graded and allocated in terms of quality, the first step involved conducting a thorough literature review that included articles, papers, and journals about high-rise structures from reputable organizations and professionals.

The second stage involved selecting important quality parameters specific to the construction settings of high-rise buildings in Pakistan. In the third stage, a thorough questionnaire was created to determine the respondents' preferences for allocation and quality rating of different high-rise structures across the nation. To obtain fair, realistic, and firsthand quality perception ideas for high-rise building projects, respondents with building construction expertise were chosen based on merit in the fourth step of the process. In the fifth stage, all respondents received questionnaires, and professionals from the public, private, and academic sectors were interviewed about high-rise structures.

The sixth step involved gathering survey data from participants and organizing it for statistical analysis and objective assessment. Data analysis was done in the

seventh step to come to rational and useful findings, ideas, and recommendations for additional research. In Figure 1, the steps of the research process are displayed.

A five-point Likert scale was employed to quantify the data. One kind of psychometric response scale that is frequently utilized in questionnaires is the Likert scale. In survey research, it is the scale that is most frequently utilized. When answering a Likert questionnaire question, respondents indicate how much they agree with a statement (A. Deviprashad, 2016). To assess the likelihood of a quality event, a five-point Likert scale is used, with 1 denoting Very Low, 2 Low, 3 Medium, 4 High, and 5 Very High.

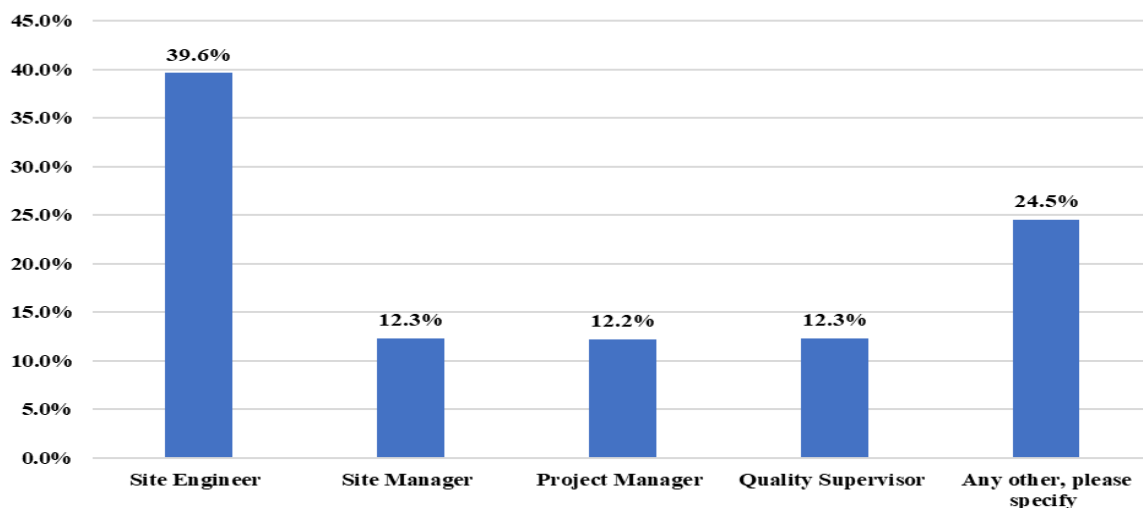
#### 4. RESULTS AND DISCUSSIONS

This study's research approach is quantitative, and data is gathered using a standardized, closed-ended questionnaire as detailed in the methodology section. When information is obtained via a questionnaire, it is unprocessed and needs to be interpreted. A suggested sample size of 95 was used. For this purpose, more than 300 forms were distributed, and 173 forms were returned. 106 of these were complete enough to be included in the data analysis. An MS Excel spreadsheet was used to organize the data. After that, the data was imported into SPSS for statistical analysis.

Different data analysis techniques were used to obtain suitable results. The major steps of data analysis for this research work are as follows. Demographics asked from the respondents included Gender, Age Group, Education, Working Experience, and Job Role. 130 forms were considered acceptable and the statistics show the division of respondents in demographic categorization.

