

COMMON FACTORS AFFECTING TIME AND COST PERFORMANCE OF CONSTRUCTION PROJECTS IN PAKISTAN

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ABSTRACT: Time and cost performance is key criteria for measuring success of any work. Unfortunately, like other countries of the world, Pakistani construction projects are also suffering from poor time and cost performance. This poor performance is resulted by different reasons which are essential to uncover and control. This paper has addressed the issue of identifying the common factors affecting time and cost performance. Review of literature resulted in identifying 74 common factors occurring worldwide. Relevancy of the factors was identified through structured interview of 23 experience personnel. The data was analyzed statistically which revealed that all the 74 factors have relevancy with construction sector of Pakistan. Among these factors 12 factors are very relevant and 62 factors are moderately relevant. Among the factors lack of communication between parties, delay in obtaining permits from governmental agencies and shortage of technical personnel are reported as top ranked factors.

Keywords: Time performance, Cost Performance, Construction Industry, Pakistan.

INTRODUCTION

Poor performance of time and cost in construction industry is prominent issue since long time. This is global phenomenon (Le-Hoai, *et al.*, 2019; John *et al.*, 2015). A study revealed that 70% of project in Saudi Arabia faced delay (Al-Khalil and Al-Ghafly, 1999) while in Qatar 80% of infrastructure projects experienced delay with 25% of additional time (Emam *et al.*, 2015). Construction projects of Brazil face poor cost performance in investigation of 238 projects by where cost was exceeded by 82% (França and Haddad, 2018). In Pakistan construction sector is among the prime sectors which contributing to GDP of the country. It shares 2.3% of the country's GDP growth. It has contributed 239,361.33 PKR Million annually from 2006 until 2017. However, this sector is suffering from severe problem of poor time and cost performance (Hussain *et al.*, 2018) such as Hydro Power projects initiated by Water and Power Development Authority (WAPDA) were completed with spending excessive time of 200% times the contract time while 2.5% overrun of budget was reported ((DETR) (UK)), 2000. Hence it is very essential to improve project performance to achieve successful completion of the projects. Thus, this research focuses on studying the problem of poor time and cost performance. However, this paper is limited to investigating the common factors causing poor time and cost performance in construction projects of Pakistan.

Time and cost performance occurs in construction projects due to several attributes. It is very essential to identify those attributes to address the

problem of time and cost performance. A study in Gilgit Baltistan Pakistan highlighted that financial difficulty faced by contractors; delays in project progress and dispute on land usage are main factors affecting time performance in public sector building projects. (Hussain *et al.*, 2018). Assessment of Egyptian construction projects highlighted that time, cost and quality performance experience very poor performance. Major reason of poor performance was lack of communication between the parties involved in handling projects (Akal *et al.*, 2017). Similarly, a study of Saudi Arabia indicated that Poor site management and supervision by contractors; conflict between the main contractor and subcontractor; poor planning and scheduling of projects by the contractor are major issue in affecting project time performance (Alhajri and Alshibani, 2018). In Nigeria, Insufficient number of equipment, inaccurate time estimate, interim payment difficulties, change orders, inaccurate cost estimate, poor site management and supervision, inadequate modern equipment, shortage of construction materials, incompetent project team are reported as prominent factors in affecting project performance (Obodoh and Chikasi, 2016). Corruption, late payment by the client and financial problems on the part of the construction companies are described as main causes of the increase in construction costs in Afghanistan (Niazi and Painting, 2017). A study of Sindh province Pakistan revealed financial issue faced by client, slow information between parties, change in material price, poor site management, and payment problem faced by contractor as major reason of cost overrun factors in building projects of Sindh Province (Sohu *et al.*, 2019). A comprehensive review of literature was conducted which

resulted in listing out 74 common factors (Memon *et al.*, 2011; Sarwar *et al.*, 2002). These factors were used for developing questionnaire form and collection of data as discussed in following sections.

MATERIALS AND METHODS

Collection of data for this study was carried out through structured interview with the help of questionnaire form. This questionnaire form was designed based on the factor of time and cost performance identified by reviewing literature published worldwide regarding time and cost performance. A total of 74 factors were investigated in order to assess the relevancy with construction projects of Pakistan. The participants were asked the level of relevancy for each factor using 5-point likert scale as Not Relevant (NR), Slightly Relevant (SR), Moderately Related (MR), Very Related (VR) and Extremely Related (ER). The response of the participants for each factor was recorded and analyzed statistically using Average Index (AI) formula as described below:

$$AI = \frac{\sum n_i X_i}{N} \quad (1)$$

$$AI = \frac{1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5}{X_1 + X_2 + X_3 + X_4 + X_5} \quad (2)$$

where;

