

Factors adversely affecting quality in highway projects of Pakistan



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ABSTRACT

Quality is one of an important parameter for measuring successful and sustainable construction projects. For a successful construction projects, it is essential that the projects are delivered according to the quality standards and in line with the customer desire. However, construction projects in both developed and developing countries are characterized by poor quality and highway projects in Pakistan has no exception. This paper aims to determine factors adversely affecting quality in highway projects of Pakistan. Research method for this study is a combination of both literature review and questionnaire survey. Literature review enabled identification of 24 common factors adversely affecting quality in construction industry. A questionnaire based on literature review was distributed amongst construction professionals of highway projects in Pakistan. Data collected from 215 respondents was analyzed using Statistical Package for the Social Sciences (SPSS). It was discovered that incompetent main contractors, improper planning, and improper selection of materials are the main factors adversely affecting quality in highway projects of Pakistan. The findings of this study can assist construction professionals to develop strategies to improve the quality of construction projects in general and highway projects particularly.

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1. Introduction

Construction industry makes a significant contribution to country's economy and development, as it provides large number employment opportunities and essential infrastructures. For a vibrant construction industry, successful completion of construction projects is the prime requirement. Compliance with quality specifications has been considered as imperative prerequisite to the achievement of successful construction projects. Quality of a construction project is the fulfilment of client requirements and satisfaction of the end-user ([Mallawaarachchi and Senaratne, 2015](#)). Quality is regard as vital for modern organizations because it escalates competitiveness and productivity, decreases costs and ensures a long-term cooperation with customers ([Dolacek-Alduk et al., 2009](#)). However, poor quality is a common issue in

construction industry ([Janipha and Ismail, 2013](#)). Construction project is considered as of poor quality when it fails to achieve its objectives and owner's needs are not fulfilled ([Ali and Wen, 2011](#)). Poor quality has many negative impacts on construction industry i.e. disputes among parties involved in construction projects, additional expenses due to rework and repair, loss in productivity, and bad reputation ([Mallawaarachchi and Senaratne, 2015](#); [Ali and Wen, 2011](#)).

Literature review reveals that poor quality is a global phenomenon in construction projects. A study was carried out by Construction Industry Institute, US (CII), to identify and quantify the additional cost due to poor quality in construction projects ([Abdel-Razek, 1998](#)). It was found that quality failure can add 25% extra to the final project cost. Further, [Abdel-Razek \(1998\)](#) stated that a study conducted by Building Research Establishment, UK (BRE) concluded that construction projects built with poor quality require excessive maintenance and repair, which can cause additional cost. According to [Chan and Tam \(2000\)](#), due to rapid increase in population in Hong Kong, Government concerned about quantity than quality of residential projects. Which

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resulted in poor quality of housing projects requiring repair works. It is stated by [Baiden and Tuuli \(2004\)](#) that defects are persistent in construction project of Ghana due to deviation from quality standards. [Abdul-Razak et al. \(2010\)](#) stated that certain construction projects in Malaysia fail to achieve client's satisfaction on quality level. It is quoted by [El-Maaty et al. \(2016\)](#) that according to the reports of World Bank, only 20% of road projects in Egypt are at the desired level of quality.

Likewise, other countries, construction industry in Pakistan is also recognized by poor quality. Study carried out by [Memon et al. \(2011\)](#) confirmed that construction industry of Pakistan is struggling for achieving quality from long time. Moreover, [Attaullah et al. \(2014\)](#) and [Abas et al. \(2015\)](#) also stated that construction projects in Pakistan are facing the issue of poor quality. Pakistan's highway network is comprised of 12,131 kilometres and it carry 80 % of the country's freight and passenger traffic, making it one of the significant sector shearing to GDP. In overall transport sector shear 10% to Country GDP and employing 2 million people. However, highway projects in Pakistan are also fails to achieve desired quality standards. Various studies have been carried out on the quality of construction projects in different countries including Pakistan. However, there is a still need to explore the issue of quality in Highway projects of Pakistan. Hence, the aim of this study is to determine and evaluate the factors adversely affecting quality of highway construction project in Pakistan.

