INTERNATIONAL JOURNAL OF SUSTAINABLE CONSTRUCTION ENGINEERING AND TECHNOLOGY
Vol. 11 No. 3 (2020) 84-92

IJSCET

http://penerbit.uthm.edu.my/ojs/index.php/ijscet
ISSN : 2180-3242 e-ISSN : 2600-7959

International Journal of Sustainable Construction Engineering and Technology

Contractor's Perception on Factors Causing Cost Overrun in Construction Works of Pakistan

Abdul Qadir Memon[1], Aftab Hameed Memon[1*], Mohsin Ali Soomro[1]

[1]Department of Civil Engineering,
Quaid-e-Awam University of Engineering, Science and Technology, Nawabshah, PAKISTAN

*Corresponding Author

DOI: https://doi.org/10.30880/ijscet.2020.11.03.009
Received 30 January 2020; Accepted 29 June 2020; Available online 30 June 2020

Abstract: This paper assessed the occurrence and severity level of various factors causing time and cost overrun in construction projects of Pakistan. Investigation was carried out through questionnaire form prepared based on 55 common factors identified from literature. Survey was done amongst the representatives of the contractors involved in handling construction activities in Pakistan. A total of 46 responses gathered against 100 distributed forms were analysed statistically. The results obtained from the analyses based on Average Index values revealed that delay in obtaining permits from the governmental agencies, financial difficulties are common issue faced in construction works of Pakistan. The study also revealed that high cost of machinery & its maintenance, inadequate planning & scheduling and slow information flow between parties have significant effect on time overrun cost while critical factors affecting cost overrun are high cost of machinery & its maintenance, unsuitable construction methods and lack of experience of contractors in affecting project cost. The findings of this study will be helpful for the practitioner in planning for achieving timely completion of the projects and also within the estimated cost.

Keywords: Time and cost overrun, construction industry, causative factors, Pakistan

1. Introduction

Poor performance of time and cost in construction industry is prominent issue since long time. This is global phenomenon. Morris (1990) studying 290 medium & large on-going construction projects in the Public Sector with a cost of Rs. 20 crores or more reported that 186 had cost overruns with percentage cost overrun as much as 50%. 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). Flyvbjerg et al. (2003) highlighted that performance of the construction projects has not improved over the time and its magnitude has not changed for the past 70 years. This problem of cost overrun is results of several factors and it is important to identify factors that contribute to cost overruns to avoid and minimize problems (Azhar et. al. 2008). Hence, it is very essential to study cost overrun problem in depth to avoid overrun and achieve successful projects. To avoid construction cost overrun, very first and most important step is to identify and understand the causative factors responsible for cost overrun (Memon et. al. 2011). Thus, this study has focused on identifying the factors of time and cost overrun. Focus of this paper is limited to construction works of Pakistan.

*Corresponding author: aftabm78@hotmail.com

2. Literature Review

Problem of time and cost overrun is emerging issue since long time. Over run of time and cost occurs due to several attributes which have been highlighted by several researchers from various parts of the world for long time. In order to study these problems, Baldwin and Manthei (1971) carried out a survey among the contractors, architects and engineers of United States to indicate the reasons of delays in construction projects. This survey helped in determining seventeen factors of delay among which design changes, subcontractors, sample approvals, jurisdictional disputes, financial matters were reported as top ranked factors. Later on studying Turkish construction industry, Arditi et. al. (1985) reported 23 attributes of delays where shortage of materials, delay of payment, contractor's difficulty to get credit purchase and organizational characteristics were found vital factors. A study of UK construction works carried out by Sullivan and Harris (1986) revealed that delay in information sharing and variability are key issues faced in construction works. Through administrating a survey among construction practitioners of Nigeria, Okpala and Aniekwu (1988) reported that shortage of materials, delay in payment and poor contractor management hinder the cost and time performance of construction works.

