

Ranking Construction Superintendent Competencies and Attributes Required for Success in Pakistani Construction Industry

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Abstract

Success of a project is the responsibility of construction team leaders, project manager and superintendent. The construction job superintendent is like the conductor of a symphony orchestra. He must see that all elements are fitted together at the right time and sequence. This construction conductor is responsible for the on-time and within budget completion of construction projects. The superintendent plays a key role in the completion of the built environment. He is responsible for the direct daily supervision of construction activities on the project, whether the work is performed by the contractor's workers or those employed by subcontractors. It is his responsibility to coordinate labor, material, equipment and subcontractors during construction. Since the superintendent has a key role in the success of a construction project, the competencies (skill sets) and attributes that make that individual successful are very important. This research attempts to identify and rank the key competencies and attributes needed in a construction superintendent that make him successful. Results indicated that leadership, time management, ability to plan ahead, understanding subcontractors' work, and ability to work with different kinds of people are the top ranked skills for construction superintendents. It is emphasized that ranking the key superintendent competencies and attributes would help in the development of appropriate training programs for construction superintendents as well as providing a mechanism for contractors to improve key superintendent skills in order to achieve successful projects.

Keywords

Construction Industry, Construction superintendent, Competencies, Attributes, Pakistan.

1. Introduction

Success of a project is the responsibility of construction team leaders, project manager and superintendent. "The [construction] job superintendent is like the conductor of a symphony orchestra. He must see that all elements are fitted together at the right time and sequence" (Diamant & Debo, 1988). This construction conductor is responsible for the on-time and within budget completion of construction projects. The superintendent plays a key role in the completion of the built environment.

There are common threads focusing on the supervisory role of the construction superintendent that weave through different authors' perceptions of the role that the project superintendent plays in the construction process. Schaufelberger and Holm (2002) state, "The superintendent is responsible for the direct daily supervision of construction activities on the project, whether the work is performed by the contractor's workers or those employed by subcontractors". Mincks and Johnston (2004) focus on the superintendent's field knowledge stating that regardless of the project delivery method chosen, "the superintendent is responsible for the correct, timely, and profitable construction of the project. It is the superintendent's responsibility to coordinate labor, material, equipment and subcontractors" during construction. The functional role has "the necessary skills and understanding of common construction methods and practices". Schexnayder and Mayo (2004) focus more on the superintendents' field experience when they state, "Superintendents often come up through the trades, and have many years of experience. Their primary function is to coordinate the field work and supervise the trade foremen". Gould and Joyce (2002) identify the changing source of superintendents stating that traditionally superintendents "were people from the trades themselves, working their way up to a management position. Recently, however, more superintendents have been hired out of college engineering or construction management programs". This research focuses on the competencies (also referred to as skill sets) and attributes needed by today's construction superintendent to be successful.

Webster's Third New International Dictionary (1993) defines success as "the degree or measure of attaining a desired end". Sanvido et. al. (1992) determined the contractor's criteria for project success to include: "meet the schedule; project profit; under budget including savings for the owner or the contractor; quality met or exceeded; no claims and/or litigation; safety; client satisfaction; good subcontractor buy out; good direct communication; and minimal or no surprises during the project". The success of a project is the responsibility of the construction team leaders, the project manager and the superintendent. Clough et. al. (2005) state, "In practice, construction project authority is wielded much as a partnership effort, with the project manager and the project superintendent functioning as allied equals". The list of success factors generated by Sanvido et. al. (1992) is presented in Table 1. Different construction companies delegate responsibility and authority in different ways. Table 1 is the authors' attempt at summarizing how the responsibility for project success is often delegated.

Table 1: Criteria Leading to Project Success

Constructor's Criteria for Project Success	Responsible Person
Meet the Schedule	Superintendent
Project Profit	Project Manager and Superintendent
Under Budget (including savings for the owner or contractor)	Project Manager and Superintendent
Quality Met or Exceeded	Superintendent
No Claims and/or Litigation	Project Manager and Superintendent
Safety	Superintendent
Client Satisfaction	Project Manager and Superintendent
Good Subcontractor Buy Out	Project Manager
Good Direct Communication	Project Manager and Superintendent
Minimal or No Surprises during the Project	Project Manager and Superintendent

This delegation of responsibility varies from company to company and from project to project. Although arguable, the project superintendent is responsible or shares responsibility with the project manager for nine of the 10 criteria leading to project success. Since the superintendent has a key role in the success of a construction project, the competencies and attributes that make that individual successful are very important.