##### 4.1 DESIGNATION OF RESPONDENTS AT PROJECT

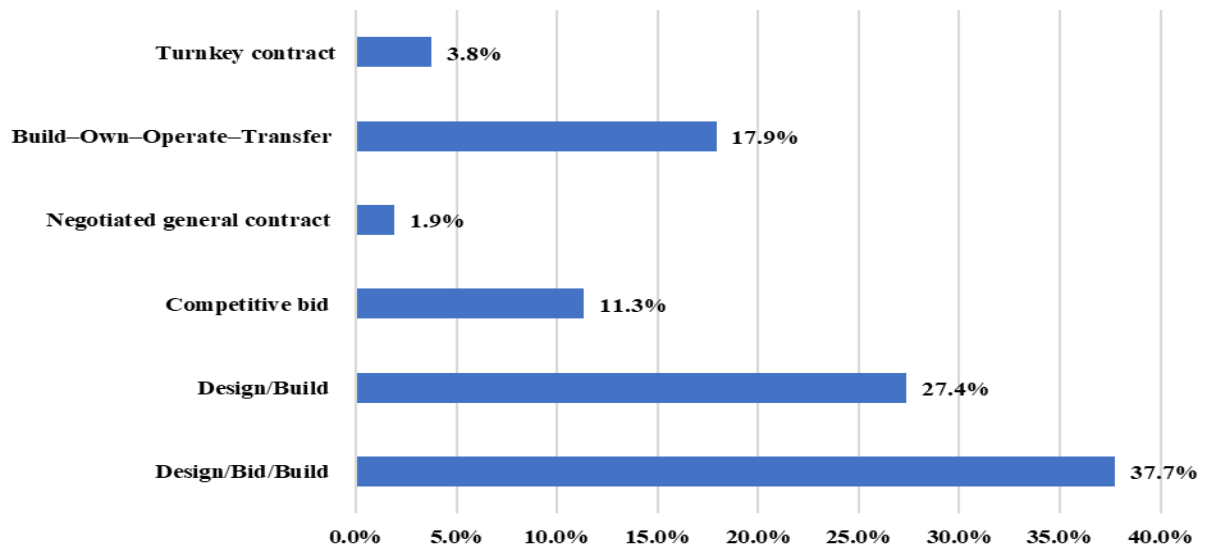
Most of the respondents are site engineers with less than five years of experience. Around 40% of respondents are site engineers while 24.5% are from other designations. Interestingly, approximately 39% of respondents are from top management as shown in Figure 1 below.



**Figure 1:** Designation of Respondents

##### 4.2 PROCUREMENT METHODS ADOPTED FOR CONSTRUCTION PROJECTS

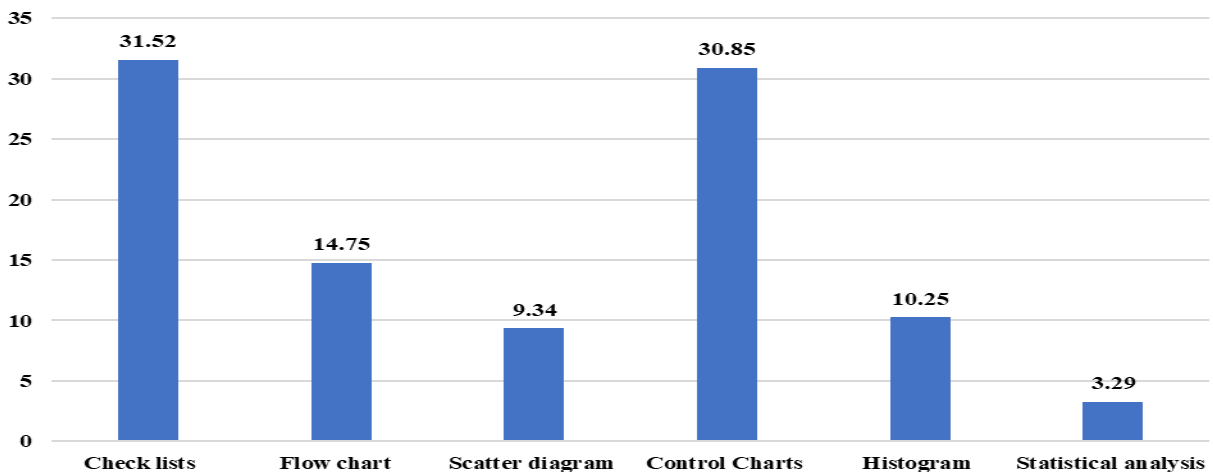
It is clear from the figure below that most of the respondents (37.7%) are using the design bid build method for the procurement of construction projects. While around 27.4% are using the design-build procurement method of construction projects. The competitive bid procurement method is considered old, so few respondents are still using that method in the construction industry as shown in Figure 2 below.