Later on, Mansifield et. al. (1994) talking about delay and cost overrun highlighted that mode of financing and payment of completed work as well as contract management are common reasons observed in construction works which affect the performance of the work. Frimpong (2003) through research of in construction works of Ghana confirmed that payment difficulties and poor contract management cause time and cost overrun. Lo et. al. (2006) emphasized that ground conditions and communication gaps among the stakeholders are serious issues which need to be improved to avoid project delays. Memon et. al. (2011) listed out 78 factors of cost overrun through reviewing the research works published the researchers throughout the world. Later on interviewing the experienced practitioners of working in public project of Malaysia, the authors pointed out that the project's cost performance is highly affected due to design related issues, contractor's experience and unrealistic time duration and requirements imposed by client. . .

Mahamid (2011) pointed out that construction projects often fail due to poor communication between the stakeholders involved in construction projects. The poor performance of public works resulting in cost increases and delivery times is frequently faced issue in developing countries. Alzara et. al. (2016) studied the performance of construction works of a university and spotlighted on the delay reasons. The authors mentioned that most critical issue which cause delay is the bidding system. Since, it is common practice that the lowest bid is selected for award and hence many low standard contractors reduce their rate to compete and win the project but later on this criterion becomes headache. These low bidding contractors do not have enough experience as well as resource availability which cause delay in completion of the works. In Afghanistan, corruption and payment issues are reported as major problems which affect the overall project cost (Niazi and Painting 2017) while in Zimbabwe progress payment and change orders are regarded as common causes of delay (Nyoni and Bonga 2017).

Maqsoom et al. (2018) highlighting the issues regarding time overrun in construction works of Pakistan mentioned that design and drawing related factors are major reason of failing the project completion on time. Besides that, performance of subcontractors and lack of availability of technical staff are also important causes which need serious attentions. Memon et. al. (2019) studied cost performance in construction works of Pakistan through questionnaire survey and found that all the stakeholders i.e. client, consultant and contractors agreed that common factors of cost overrun in construction works are lack of communication between parties, delay in obtaining the permits from governmental agencies, shortage of technical personnel (skilled labour), poor site management, lack of coordination between parties and poor financial control on site. Asiedu and Adaku (2019) pointed out that planning and scheduling play very important role in controlling the issue of cost overrun while ANDRIĆ et. al. (2019) argued that timely availability and performance of construction resources are very essential component in improving cost performance. Jadhav et. al. (2020) investigated 29 factors causing Cost Overruns in Satara city and collected 120 questionnaire forms amongst contractors, clients, quantity surveyors, project managers, engineers and architects working on building projects. Survey results showed that contractual claims, inadequate planning, additional work issues, delay in procuring and arrangement of construction equipment's, poor site management, fluctuation in the cost of building materials are the major factors for cost overrun in residential building construction projects.

3. Research Method

Data collection for this study was carried out through surveying the representatives of the contractors working on construction projects in Pakistan. Questionnaire form was prepared based on 55 common factors of time and cost overrun identified from review of published literature globally. Survey was carried out through emails, Google forms and in person visit of the construction sites. Data collection aimed to gather the perception of the practitioners regarding level of occurrence and severity level of the factors in causing time and cost overrun. The perception was recorded based on 5-poin likert scale. Scale adopted for measuring occurrence level was NO (Never Occur), RO (Rarely Occur), SO (Sometimes Occur), MO (Mostly Occur) and AO (Always Occur). The scale used for measuring significant level was NS (Not Significant), SS (Slightly Significant), MS (Moderately Significant), HS (Highly Significant) and ES (Extremely Significant). Gathered completed survey forms were analyzed statistically using MS Excel and SPSS

software package. The factors were ranked based on Average Index (AI) values calculate using the formula adopted from Alhammadi and Memon (2020)

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

Where,
X_1 = No of respondents for Never Occur/Not Significant
X_2 = No of respondents for Rarely Occur/Slightly Significant
X_3 = No of respondents for Sometimes Occur/Moderately Significant
X_4= No of respondents for Mostly Occur/Very Significant
X_5= No of respondents for Always Occur/Extremely Significant

4. Results and Discussions

A total of 46 representatives of the contractors responded in the survey against 100 personnel contacted. These respondents bear sound professional characteristics to provide required

In the process of data collection, a total of 33 respondents participated. These respondents were familiar with engineering knowledge and had sound experience in handling construction projects. Demographic details of the participants in shown in Table 1.