2. Literature review

Literature review reveals that different researches have been conducted to examine factors affecting the quality of construction projects. [Shobana and Ambika \(2016\)](#) identified that factors affect quality of construction projects in India were poor coordination among workers, Labour shortage, late supply of materials, Labours work more than 8 hours per day, lack of proper inspection, lack of skilled labour, Financial problems arise during construction, and changes in design. A survey was carried out by [Oke et al. \(2017\)](#) to highlight the factors affecting quality in construction projects in Swaziland. The results of the survey showed that main factors affecting quality in construction projects were unexperienced subcontractors, poor supervision on site, unskilled labours, poor planning, lack of communication, project manager's ignorance, poor material management, poor plant management, and design changes. [Enshassi et al. \(2009\)](#) quoted that according to construction stakeholders handling large number of projects at the same time, material shortage, and unavailability of competent staff affects the quality of construction projects.

A questionnaire survey was conducted by [Jha and Iyer \(2006\)](#) to identify the factors affecting the quality of in construction projects. Analysis of the survey showed that factors adversely affecting quality in construction projects are: conflicts among

parties involved in project, harsh weather condition, lack of knowledge with project manager, and unfair award of contract. [Said et al. \(2009\)](#) stated that main factors affecting quality in Malaysian construction industry are lack of quality awareness in project participants, lack of support from the top management, improper planning, and unskilled workers. [Oyedele et al. \(2015\)](#) investigated factors affecting quality in construction in Nigeria by conducting a questionnaire survey in construction professional. The results of the survey presented that significant factors affecting quality are: poor quality of construction materials, low skill workers, lack of quality assurance, poor technical knowledge of contractors, unrealistic project cost, making slow decision, and inadequate site supervision. Other factors affecting quality of construction projects includes unclear client's requirements for design, improper material selection, lack of coordination between designer and owners, use of improper equipment ([Ahmed and Yusuff, 2016](#)).

3. Research methodology

Quantitative research method using questionnaire survey was adopted for this study. A deep literature review was performed to figure out the common factors adversely affecting the quality in construction industry. A questionnaire was designed based on the literature review. The developed questionnaire was divided into two sections. First section was intended to know the information of respondents while section two was aimed to assess the factors adversely affecting quality in highway projects of Pakistan. In total, 24 common factors adversely affecting quality were listed in section. A five-point Likert scale, with 1 presenting a not significant and 5 showing extremely significant was used to measure the significance level of factors as shown in [Table 1](#).

Table 1: Scale used in questionnaire

Rating	Likert Scale
1	Not Significant
2	Slightly Significant
3	Moderately Significant
4	Very Significant
5	Extremely Significant

To improve the content and practicality of the developed questionnaire, it was pilot tested through 10 experts involved in handling of highway construction projects in Pakistan. The questionnaire was modified based on the comments of experts. After pilot test, questionnaire was distributed to three main categories of construction stakeholders i.e. owners, consultants and contractor.

4. Characteristics of respondents

The questionnaire was distributed to three hundred and fifty (350) professionals working in highway projects in Pakistan, as result of two hundred and thirty (230) responses were received,

yielding response rate of 65.71 %. The response rate for the questionnaire survey was acceptable as in construction research the normal response rate for the questionnaire survey is around 20-30% (Yong and Mustafa, 2011). Fifteen (15) questionnaires were received that were incomplete, thus the remaining two hundred and fifteen (215) valid questionnaires were considered for further analysis. Fig. 1 shows the three main groups of stakeholders which participated in this survey.

Fig. 1 shows that almost half of the respondents were from contractors. Second most response was from consultants i.e. 30%. While only 20% of the survey participants were from the owners. Professional experience and experience of survey respondents counts for an important aspect in quantitative research. The participants of survey were highly experienced in highway construction, Fig. 2 summarize their experience level.