**Figure 2:** Procurement Approaches Used by Respondents

**4.3 QUALITY TOOLS AND TECHNIQUES**

From the figure below, approximately 61% of the respondents are using checklists and control charts at their construction sites. These are efficient ways to control the site but these are older methods. Only a few use sites the modern method which is statistical analysis to control the quality at the construction site as shown in Figure 3 below.

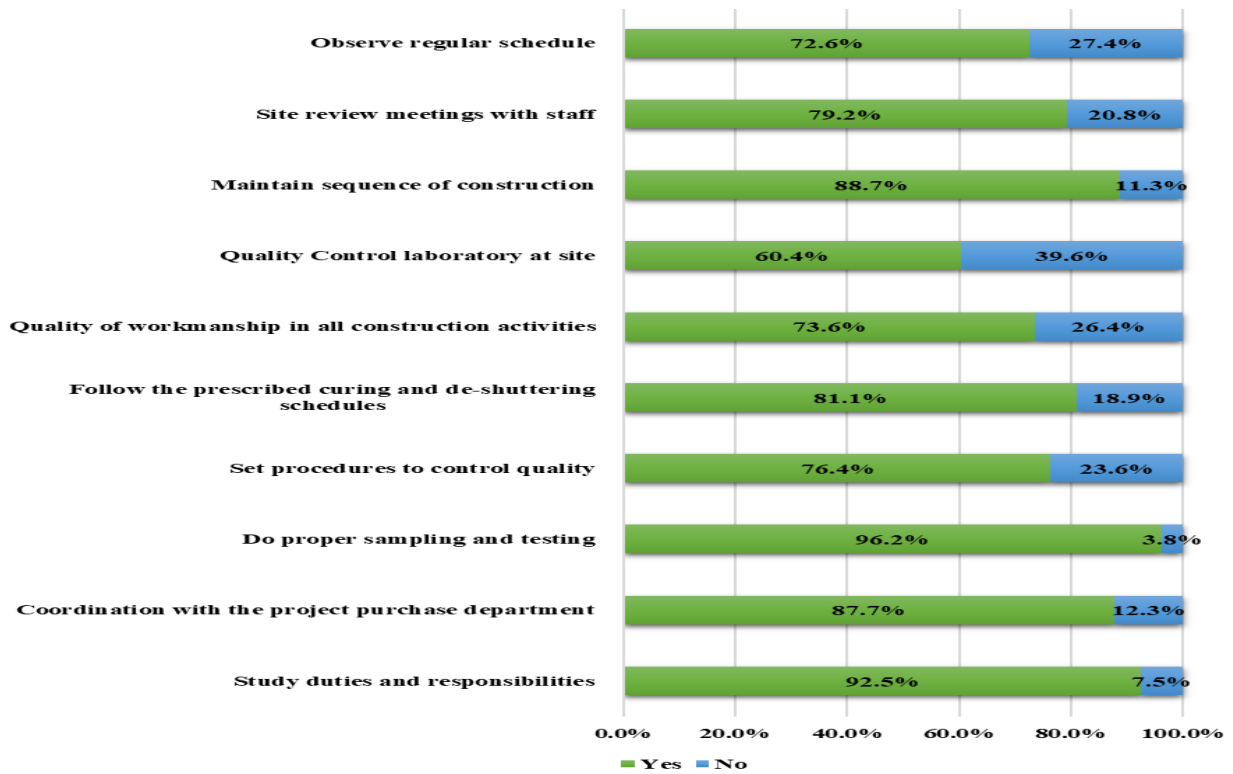


**Figure 3:** Quality Tools Used at Site

**4.4 QUALITY CONTROL MEASURE AT THE SITE**

Some useful questions were asked of the respondents about the application of quality-related aspects at construction sites. The majority of the factors or aspects have been covered at construction sites to control the quality of construction projects. The quality control laboratories are only a few sites that did not allow the site inspectors to test the samples at the site before their application. In this section sampling and testing received the maximum score compared to all other factors.

It is interesting to note that almost all the quality-related factors scored more than 50% but still, the quality of construction projects in Pakistan is up to standards and satisfies the client's requirements as in Figure 4.