Table 1 - Characteristics of the respondents

Category	Items	Frequency of respondents	Percentage of respondents
Academic qualifications	Bachelor degree	27	58.7%
	Diploma	10	21.7%
	Masters	8	17.4%
	PhD	1	2.2%
Working experience in construction industry	5 to 10 years	25	54.3%
	11 to 15 years	12	26.1%
	More than 15 years	5	10.9%
	Less than 5 years	4	8.7%
Position in the construction company	Engineer	21	45.7%
	Construction manager	15	32.6%
	Quantity Surveyor	4	8.7%
	Resident Engineer	3	6.5%
	Planning Engineer	2	4.3%
	Director	1	2.2%
Type of construction that you currently involved	Infrastructure	21	45.7%
	Buildings	21	45.7%
	Buildings and Infrastructure	3	6.5%
	Social Amenities	1	2.2%

From Table 1, it is indicated that all the major stakeholders involved in construction process were participating in this pilot study process. A significant number of participants with 39.4% represented contractors as contractors are key stakeholder in converting designed project into physical state. This is followed by consultant with 36.4% while there were 24.2% participants representing client organizations. These participants represented both public and private sector where 63.6% of the participants belong to private sector organization and 36.4% of the respondents are working in public/government sector projects. Among the participants 35.7% of the respondents have obtained engineering degree and 21.4% respondents have completed education up to post graduate level and remaining 28.6% of the respondents are diploma holders. These respondents are working in construction industry for several years. Statistical analysis reveals that 32.2% of the respondents have more than 10 years' experience of handling construction activities. A significant number of participants representing 48.5% are working as project engineers while 27.3% respondents are involved in management and 24.2% of the respondents are working as senior managers on project. The respondents have experience of handling infrastructure and building projects representing 90.9% of the participant while 9.1% of the

respondents are engaged in management office in planning section. Perception of the respondents regarding relevancy of the factors with construction industry of UAE was analyzed with AI formula and the results are presented in Table 2.