X₁ = No of respondents for “Not Relevant (NR)”

X₂ = No of respondents for “Slightly Relevant (SR)”

X₃ = No of respondents for “Moderately Relevant (MR)”

X₄ = No of respondents for “Strongly Relevant (VR)”

X₅ = No of respondents for “Extremely Relevant (ER)”

Relevancy level of the factors was evaluated based on the ranges adapted by (Memon *et. al.* 2011) as follows:

1.00 < AI < 1.50 Not Relevant

1.50 < AI < 2.50 Slightly Relevant

2.50 < AI < 3.50 Moderately Relevant

3.50 < AI < 4.50 Very Relevant

4.50 < AI < 5.00 Extremely Relevant

RESULTS AND DISCUSSION

Experienced professional involved in execution process of construction works were invited for participating in data collection for this work. A total of 23 personnel representing client, consultant and contractors were interviewed and fill the structured form of questionnaire. The responses of the participants were analyzed statistically for drive the results. Demography of the respondents is presented in table 1.

Table 1: Characteristics of the Respondents.

| | Frequency | Percentage | Cumulative percentage |
|---|-----------|------------|-----------------------|
| Respondents organization | | | |
| Client | 6 | 26.09 | 26.09 |
| Consultant | 8 | 34.78 | 60.87 |
| Contractor | 9 | 39.13 | 100.00 |
| Academic Qualification of the respondents | | | |
| B. E | 16 | 69.57 | 69.57 |
| M.E | 7 | 30.43 | 100.00 |
| Respondent’s Experience in Construction Industry | | | |
| 06-10 | 7 | 30.4 | 30.4 |
| 11-15 | 4 | 17.4 | 47.8 |
| 16-20 | 6 | 26.1 | 73.9 |
| 21-25 | 2 | 8.7 | 82.6 |
| More than 25 years | 4 | 17.4 | 100.0 |
| Working Position of The Respondents | | | |
| Engineers | 10 | 43.5 | 43.5 |
| Managers | 8 | 34.8 | 78.3 |
| Director | 3 | 13.0 | 91.3 |
| Planner | 2 | 8.7 | 100.0 |

Table 1 illustrates that the participants are representing all the three major stakeholders of construction sector i.e. client, consultant and contractors. Minimum experience of the respondents has more than five years while majority of the participants have worked for more than 10 years in handling construction projects. All the participants have gained engineering education and 30% of respondents have completed master education also. These personnel are working at different professional level where 43.5% of respondents are at engineering level, 34.8% of respondents are working at managerial level i.e. project manager and construction manager. Based on demographic information, the respondents are considered valid for the collection of data. The results obtained for the collected data from analysis are ranked and presented in tabular form as in table 2.

Above table shows that 12 factors are reported as very relevant and remaining all 62 factors are moderately relevant with AI value in between 2.5 and 3.5. Among the factors lack of communication between parties is placed at 1st rank by the participants as communication is very important criteria for success of any work. Delay in obtaining permits from governmental agencies is reported as 2nd major factors related to time and cost performance of the projects. Shortage of technical personnel is also 2nd ranked factor in Pakistan. This has direct relation with the number of projects going on in the country. When development works are increased, shortage of the labour is experienced.

Table 2: Ranking of the Factors Relevant to Time and Cost Performance.