**Figure 4:** Quality control measures you apply on-site

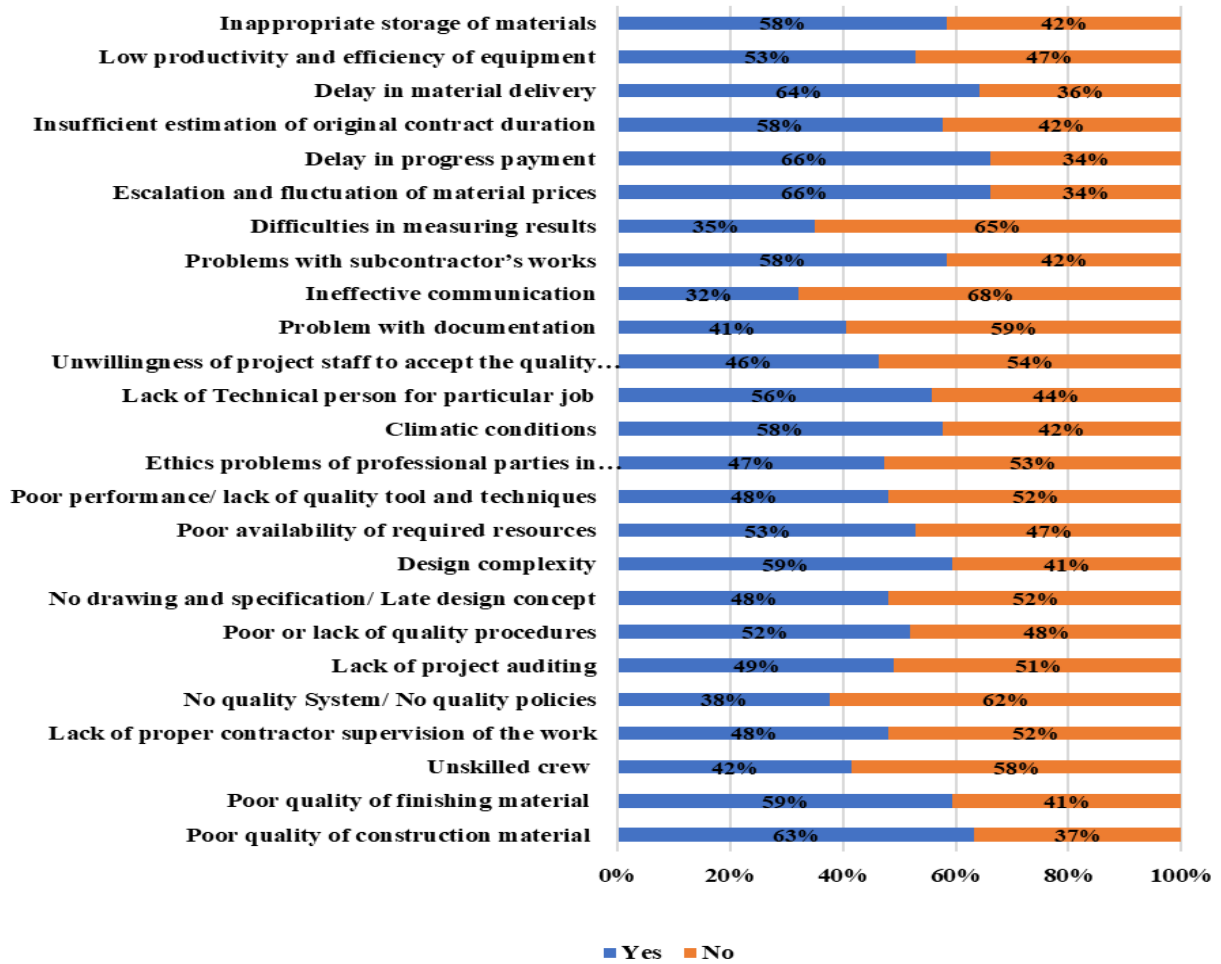
#### 4.5 QUALITY-RELATED ISSUES FACED AT CONSTRUCTION SITES

Some quality-related issues were discussed and asked from the respondents that they were facing at their construction sites during the execution.

It is clear from the figure below that some factors received a score of less than 50% indicating these are less important and have not significantly affected the quality of on construction projects in Pakistan. These factors are as follows.

- 1- Difficulties in measuring results.
- 2- Ineffective communication between stakeholders.
- 3- The unwillingness of project staff to adopt quality standards and guidelines.
- 4- Climatic conditions affecting project quality.
- 5- Poor performance and lack of quality tools and techniques available at the site.
- 6- Design complexity.
- 7- Unavailability of quality systems and policies in organizations.
- 8- Unskilled workers at the site.