Table 2 - Relevancy of factors causing cost overrun

S. No	Factors	Level of Occurrence							
		NO	RO	SO	MO	AO	Total	AI	Rank
1	Delay in obtaining permits from governmental agencies	3	5	17	14	7	46	3.37	1
2	Financial difficulties faced by contractors	3	9	12	15	7	46	3.30	2
3	Delay in Material procurement	1	12	12	15	6	46	3.28	3
4	High cost of machinery and its maintenance	6	6	13	11	10	46	3.28	3
5	Inaccuracy in cost estimation	3	11	13	12	7	46	3.20	4
6	Delay in progress payment by owner	3	10	17	9	7	46	3.15	5
7	Inadequate planning and scheduling	6	9	9	16	6	46	3.15	5
8	Economic instability	5	8	15	12	6	46	3.13	6
9	Mode of financing, bonds and payments	4	12	11	13	6	46	3.11	7
10	Incompetency of subcontractors	8	10	5	16	7	46	3.09	8
11	Financial difficulties of owner	9	9	9	8	11	46	3.07	9
12	Bureaucracy in tendering method	3	16	9	12	6	46	3.04	10
13	Slow decision-making by owners	4	9	21	6	6	46	3.02	11
14	Contractual claims, such as, extension of time with cost claims	6	9	16	8	7	46	3.02	11
15	Inaccurate Site investigation	8	5	17	10	6	46	3.02	11
16	Mistakes and discrepancies in contract document	6	10	13	12	5	46	3.00	12
17	Lack of modern Equipment	11	7	7	15	6	46	2.96	13
18	Low productivity of labour	9	7	16	6	8	46	2.93	14
19	Schedule Delay	10	7	12	10	7	46	2.93	14
20	Lack of experience of contractor	8	11	12	7	8	46	2.91	15
21	Lack of constructability	5	17	7	11	6	46	2.91	15
22	Shortage of technical personnel (skilled labour)	9	11	9	10	7	46	2.89	16
23	Relationship between management and labour	3	18	12	7	6	46	2.89	16
24	Delay in inspection and approval of completed works by consultant	6	11	16	8	5	46	2.89	16
25	Poor project management on site	9	6	17	9	5	46	2.89	16
26	Poor financial control on site	5	11	17	10	3	46	2.89	16
27	Inadequate monitoring and control	7	10	17	6	6	46	2.87	17
28	Fraudulent practices and kickbacks	10	8	12	10	6	46	2.87	17
29	Shortage of labour on site	6	15	11	8	6	46	2.85	18
30	Delay payment to supplier /subcontractor	7	12	12	11	4	46	2.85	18
31	Unforeseen ground condition	8	12	14	3	9	46	2.85	18
32	Fluctuation of prices of materials on site	4	18	9	12	3	46	2.83	19
33	Mistakes during execution of works	6	10	19	8	3	46	2.83	19
34	Inappropriate overall organizational structure	6	11	18	7	4	46	2.83	19
35	Poor Supervision on site	8	12	14	5	7	46	2.80	20

36	Lack of communication between parties	5	12	19	7	3	46	2.80	20
37	Late delivery of materials on site	3	11	26	5	1	46	2.78	21
38	Problem with neighbours	9	9	15	10	3	46	2.76	22
39	Poor Quality of materials	8	10	18	6	4	46	2.74	23
40	Mistakes and Errors in design	9	11	12	11	3	46	2.74	23
41	Unsuitable construction methods	14	6	12	6	8	46	2.74	23
42	Poor Contract management	6	14	16	6	4	46	2.74	23
43	Delay in Design	7	14	13	9	3	46	2.72	24
44	Lack of coordination between parties	3	18	17	5	3	46	2.72	24
45	Poor site management	10	9	14	11	2	46	2.70	25
46	Unnecessary interface by owner	12	13	8	5	8	46	2.65	26
47	Slow information flow between parties	7	14	13	12	0	46	2.65	26
48	Waste on site	13	4	19	7	3	46	2.63	27
49	Shortages of materials	9	13	17	4	3	46	2.54	28
50	Complicated design	15	7	14	4	6	46	2.54	28
51	Change in the scope of the project	7	22	7	7	3	46	2.50	29
52	Unrealistic contract duration imposed	12	14	11	5	4	46	2.46	30
53	Frequent changes in design	10	19	7	7	3	46	2.43	31
54	Number of projects going on at same time	15	8	14	6	3	46	2.43	31
55	Policy of lowest cost bidding policy	13	14	14	2	3	46	2.30	32

From table 2, it can be reported that 16 of 55 factors have AI value more than 3 which means these 16 factors can be regarded as Medium Occurring in construction works. Among these factors, delay in occurring permits from governmental agencies is reported as top ranked factor. This factor has major influence in infrastructural work as compared to building works such as in road works, there are many hurdles faced which need permission from governmental agencies. For example if road is crossing through railway track or these are certain utility service in the way of road, then governmental permission are required to cross through railway track or relocate the underground utilities. "Financial difficulties faced by the contractors" is reported as 2nd ranked factors occurring in construction projects. Results indicate that delay in material procurement and high cost of machinery is placed at 3rd rank by the practitioners which occur in construction projects followed by inaccuracy in cost estimation. Some of the practitioners mentioned that in construction mostly incomplete drawings are provided for tendering process and estimation is also prepared based on those drawings while after completion of bidding process, the contractors are issued working drawing which are slightly different that tender drawings. This affects the estimate of the project and cause cost overrun. This study also assessed effect of these factors on time and cost based on average index value calculated for each factors as presented in table 3.