It can be observed in Fig. 2, that 72 out of 215 (33.28%) participants had experience more than 20 years in working in construction industry. Only 38 (17.67%) of the survey respondents had experience less than 10 years. Construction professional participated in survey were highly qualified. Fig. 3 presents the educational level of the survey respondents. Fig. 3 shows that majority of the survey respondents had bachelor’s degree i.e. 113 out of 215, followed by diploma holders i.e. 57 out of 215 (26.51%). While, only 20.93% of the respondents had obtained master’s degree.

5. Data analysis and results

To check the reliability of the collected data, Cronbach’s alpha was used. According to Oppenheim (2000) “Reliability is the measure of internal consistency and the probability of obtaining similar results if the measure is to be duplicated”. Cronbach’s alpha value was determined using SPSS V22. Table 2 illustrates the results of reliability test.

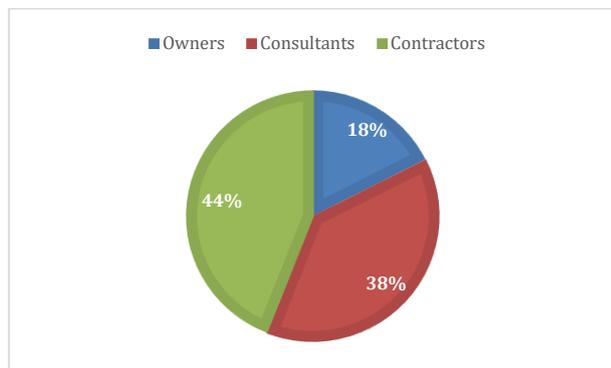


Fig. 1: Respondents based on categories

Cronbach’s alpha value was 0.914 which is greater than acceptable value 0.7 (Sohu et al., 2017). Hence the data gathered in questionnaire survey was reliable to proceed further analysis. SPSS V22 was used to determine the Relative Importance Index (RII) of the factors adversely affecting quality in highway projects in Pakistan. Table 3 shows the

ranking of factors adversely affecting quality based on their Relative Importance Index (RII).

This ranking enabled to determine the main factors adversely affecting quality in highway projects. Participants of the survey ranked the “Incompetent main contractor” as the main cause of poor quality in highway projects of Pakistan. Contactor is one of the major stakeholder in highway projects as they are directly involved in construction activities at site. Thus, low experience or incompetency of main contractor will directly affect quality of highway project. Second most factor affecting quality was “Improper planning”.

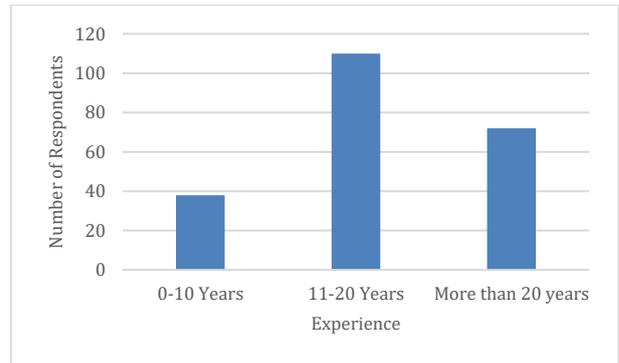


Fig. 2: Respondents experience

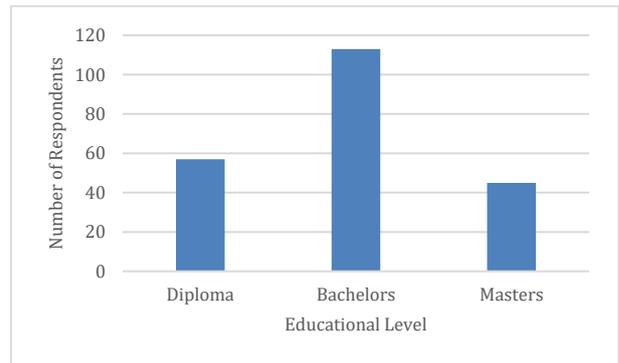


Fig. 3: Respondents education level

A well planned executed highway project not only satisfy the quality requirements but also project is completed within specified budget and time. Improper material selection was ranked as third main factors affecting quality. Materials is the main element of any construction project, selecting materials which are not in accordance with specifications in contract can lead to poor quality in highway projects. Lack of awareness regarding quality in project participants, lack of awareness regarding quality in project participants, and Conflicts among parties involved in project were least factors affecting quality in highway projects of Pakistan.