According to the respondents, these to factors that are less important or not accruing in construction in Pakistan during execution. Therefore, they factors are of less importance as compared to other factors. The figure also shows that factors like delays in progressive payment, difficulties in measuring results, and poor quality of construction materials play the most important part in affecting the quality of projects. It is essential to control these factors at the construction site to prevent construction delays and low-quality products this can be seen in below Figure 5.



**Figure 5:** Quality Issues Facing Site

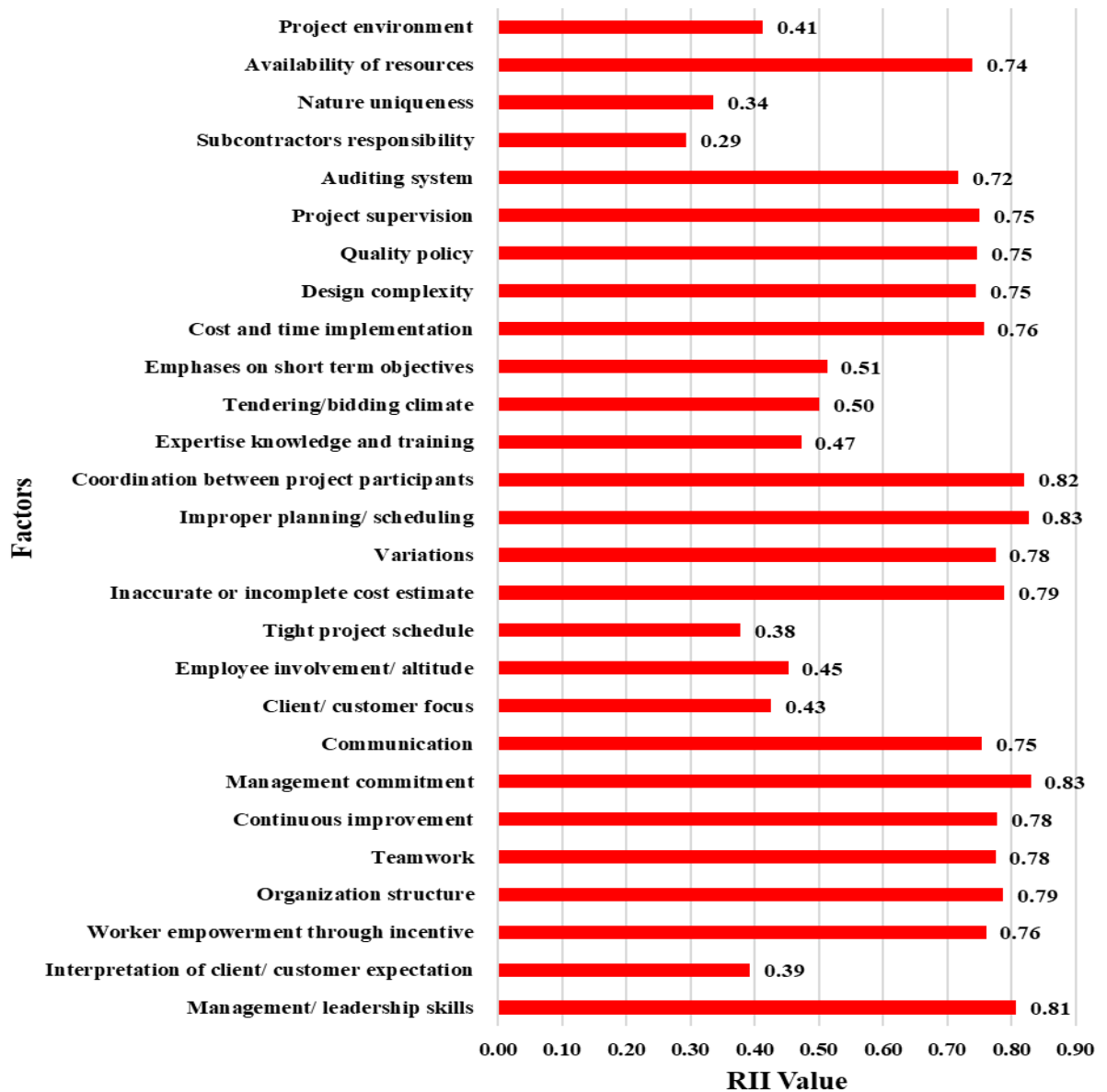
**4.6 RELATIVE IMPORTANCE INDEX (RII)**

The study utilized Simple Relative Importance Index (RII) and Percentage Frequency Distribution (PFD) techniques to analyze survey data to determine the significance and degree of correlation between the quality-related factors' responses and the construction projects' quality. A common method in structural research for determining actual relevance grade is the RII ranking methodology.