From the perspective of Pakistan – a developing country that is currently enjoying relatively strong growth in construction activities – the construction sector is a basic industry on which the development of

the country largely depends. Despite being one of the most neglected sectors in Pakistan, construction participates appreciably to increase the GDP and comprises about 14% of employment of total labor force (Economic Survey of Pakistan – Government of Pakistan, 2006-07). Compelled by the acute demand on basic and advanced infrastructure, the current decade is witnessing massive infrastructure growth in Pakistan. There are numerous infrastructure development projects in progress as well as under planning. All of these projects have the potential to lead the local industry to gain glory, status and international recognition but only when appropriate efforts are extended to achieve the same. With the stage set for a golden era for development, the challenges are still higher. The “boom cycle” and corresponding shortage of labor trades has increased the need for industry participants to adopt and apply project management philosophy, tools and techniques to help them manage the industry performance and productivity in a sustainable long-term mode. As such, the role of project superintendents has become more significant than ever before.

With the strategic aim to devise a model for nurturing the key project management skills in the industry that can lead the Pakistani construction industry to the success path, this research has been conducted as an initial step towards identifying the qualitative characteristics needed in today’s effective project superintendents in the Pakistani construction industry as perceived by the significant actors in the industry. It is expected that this study will also allow each sector in the industry to look for project superintendents that suit their particular needs so as to select the most appropriately qualified personnel as superintendents.

Based on the results of the survey, it is anticipated that patterns will emerge regarding the key attributes of effective project superintendents. Ranking the key superintendent competencies and attributes would help in the development of appropriate training programs for construction superintendents as well as providing a mechanism for contractors to improve key superintendent skills in order to achieve successful projects.

2. Research Objectives

The research work reported in this paper is part of an on-going research project under Pakistan-US Science and Technology Cooperative Program (STCP), with funds provided jointly by the United States Agency for International Development (USAID), USA and Ministry of Science and Technology (MoST), Pakistan. The above-mentioned project has four main objectives:

1. To assess the current state of Pakistan construction industry through quantitative research with specific reference to the status of construction management education, research and practice;
2. To develop a strategic model for the improvement and strengthening of construction management education, research and practice in Pakistan;
3. To devise a framework to standardize the construction industry practices for achieving improved performance on cost, time, quality, productivity and safety; and
4. To build capacity of academia, industry, owners and government in the area of construction management so as to improve the overall productivity of the construction industry.

The objective of the current study was to identify the most important competencies and attributes of an effective project superintendent as perceived by the superintendents themselves.

3. Research Methodology

The methodology of the study was a four-step process, described as follows:

1. A thorough literature review was done as well as expert interviews were conducted from a selected cross-section of local construction superintendents to allow superintendent competencies and attributes to emerge out.
2. A quantitative ranking instrument of superintendent competencies and attributes was developed using the data collected from literature review and expert interviews.
3. A structured survey was conducted via interviews with local construction superintendent to solicit input on the quantitative ranking instrument.
4. Assessment of feedback from interviews was made and relevant conclusions were drawn.

The methodology is explained as follows.

In the first step, a thorough literature review was performed to identify the key themes surrounding superintendent competencies and attributes. The literature review was done through books, conference proceedings, internet, and leading construction management and engineering journals. Most useful works studied included: Katz and Thamhain (1983) [cited in Kerzner (1989)]; Goodwin (1993); Gushgar et al. (1997); Wateridge (1997); Odusami (2002).

Following the identification of the key themes surrounding superintendent competencies and attributes, expert interviews were conducted from a selected cross-section of local construction superintendent. Open ended questions allowed themes surrounding superintendent competencies and attributes to be used to allow a list of superintendent competencies and attributes to emerge out. As a result, a list of twenty nine (29) key competence measures and attributes for a construction superintendent was developed. This list was used to develop the quantitative ranking instrument.

In the next step, a structured questionnaire consisting of two parts was designed – parts A and B. Part A consisted of requesting respondent's personal information (e.g. work experience, experience as cost estimator, etc.) and company information (e.g. type of organization, types of construction works performed, years in business, annual volume of work, number of permanent employees, cities of operation etc.). Part B consisted of the quantitative ranking instrument already developed. The respondents were asked to evaluate the importance of the competence measures and attributes starting with 1 as the least degree of importance and 10 as the highest degree of importance.