Table 3 - Effect of the Factors on Time and Cost Overrun

S. No	Factors	Effect on Time Overrun		Effect on Cost Overrun	
		AI	Rank	AI	Rank
1	High cost of machinery and its maintenance	3.59	1	3.37	1
2	Inadequate planning and scheduling	3.43	2	3.20	3
3	Slow information flow between parties	3.39	3	2.89	9
4	Delay in progress payment by owner	3.33	4	3.11	5
5	Incompetency of subcontractors	3.28	5	2.72	13
6	Inaccuracy in cost estimation	3.26	6	3.26	2
7	Schedule Delay	3.24	6	3.00	7
8	Delay in obtaining permits from governmental agencies	3.22	7	2.70	13

9	Delay in Material procurement	3.22	7	3.17	4
10	Fraudulent practices and kickbacks	3.22	7	2.72	13
11	Poor site management	3.22	7	3.02	7
12	Poor project management on site	3.20	7	2.78	11
13	Mistakes during execution of works	3.17	8	2.98	7
14	Contractual claims, such as, extension of time with cost claims	3.11	9	2.87	10
15	Inaccurate Site investigation	3.11	9	3.02	7
16	Relationship between management and labour	3.11	9	2.93	8
17	Delay in inspection and approval of completed works by consultant	3.11	9	2.91	9
18	Delay payment to supplier /subcontractor	3.11	9	2.91	9
19	Financial difficulties of owner	3.09	9	3.00	7
20	Mistakes and discrepancies in contract document	3.09	9	2.98	7
21	Unforeseen ground condition	3.09	9	2.96	8
22	Shortage of labour on site	3.07	10	2.96	8
23	Financial difficulties faced by contractors	3.04	10	3.00	7
24	Inadequate monitoring and control	3.04	10	3.09	5
25	Delay in Design	3.04	10	2.89	9
26	Economic instability	3.02	11	3.33	1
27	Slow decision-making by owners	3.02	11	2.85	10
28	Lack of constructability	3.02	11	2.91	9
29	Mistakes and Errors in design	3.02	11	2.93	8
30	Poor Supervision on site	3.00	11	3.00	7
31	Lack of coordination between parties	3.00	11	2.85	10
32	Low productivity of labour	2.98	11	2.83	10
33	Waste on site	2.96	12	2.98	7
34	Shortage of technical personnel (skilled labour)	2.93	12	2.85	10
35	Poor financial control on site	2.93	12	3.02	7
36	Mode of financing, bonds and payments	2.91	13	3.20	3
37	Bureaucracy in tendering method	2.89	13	2.83	10
38	Lack of modern Equipment	2.89	13	2.89	9
39	Lack of experience of contractor	2.89	13	3.20	3
40	Frequent changes in design	2.89	13	3.22	3
41	Late delivery of materials on site	2.87	14	3.07	6
42	Poor Contract management	2.87	14	2.80	11
43	Problem with neighbours	2.85	14	2.76	12
44	Complicated design	2.85	14	2.83	10
45	Policy of lowest cost bidding policy	2.85	14	2.63	14
46	Inappropriate overall organizational structure	2.83	14	3.15	4
47	Unsuitable construction methods	2.83	14	3.24	2
48	Lack of communication between parties	2.80	15	2.96	8

49	Shortages of materials	2.80	15	2.70	13
50	Fluctuation of prices of materials on site	2.78	15	3.13	4
51	Change in the scope of the project	2.78	15	2.87	10
52	Unrealistic contract duration imposed	2.78	15	3.02	7
53	Poor Quality of materials	2.72	16	2.85	10
54	Number of projects going on at same time	2.72	16	2.72	13
55	Unnecessary interface by owner	2.67	17	2.96	8