Each respondent was asked to assign a level of importance between 1 and 5, with 1 being the least important and 5 being the most significant. A total of 106 levels were measured using an ordinal scale. This allowed for the calculation of the RII value for each point. Since they guided how to validate any relationship between the components, the standard deviation and mean of the values were deemed unsuitable for measuring the overall rank orders. To determine the rank orders, all of the numerical scores for each questionnaire item were converted to relative significance indices.

Each point was ranked based on its RII value using the relevant formula, where the highest RII equals the highest rank and vice versa. Items with comparable RIIs were sorted based on the proportion of respondents who gave each item a score of 5. The remaining questions and feedback were analyzed using a certain technique, and the points were sorted in order of highest percentage (%). Following the respondents' responses, a frequency of occurrence test and RII were conducted along the survey items' ranks to determine the extent of correlation between the quality-related elements and their impact on the quality of building projects.

To increase the quality of building projects, the criteria with a score of greater than 0.5 will be given more weight than the other elements and must be implemented at the construction sites.



**Figure 6:** Factors Influencing Quality Management in Construction Projects

## 5. CONCLUSIONS

Based on collected data and analysis of results as described in the previous section, the following conclusions are extracted.

- 1- In the analysis of results, it is clear that monitoring and evaluation of the project scored the least. Usually in Pakistan, pre-planning and scheduling are performed just to fulfill the requirement client and after that, the plans and schedules are not monitored as per international standards. This lack of monitoring leads to conflicts, time overruns, and cost overrun problems at the construction site.
- 2- In developing countries like Pakistan, people are reluctant to adopt innovation and apply their experience to utilize new ideas. The factor of "innovation and learning" scored lower compared to other factors which indicates that the stakeholders are not interested in adopting new ideas in



- construction. This reluctance may be due to the increased upfront cost of these ideas or unfamiliarity with deep knowledge of these ideas.
- 3- The cost of the project is the main constraint and indicator of the project's success. Unfortunately, cash flow management-related decisions are made in organizations. During the project execution, lots of problems are faced at the site. The relatively important index value for "Cash flow factors" is very low because many people at the site do not know the details of cash flows because of fewer or no at-site cash flow management meetings.
  - 4- Similarly, risk management-related decisions are also made in the office of organizations rather than at sites where actual risks are present. This lack of on-site decision-making knowledge about risk management. The RII value of "risk rate at the site" is very low indicating the unawareness of the site team about risk management.
  - 5- Lack of quality training and leak of quality measurements at the site during and after the execution of projects lead the execution team toward a lesser understanding of quality control and quality assessment. According to respondents' views, quality workshops and training were not provided to the site team, therefore, they are unable to perform a quality check and quality measures at the site.
  - 6- For every project, the project team will deal with the triple constraints of time, cost, and scope of the project and it is clear from the data that all the factors related to these three constraints have the highest RII score. It means these factors are highly important to gain the project quality.
  - 7- In most projects, the main contractor sublets the work to the subcontractors. To achieve a higher quality of project subcontractor must work properly by adhering to all quality standards.
  - 8- Some quality-related issues are faced by the construction project due to the unique nature of each project. Every project is different from the previous one therefore no one is an expert to control the quality of every project.
  - 9- The project environment and the nature of crew workers also affect the quality of the project. The better the environment of the project and the more skilled crew workers are available at the site better be quality of the project.
  - 10- Project quality can be controlled by auditing systems, monitoring and evaluation of projects, and quality tests at the construction site and project.
  - 11- Projects with better coordination among all stakeholders of projects will have much better quality as compared to other projects. For the betterment of construction projects, the site workers should also be involved in coordination and meetings.
  - 12- Proper organizational structure within the organization and at the site will help staff address specific issues with the concerned person and resolve the issues at the initial stage for the betterment of the project and process.
  - 13- Organizations with more skilled staff will have better quality construction projects compared to others.
  - 14- Providing incentives to better workers will motivate other workers to work harder and safer to satisfy project management and client too.