The data of this study were collected from the participants through interviews. The questionnaire was circulated among construction superintendents working for general contractors, specialty contractors, construction management contractors, and design-build contractors. Although the questions asked during the interviews were intended to gather specific information about the skills needed by superintendents to direct work on the job site, the questions were also open ended enough to allow participants to explore aspects of the superintendents' role not preconceived by the researchers.

In the final steps, based on all the gathered information, an analysis was performed as to ranking of construction superintendent competencies and attributes. The research results are given in the next section. Finally, based on the research results, relevant conclusions and recommendations were drawn.

4. Research Results

Twenty eight (28) construction superintendents were interviewed for the study. The data collected in the interviews has been analyzed in the following sub-sections.

4.1 Demographic Information

The superintendents interviewed belonged to various types of construction industry contracting firms, as shown in Table 2.

Table 2: Participants' Affiliation

	General Contracting Firms	Specialty Contracting Firms	Construction Management Contracting Firms	Design Build Contracting Firms
Number of Participants	16 (57%)	6 (22%)	2 (7%)	4 (14%)

The average number of years in business for the firms employing the participants was thirty (30) years. These firms were involved in various types of construction works as shown in Table 3.

Table 3: Participants' Distribution with respect to Organizational Work Sector

	Heavy Eng./ Infrastructure	Commercial Building	Industrial	Institutional	Residential
Number of Participants	20 (71.4%)	12 (42.9%)	8 (28.6%)	7 (25.0%)	5 (17.9%)

Note that there were overlaps in the work sector shares of these firms. All sizes of firms, in terms of number of permanent employees, were represented in the survey sample. This is shown in Table 4.

Table 4: Participants' Distribution with respect to Size of Organization

	Under 50 permanent employees	50 – 100 permanent employees	100 – 150 permanent employees	150 – 200 permanent employees	> 200 permanent employees
Number of Participants	20 (71.4%)	12 (42.9%)	8 (28.6%)	7 (25.0%)	5 (17.9%)

The superintendents interviewed for the study were working in major cities of Pakistan including Karachi, Hyderabad, Lahore, and Islamabad. Demographic information for the 28 superintendents interviewed is presented in Table 5.

Table 5: Participants' Construction Experience

	Total Years	Average Years	Most Experience	Least Experience
Years in Construction	721	25.75	40	16
Years as a Superintendent	540	19.29	32	8

The average construction experience that these 28 participants had before moving into the superintendent role was approximately 6.5 years.

Table 6 presents the educational qualifications of the 28 participants. One very successful superintendent stated, "The last education I had was in 10th grade." This wide range of formal education among the participants did not produce a wide range of differences in the data. The majority of the participants came "up through the ranks" starting as a trades workers.

Table 6: Participants' Education

Number of Participants	Master's Degree	Bachelor's Degree (4 years)	Associate's / Technical Degree (2 years)	Some College (no degree)	Some School (no degree)
28	5	7	13	2	1

The participants had diverse academic backgrounds; the main academic concentration was in civil engineering and construction management. Table 7 presents the major concentrations for the postsecondary degrees held by the twenty five (89.3%) participants. Also included in Table 5 are the major concentrations for the five (17.9%) participants who had Master's degrees. It is interesting to note that 2 of the 5 participants having Master's degrees had degrees in structural engineering, while one had a degree in construction management; thereby indicating that the major concentration was in civil engineering and construction management. Of the 25% of the participants who held a Bachelor's degree, 86% of those degrees were in civil engineering. It is important to note that construction management is currently not in the offering at the Bachelor's level by any university in Pakistan. Hence it seems highly justified that the majority of Bachelor's degree holders have degrees in civil engineering. Similarly, of the 46% of the participants who held an Associate's degree, 85% of those degrees were in civil engineering. Almost all of the degree holder participants had degrees in engineering and construction management.

Table 7: Participant Postsecondary Education

Degree	Master's Degree		Bachelor's Degree (4 years)		Associate's/ Technical Degree (2 years)			
28	1	1	2	1	6	1	11	2
	MBA	Geology	Structural Eng.	Construction Mgt.	Civil Eng.	Mech. Eng.	Civil Eng.	Mech. Eng.