| S. No | Factors | NR | SR | MR | VR | ER | N | AI | Rank |
|-------|---|----|----|----|----|----|----|------|------|
| 1 | Lack of communication between parties | 1 | 3 | 3 | 8 | 8 | 23 | 3.83 | 1 |
| 2 | Delay in obtaining permits from governmental agencies | 1 | 1 | 7 | 9 | 5 | 23 | 3.70 | 2 |
| 3 | Shortage of technical personnel (skilled labour) | 2 | 1 | 5 | 9 | 6 | 23 | 3.70 | 2 |
| 4 | Poor site management | 2 | 2 | 6 | 5 | 8 | 23 | 3.65 | 3 |
| 5 | Lack of coordination between parties | 2 | 3 | 4 | 6 | 8 | 23 | 3.65 | 3 |
| 6 | Poor financial control on site | 1 | 1 | 9 | 6 | 6 | 23 | 3.65 | 3 |
| 7 | Fluctuation of prices of materials on site | 2 | 2 | 3 | 11 | 5 | 23 | 3.65 | 3 |
| 8 | Delay in progress payment by owner | 2 | 3 | 4 | 8 | 6 | 23 | 3.57 | 4 |
| 09 | Slow decision-making by owners | 1 | 6 | 3 | 5 | 8 | 23 | 3.57 | 4 |
| 10 | Late delivery of materials on site | 0 | 2 | 8 | 12 | 1 | 23 | 3.52 | 5 |
| 11 | Slow information flow between parties | 0 | 4 | 9 | 4 | 6 | 23 | 3.52 | 5 |
| 12 | Financial difficulties of owner | 4 | 1 | 4 | 8 | 6 | 23 | 3.48 | 6 |
| 13 | Inadequate monitoring and control | 1 | 3 | 7 | 8 | 4 | 23 | 3.48 | 6 |
| 14 | Bureaucracy in tendering method | 2 | 3 | 7 | 5 | 6 | 23 | 3.43 | 7 |
| 15 | Shortages of materials | 1 | 2 | 9 | 8 | 3 | 23 | 3.43 | 7 |
| 16 | Lack of modern Equipment | 1 | 1 | 10 | 10 | 1 | 23 | 3.39 | 8 |
| 17 | Mistakes during execution of works | 0 | 6 | 6 | 7 | 4 | 23 | 3.39 | 8 |
| 18 | Delay payment to supplier /subcontractor | 1 | 3 | 8 | 8 | 3 | 23 | 3.39 | 8 |
| 19 | Inadequate planning and scheduling | 2 | 3 | 8 | 4 | 6 | 23 | 3.39 | 8 |
| 20 | Economic instability | 1 | 1 | 12 | 6 | 3 | 23 | 3.39 | 8 |
| 21 | Lack of experience of contractor | 1 | 6 | 5 | 6 | 5 | 23 | 3.35 | 9 |
| 22 | Shortage of labor on site | 0 | 4 | 10 | 7 | 2 | 23 | 3.30 | 10 |
| 23 | Poor Supervision on site | 1 | 6 | 7 | 3 | 6 | 23 | 3.30 | 10 |
| 24 | Poor project management on site | 2 | 5 | 5 | 6 | 5 | 23 | 3.30 | 10 |
| 25 | Frequent changes in design | 2 | 5 | 4 | 8 | 4 | 23 | 3.30 | 10 |
| 26 | Financial difficulties faced by contractors | 2 | 4 | 6 | 7 | 4 | 23 | 3.30 | 10 |
| 27 | Poor Contract management | 0 | 4 | 11 | 6 | 2 | 23 | 3.26 | 11 |
| 28 | lack of constructability | 0 | 4 | 11 | 6 | 2 | 23 | 3.26 | 11 |
| 29 | Delay in Material procurement | 3 | 2 | 6 | 11 | 1 | 23 | 3.22 | 12 |
| 30 | Inaccurate Site investigation | 3 | 2 | 8 | 7 | 3 | 23 | 3.22 | 12 |
| 31 | Schedule Delay | 0 | 4 | 12 | 5 | 2 | 23 | 3.22 | 12 |
| 32 | Change in the scope of the project | 2 | 4 | 7 | 7 | 3 | 23 | 3.22 | 12 |
| 33 | Relationship between management and labor | 2 | 2 | 10 | 8 | 1 | 23 | 3.17 | 13 |
| 34 | Mode of financing, bonds and payments | 1 | 6 | 5 | 10 | 1 | 23 | 3.17 | 13 |
| 35 | Mistakes and Errors in design | 0 | 7 | 7 | 7 | 2 | 23 | 3.17 | 13 |
| 36 | Inappropriate overall organizational structure | 1 | 7 | 6 | 6 | 3 | 23 | 3.13 | 14 |
| 37 | Low productivity of labor | 1 | 4 | 11 | 5 | 2 | 23 | 3.13 | 14 |
| 38 | High cost of machinery and its maintenance | 1 | 6 | 8 | 5 | 3 | 23 | 3.13 | 14 |
| 39 | Fraudulent practices and kickbacks | 0 | 7 | 7 | 8 | 1 | 23 | 3.13 | 14 |
| 40 | Problem with neighbors | 1 | 6 | 8 | 6 | 2 | 23 | 3.09 | 15 |
| 41 | Delay in inspection and approval of completed works by consultant | 0 | 7 | 10 | 3 | 3 | 23 | 3.09 | 15 |
| 42 | Complicated design | 1 | 6 | 9 | 4 | 3 | 23 | 3.09 | 15 |
| 43 | Delay in Design | 2 | 5 | 9 | 3 | 4 | 23 | 3.09 | 15 |
| 44 | Unrealistic contract duration imposed | 3 | 4 | 7 | 6 | 3 | 23 | 3.09 | 15 |
| 45 | Unsuitable construction methods | 2 | 6 | 6 | 6 | 3 | 23 | 3.09 | 15 |
| 46 | Mistakes and discrepancies in contract document | 0 | 6 | 10 | 6 | 1 | 23 | 3.09 | 15 |
| 47 | Policy of lowest cost bidding policy | 2 | 4 | 9 | 6 | 2 | 23 | 3.09 | 15 |
| 48 | Incompetency of subcontractors | 2 | 2 | 14 | 3 | 2 | 23 | 3.04 | 16 |
| 49 | Waste on site | 1 | 6 | 8 | 7 | 1 | 23 | 3.04 | 16 |
| 50 | Number of projects going on at same time | 2 | 5 | 7 | 8 | 1 | 23 | 3.04 | 16 |
| 51 | Unnecessary interface by owner | 2 | 3 | 12 | 5 | 1 | 23 | 3.00 | 17 |
| 52 | Poor Quality of materials | 3 | 5 | 6 | 7 | 2 | 23 | 3.00 | 17 |