Ranking of the factors presented in table 3 indicate that high cost of machinery and its maintenance is reported as the most significant factors in causing time and cost overrun in construction projects of Pakistan. Inadequate planning and scheduling is reported as 2nd ranked significant factors in causing time overrun while it is ranked at 3rd place in causing cost overrun. Respondents highlighted that in causing cost overrun run, second ranked significant factors is adoption of unsuitable construction method. Slow information flow between parties is reported as 3rd ranked factor in causing time overrun while it has slightly lower effect in causing cost overrun and the respondents placed this factors at rank 9. In causing cost overrun, 3rd ranked factors as perceived from the respondents is mode of financing, bonds and payments. The practitioners mentioned that delay in progress payment by owner is 4th significant factor in causing time overrun while the respondents placed this factor at 5th place in causing cost overrun. On the contrary, fluctuation of prices of materials on site is reported as 4th significant factor in causing cost overrun. This is very serious factor and the fluctuation in material prices has become headache for the owners and sponsoring agencies. Incompetency of subcontractors is the 5th significant factors causing time overrun however this is 13th ranked factor in causing cost overrun.

5. Conclusion

This paper studied the factors responsible for time and cost overrun in construction projects of Pakistan. Review of similar studies carried out in past globally resulted in listing out 55 common factors which were investigated through questionnaire survey. Gathered data was analysed with average index method to rank the factors. From analysis, it was found that delay in obtaining permits from governmental agencies, financial difficulties faced by contractors, delay in material procurement, high cost of machinery & its maintenance and inaccuracy in cost estimation are the five most commonly faced factors. Study also addressed the assessment of significance level of the factors in causing time and cost overrun. It was found that high cost of machinery and its maintenance; inadequate planning and scheduling, slow information flow between parties, delay in progress payment by owner and incompetency of subcontractors are the top five factors which cause time overrun while high cost of machinery & its maintenance; unsuitable construction methods, lack of experience of contractor, fluctuation of prices of material on site and inadequate monitoring & control are top five factors which cause cost overrun in construction projects of Pakistan. These finding will be helpful for the practitioners in planning properly to control the problem of time and cost overrun.

Acknowledgement

The authors would like to thank Quaid-e-Awam University of Engineering, Sciences and Technology, Nawabshah, Sindh, Pakistan for supporting this study. Also we are thankful to construction practitioners for providing comprehensive and important information and a lot of cooperation which made data collection easier.

References

Alhammadi, A. S. A. M., and Memon, A. H. (2020), "Ranking of the Factors Causing Cost Overrun in Infrastructural Projects of UAE", International Journal of Sustainable Construction Engineering and Technology, Vol. 11, No. 2, pp. 204-211

Al-Khalil, M. I., & Al-Ghafly, M. A. (1999), "Important causes of delay in public utility projects in Saudi Arabia", Construction Management & Economics, Vol. 17, No. 5, pp. 647-655

Alzara, M., Kashiwagi, J., Kashiwagi, D. and Al-Tassan, A. (2016), "Important Causes of Delayed Projects in Saudi Arabia vs. PIPS: A University Campus Case Study," CIBW117.com/journal © PBSR

Andrić, J. M., Mahamadu, A. M, Wang, J., Zou, P. X. W and Zhong, R (2019), "The cost performance and causes of overruns in infrastructure development projects in Asia", Journal of Civil Engineering and Management, Vol. 25, No. 3, pp. 203–214 https://doi.org/10.3846/jcem.2019.8646

Arditi, D., Akan, G.T. and Gurdamar, S. (1985), "Reasons for delays in public projects in Turkey", Construction Management and Economics, Vol. 3, pp. 171-181

Asiedu, R. O and Adaku, E (2019), "Cost overruns of public sector construction projects: A developing country perspective", International Journal of Managing Projects in Business