4.2 Superintendent Competencies and Attributes

The participants were asked to evaluate 29 skill sets or attributes deemed significant for an effective construction superintendent. The list of skill sets was generated in the initial phase of the study from interviews with a selected cross-section of local construction superintendents. The evaluation was requested on a ten-point scale starting with 1 for least degree of importance and 10 for highest degree of importance. Based on the scale rating of responses, the mean level of significance for each skill set was then calculated to obtain the importance index for each skill set or attribute. The importance indices were then ranked from the highest to the lowest to get the overall ranking of the competencies and attributes. Table 8 provides the results for the ranked superintendent skills sets and attributes.

The mean level of significance showed that the most important skills for construction superintendents are: leadership (8.07), time management (8.04), ability to plan ahead (7.89), understanding subcontractors' work (7.83) and ability to work with different kinds of people (7.78). The five least important skills are: work ethic (5.71), computer skills (5.61), ability to sketch (5.32), reinforcing behaviors (5.26) and typing skills (3.92).

Table 8: Superintendent Competencies or Attributes Ranking

Rank	Superintendent Competency or Attribute	Mean Score (Max. 10)	Rank	Superintendent Competency or Attribute	Mean Score (Max. 10)
1	Leadership	8.07	16	Understand Materials	6.65
2	Time Management	8.04	17	Learn from Others	6.64
3	Ability to Plan Ahead	7.89	17	Collaboration	6.54
4	Understand subcontractors' work	7.83	19	Listening Skills	6.50
5	Ability to work with Different kinds of People	7.78	20	Strong Values and Ethics	6.33
6	Conceptualization (Thinking how it will work)	7.63	21	Trust Building	6.31
7	Team Building	7.56	22	Good with Numbers	6.30
8	Cost Control	7.50	23	Ability to Teach	6.15
9	Estimating	7.33	24	Get Along with People	6.07
10	Scheduling	7.14	25	Work Ethic (Doing the right things only)	5.71
11	Broad Knowledge of Construction (various aspects)	7.11	26	Computer Skills	5.61
11	In-depth Knowledge of Construction processes	7.11	27	Ability to Sketch	5.32
13	Ability to "Keep your Cool"	7.00	28	Reinforcing Behaviors	5.26
14	Oral Communication	6.86	29	Typing Skills	3.92
15	Written Communication	6.71			

5. Conclusions, Limitations and Future Research Directions

The top ten (10) skills for construction superintendents are shown below.

1. Leadership
2. Time Management
3. Ability to Plan Ahead
4. Understand subcontractors' work
5. Ability to work with Different kinds of People
6. Conceptualization (Thinking how it will work)
7. Team Building
8. Cost Control
9. Estimating
10. Scheduling

The challenge facing a would-be effective construction superintendent is the development and successful application of these important skills to achieve their project objectives. Some of these skills can be acquired in schools, while others may be acquired on the field. Emphasis will then be laid on those that need to be acquired in schools, while others will be deferred till after graduation. The rankings of the importance of skills can be a guide in the training of construction superintendents both at the undergraduate or postgraduate levels and post-qualification. They can also be used as a yardstick in appointing/selecting a would-be construction superintendent during interview and final selection.

This is an initial study that can be the base for upcoming studies. Future studies can look at the perception of other industry stakeholders (owners, construction managers, A/Es, etc.) as to the key skills of construction superintendents and can assess the level of agreement (and disagreement) amongst various stakeholders.

Future studies in the same field not only need to target a different crowd but also need to acquire opinions from other major construction industries in developing countries.

In a future study, examination of the relative difference in the importance of the skills in relation to the complexity of projects (heavy engineering vs. industrial vs. commercial vs. residential) can be done. Furthermore, testing the needs in a detailed scale for each category of project complexity will help identify the skills that can give the best results. For example, infrastructure projects can be broken down into road projects, sewerage system projects and bridges. Each part should attempt to inspect the most critical skills needed for construction superintendents in that particular division.

Finally, doing this study in a backwards manner is a good potential for a future study. Instead of getting the opinions from the people, a survey can be conducted on previous successful projects. These projects could be studied and the analysis may be performed on the skill set of construction superintendents that have worked on these successful projects. Knowing their skills and performing questionnaire surveys and interviews with them would give better and more accurate results.

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