## REFERENCES

- Ali, H. M., & Wen, Z. (2011). High-rise buildings: Meeting the demands of modern society. *Construction Research Congress 2011: Innovation and Sustainability in Construction and Infrastructure*, 160-171.
- Ali, H. M., & Wen, Z. (2011). Poor quality in construction projects: A global perspective. *Construction Research Congress 2011: Innovation and Sustainability in Construction and Infrastructure*, 172-181.
- Arditi, D., & Gunaydin, H. M. (2014). Quality in the construction industry. *Journal of Construction Engineering and Management*, 140(2), Article ID A4013001.

- Ashokkumar, T. (2014). Performance and productivity in the construction industry: A comparative analysis. *Construction Management and Economics*, 32(9), 882-895.
- Ashokkumar, T. (2014). Use of cement blocks in high-rise building construction: A review of modern construction methods. *Construction and Building Materials*, 65, 296-305.
- Battikha, A. M. (2000). Quality management in construction projects: An empirical study. *Construction Management and Economics*, 18(7), 819-832.
- Battikha, A. M. (2002). Quality management in construction projects: An empirical study. *Engineering, Construction and Architectural Management*, 9(3), 196-204.
- Chandrasena, R. M. M. R. (2013). Importance of maintaining quality control throughout building projects: A comprehensive perspective. *International Journal of Construction Engineering and Management*, 2(3), 87-95.
- Ferguson, G. E., & Clayton, J. (1988). Defining quality in the construction industry: A multi-stakeholder perspective. *Construction Management and Economics*, 6(2), 131-145.
- Harris, F., & McCaffer, R. (2001). *Modern construction management* (5th ed.). Blackwell Science.
- Hirano, M., & Furusaka, M. (2008). Evolution of high-rise building construction: From solid brick masonry to modern architecture. *Journal of Architectural Engineering*, 14(4), 136-145.
- Juran, J. M. (1988). Quality management in project management: Concepts and importance. *Project Management Journal*, 19(4), 57-61.
- Kazaz, A., & Birgonul, M. T. (2005). The importance of quality for construction project success: A global perspective. *Construction Management and Economics*, 23(6), 565-577.
- Loushine, M., Maqsood, T., & Seo, J. (2006). The changing environment of the construction industry in the new millennium. *Construction Innovation*, 6(3), 145-157.
- Memon, A. H., Rahman, I. A., & Memon, A. H. (2014). Assessing the Occurrence and Significance of VO Factors in Affecting Quality of Construction Projects. *Life Science Journal*, 11(7), 112-120.
- Memon, A. H., Rahman, I. A., Akhund, M. A., Abro, A. K., & Imad, H. U. (2018). Risk level of the factors affecting the quality of construction projects in Pakistan. *Indian Journal of Science and Technology*, 11(48), 1-8.
- Myjoyonline (2012). 6-storey building collapses in Lagos; 5 feared trapped.
- Olatunji, O. A., Babalola, O. O., & Afolabi, A. O. (2012). The impact of project management (PM) and contract management (CM) practices on performance of construction projects in Nigeria. *International Journal of Business and Management*, 7(9), 131-140.
- Osei Assibey, B. (2005). Concerns over quality of construction projects at district level in Pakistan. *Construction Review*, 11(2), 45-52.
- Oyegbile, O. A., Opoko, A. P., & Ayo-Vaughan, K. O. (2012). Causes of building collapse in Nigeria: A pilot study. *Journal of Construction Engineering and Management*, 138(8), 932-941.
- Shaughnessy, J. J., Zechmeister, E. B., & Zechmeister, J. S. (2015). *Research Methods in Psychology* (10th ed.). McGraw-Hill Education.
- Stasiowski, F., & Burstein, D. (2014). Rethinking the traditional definition of quality in construction projects. *Journal of Construction Engineering and Management*, 140(2), Article ID A4014001.
- Tan, C. S., & Abdul-Rahman, H. (2005). Quality management in construction projects: A study on the impact of the requirements management process. In 3rd International Conference on Construction Project Management (ICCPM 2005) (pp. 29-30).

Yasamis, F., Arditi, D., & Birgonul, M. T. (2002). Factors affecting construction labor productivity in Turkey. *Journal of Construction Engineering and Management*, 128(6), 512-519.