| | | | | | | | | | |
|----|---|---|----|----|---|---|----|------|----|
| 53 | Unforeseen ground condition | 0 | 7 | 11 | 3 | 2 | 23 | 3.00 | 17 |
| 54 | Contractual claims, such as, extension of time with cost claims | 3 | 5 | 6 | 7 | 2 | 23 | 3.00 | 17 |
| 55 | Inaccuracy in cost estimation | 2 | 3 | 11 | 7 | 0 | 23 | 3.00 | 17 |
| 56 | High interest rates charged by banks on loans received by contractors | 2 | 3 | 13 | 4 | 1 | 23 | 2.96 | 18 |
| 57 | Incomplete design at the time of tender | 5 | 4 | 4 | 7 | 3 | 23 | 2.96 | 18 |
| 58 | Accidents on site | 0 | 12 | 4 | 3 | 4 | 23 | 2.96 | 18 |
| 59 | Inaccurate quantity take-off | 1 | 8 | 7 | 5 | 2 | 23 | 2.96 | 18 |
| 60 | Frequent equipment failure | 3 | 6 | 6 | 6 | 2 | 23 | 2.91 | 19 |
| 61 | Insufficient Numbers of equipment | 2 | 6 | 8 | 6 | 1 | 23 | 2.91 | 19 |
| 62 | Frequent change of subcontractors during the construction stage | 2 | 8 | 5 | 6 | 2 | 23 | 2.91 | 19 |
| 63 | Delay in land acquisition | 4 | 5 | 6 | 5 | 3 | 23 | 2.91 | 19 |
| 64 | Labour Absenteeism | 1 | 8 | 9 | 3 | 2 | 23 | 2.87 | 20 |
| 65 | Insurance cost | 2 | 7 | 8 | 4 | 2 | 23 | 2.87 | 20 |
| 66 | Social and cultural impacts | 2 | 8 | 7 | 3 | 3 | 23 | 2.87 | 20 |
| 67 | Rework | 1 | 6 | 11 | 5 | 0 | 23 | 2.87 | 20 |
| 68 | Changes in Material Specification and type | 0 | 9 | 9 | 5 | 0 | 23 | 2.83 | 21 |
| 69 | Labour Disputes on site | 7 | 2 | 7 | 4 | 3 | 23 | 2.74 | 22 |
| 71 | Natural Disasters | 3 | 8 | 7 | 2 | 3 | 23 | 2.74 | 22 |
| 71 | Laws and Regulatory Framework | 1 | 9 | 9 | 3 | 1 | 23 | 2.74 | 23 |
| 72 | Effect of weather | 2 | 12 | 3 | 3 | 3 | 23 | 2.70 | 24 |
| 73 | High wages of labour | 1 | 10 | 7 | 5 | 0 | 23 | 2.70 | 24 |
| 74 | Unsuitable type of contract | 3 | 5 | 12 | 2 | 1 | 23 | 2.70 | 24 |

Conclusion: This paper addressed the issue of time and cost performance. Study involved survey and interview amongst the experience personnel from client, consultant and contractor firms involved in handling construction projects in Pakistan. A survey form was prepared based on 74 common factors of time and cost performance identified from wide-ranging literature review to assess relevancy of each factor from perspective of construction sector of Pakistan. Statistical analysis of data gathered from 23 respondents revealed that all the identified factors have relevancy with construction sector of Pakistan where 12 factors are very much relevant and other 62 factors are reported as moderately relevant to Pakistan construction industry. These findings suggest that the significance level of the factors be assessed as proper controlling system should be devised to improve project time and cost performance.

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