6. Spearman’s rank correlation coefficient

Spearman’s rank correlation coefficient is used to indicate whether there is the agreement or disagreement among the groups of respondents. Table 4 shows the results of Spearman coefficient.

Spearman coefficient in indicates that there is a strong agreement between three groups of respondents i.e. contractors, clients, and consultants on raking the factors adversely affecting quality in highway projects of Pakistan.

Table 2: Reliability statistics

Cronbach's Alpha	No. of items
0.914	24

Table 3: Ranking of factors adversely affecting quality in highway projects

Factors	RII by Contractor	Rank	RII by Clients	Rank	RII by Consultants	Rank	Overall RII	Overall rank
Unexperienced subcontractors	0.842	9	0.814	6	0.833	6	0.829	7
Project manager's ignorance	0.866	5	0.822	5	0.798	11	0.828	6
Unfair award of contract	0.798	14	0.768	14	0.812	8	0.793	13
Improper planning	0.896	1	0.854	2	0.844	3	0.865	2
Poor quality of construction materials	0.851	7	0.778	13	0.790	12	0.806	9
Improper material selection	0.873	3	0.842	3	0.848	2	0.854	3
Incompetent main contractor	0.886	2	0.870	1	0.854	1	0.87	1
Poor coordination among workers	0.838	10	0.782	12	0.784	12	0.801	11
Late supply of materials	0.784	15	0.663	21	0.714	17	0.72	19
Material shortage	0.844	8	0.738	18	0.756	14	0.779	14
Lack of coordination between designer and client	0.832	11	0.808	7	0.818	7	0.819	8
Poor supervision on site	0.872	4	0.792	10	0.836	5	0.833	5
Lack of support from the top management	0.736	18	0.761	15	0.808	9	0.768	16
Lack of skilled labour	0.857	6	0.832	4	0.841	4	0.843	4
Financial problems during construction	0.743	17	0.756	16	0.732	16	0.744	18
Unclear client's requirements for design	0.732	19	0.794	9	0.705	18	0.745	17
Unavailability of competent staff	0.824	12	0.788	11	0.804	10	0.805	10
Labours work more than 8 hours per day	0.684	21	0.680	20	0.702	19	0.688	20
Lack of communication among project stakeholders	0.656	23	0.712	19	0.684	21	0.684	21
Labour shortage	0.813	13	0.756	17	0.700	20	0.756	15
Changes in design	0.768	16	0.804	8	0.782	14	0.784	12
Handling large number of projects at the same time	0.674	22	0.605	24	0.612	24	0.63	24
Lack of awareness regarding quality in project participants	0.700	20	0.650	22	0.615	23	0.655	22
Conflicts among parties involved in project	0.630	24	0.619	23	0.644	22	0.631	23

Table 4: Result of spearman co-efficient

Parties	Spearman rank correlation coefficient	Significance level
Contractors– Consultants	0.802	0.000
Contractors – Clients	0.843	0.000
Consultants – Clients	0.870	0.000

7. Conclusion

It can be concluded that quality is one of the prime requirements of successful construction projects. However, majority of the construction projects including highway projects are facing the issue of poor quality. This paper highlights the factors affecting adversely quality in highway projects of Pakistan. The analysis of the survey showed that incompetent main contractor, improper planning and improper selection of materials are the top three factors affecting adversely quality in highway projects of Pakistan. The scope of this study was limited to highway project in Pakistan, future studies can be carried out on other types of construction projects. The results of this study can help construction practitioners in order to improve quality in construction industry.

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