Azhar, N., Farooqui, R. U., and Ahmed, S. M. (2008). Cost Overrun Factors In Construction Industry of Pakistan. Paper presented at the First International Conference on Construction in Developing Countries (ICCIDC–I), held in 2008 at NED University Karachi, Pakistan

Baldwin, J. R., Manthei, J. M., Rothbart, H., and Harris, R. B. (1971), "Causes of delay in the construction industry", Journal of the Construction Division, Vol. 97, No. 2, pp. 177-187

Emam, H., Farrell, P., and Abdelaal, M. (2015, September). Causes of delay on infrastructure projects in Qatar. In Proceedings of the 31st Annual ARCOM Conference, Lincoln, UK, Association of Researchers in Construction Management, Nottingham, UK (pp. 773-782)

Flyvbjerg, B., Holm, M. K. S and Buhl, S. L (2003), "How common and how large are cost overruns in transport infrastructure projects?", Transport Reviews, Vol. 23, No. 1, 71-88

França, A., and Haddad, A. N. (2018), "Causes of Construction Projects Cost Overrun in Brazil", International Journal of Sustainable Construction Engineering and Technology, Vol. 9, No. 1, pp. 69-83

Frimpong, Y., Oluwoye, J., & Crawford, L. (2003), "Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study", International Journal of Project Management, Vol. 21, pp. 321–326

Jadhav, D., Konnur, B. A. and Patil, S. (2020), "Analysis of factors causing cost overruns in residential building construction projects", International Journal of research in engineering, science and management, Vol. 3, No.7

Lo, T. Y., Fung, I. W., & Tung, K. C. (2006), "Construction delays in Hong Kong civil engineering projects", Journal of construction engineering and management, Vol. 132, No. 6, pp. 636-649

Mahamid, I. (2011), "Risk matrix for factors affecting time delay in construction projects; owner's perspective", Engineering, Construction and Architectural Management, Vol. 18 No. 6, pp. 609-617

Mansfield N. R, Ugwu O. O and Doran T. (1994), "Causes of delay and cost overruns in Nigerian construction projects", Vol. 12, No. 4, pp. 254-260

Maqsoom, A., Khan, M. U., Khan, M. T., Khan, S, Ullah, N. and Ullah, F. (2018), "Factors Influencing the Construction Time and Cost Overrun in Projects: Empirical Evidence from Pakistani ConstructionIndustry", Proceedings of the 21st International Symposium on Advancement of Construction Management and Real Estate

Memon, A. H., Rehman, I. A. and Azis, A. A. A. (2011), "Preliminary Study on Causative Factors Leading to Construction Cost Overrun", International Journal of Sustainable Construction Engineering & Technology, Vol 2, No. 1

Memon, A. Q., Memon, A. H, Soomro, M. A. and Rahman, I. A. (2019), "Common Factors Affecting Time and Cost Performance of Construction Projects in Pakistan", In Pakistan Journal of Science, Special Issue, September 2019

Morris (1990) Cost and Time Overruns in Public Sector Projects, in Economic and Political Weekly, Nov.24, 1990, Vol. XXV, No.47, pp.M-154 to M-168

Niazi, G. A and Painting, N (2017), "Significant factors causing cost overruns in the construction industry in Afghanistan", Procedia Engineering, Vol. 182, pp. 510-517

Nyoni, T., Bonga, W. G. (2017), "Towards Factors Affecting Delays in Construction Projects: A Case of Zimbabwe", Dynamic Research Journalof Economics and Finance (DRJ-JEF), Vol. 35, No. 1, pp. 12-28

Okpala, D. C., and Aniekwu, A. N. (1988), "Causes of high costs of construction in Nigeria", Journal of Construction Engineering and Management Accounting Research, Vol. 114, No. 2, 233-244

Sullivan, A., and Harris, F. C. (1986), "Delays on large construction projects. International", Journal of operations & production management