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Analysis of Critical Causes of Transaction Cost Escalation in Public Sector Construction Projects

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Abstract

Although transaction costs (TCs) that affect the total project costs are a common phenomenon in the Pakistani construction industry, the causes that escalate the TCs are ambiguous, and public sector organizations are unable to manage these causes efficiently. To investigate the causes of escalation of TCs in public sector construction projects, a total of 30 causes were first identified through a review of the literature and factor analysis was employed for further analysis. The semi-structured interviews were conducted with 8 professionals from the construction industry in Pakistan. The primary data used to prioritize the causes of escalation of TCs were collected from survey questionnaires in which causes such as inadequate investigation, an unclear work scope, project complexity and incomplete design and specification ranked the highest. Finally, factor analysis was used and identified 5 major underlying dimensions of the causes, namely, the procurement and contracting management, the contractor relationship management, the project external environment, managing project finance and the project transaction environment**.** The contribution of this research lies in the identification and examination of the underlying causes of TC escalation, as discerned by the industry professionals. All factors are important, but in the local context, soft aspects (contract relationship) and hard aspects (financial management) are additional factors perceived by the experienced professional in overcoming TC escalation issues. This could be a point of reference in the public sector construction industries of developing countries, which are characterized by their unique economic and social systems.

Keywords: construction projects, project complexity, transaction environment, transaction cost, project procurement, Pakistan.

1. Introduction

Construction professionals spend most of their time determining the cost of projects and then assessing the price decision on which the contract is awarded to a contractor (Guo et al. 2016). The traditional management approach has focused on the production cost; in contrast, the strategic management approach adds transaction costs (TCs) (Ho et al. 2015). The primary assertion is that in construction projects, there are TCs over and above the production cost (Winch 1989). The production cost is different from TCs because the production cost is a predefined cost used to transfer input to output, but TCs are hidden costs that occur due to economic exchange (Coase 1937). TCs are incurred when goods or services are transferred to a technologically different interface (Williamson 1985). TCs in construction projects occur when an organization contract out a project to a private contractor. In this exchange relationship, the contract price becomes a cost for the owner (Hillebrandt and Hughes 2000). The owner always focuses on minimizing both production and TCs (Walker and Wing 1999).

To this end, the Transaction cost economic (TCE) theory better describes the way various task are organized and carried out in relationship between two contracting parities. Hence, TCE theory provide economic ways to adopt among the contracting parties during contract agreements. In spite of ex-ante competition among the contractors to win a project at a certain price, the cost rise in the ex-post phase of the projects till its completion (Whittington 2012). TCE theory describes that the contract parties are rational but cannot make accurate prediction of everything. In this relationship one could be opportunistic and confronted with disruption due to omission and errors in contract (Williamson 2002). In these circumstances, self-serving strategic behavior of each contracting partner is seen in the form of haggle or bargain over the claims. Moreover, contracts are unavoidably incomplete due to which critical dimension of transactions in the contract cause to escalate the TC (Whittington 2012). The TC is a part of total project cost that is above the production cost which difficult to quantify (Whittington and Dowall 2006). Although research discussed the TC escalation in variety of perspective. However, this research account for the causes, which increase the TC in the construction projects.

In the literature, project contracting in the construction industry has gained importance (Brockmann 2001; Turner and Simister 2001). Researchers have studied the application of TCs in construction projects (Haaskjold et al., 2020; Li et al., 2013; Soliño and Santos 2008). The TCs, whether higher in the ex-ante or the ex-post phase remain unknown (Hughes et al., 2006; Lingard et al., 1998; Turner and Simister 2001). In either or both cases, the TC is considerably high (Li et al., 2013). In the extant literature, several causes of TCs escalation can be found. For instance, Guo et al., (2016) studied TCs influencing factors under uncertainty in USA. Likewise, in a study conducted in USA, Li et al. (2013) reported the factors that cause to enhance the TCs and highlighted the role of transaction environment of projects more influential to influence the TCs. Similarly, Blanc-Brude et al. (2006) investigated the European construction projects and compared the traditional public procurement and public-private partnership in which significant finding was

procurement management that influence the TCs. Also, Coggan et al. (2013) studied construction projects in Australia and discovered external project environment more critical to escalate the TCs. Likewise, Dudkin and Timo (2005) studied the construction project and found that in road projects, TC was estimated 10% of the project value. It is further ascertained that small project (less than £25 m) suffers the most from the TC than the larger projects. While differentiating between the production and TC, Furubotn and Richter (2005) argued that the production cost is associated with activity of 'production' whereas, TC is the cost of activity of 'transaction'. However, Boardman and Vining (2010) argued that the production cost in projects are routinely included in project's decisions but TC usually neglected.

It is therefore evident from all of the above studies that TC escalation is the general problem in the construction industry of both developed and developing countries. Although, there are few researches conducted in developed countries to identify the most influential causes of TC escalation (Li et al., 2013, 2015), there is limited research available on the TC escalation in developing countries such as Pakistan. Researchers argued that project implementation strategies in developing countries derived from the developed countries and the economic, political and managerial environment between these countries are different (Diallo and Thuillier 2004; Ika et al., 2012). Therefore, there is a need to explore more realistic analytical framework for developing countries that explains the causes of TC escalation in construction projects. Hence, the focus of this research is to determine the critical causes of TC in developing countries.

To investigate the problem identified above, a question is formulated; what are the critical causes of TCs escalation in construction projects in Pakistan? The current study has three objectives. First, this study investigates the critical factors that escalate TCs in Pakistan's construction industry. Second, this study compares and analyzes the results with other countries. Third, this study provides practical implications and recommendations to the practitioners to bring cost efficiency in construction projects. This study will help the practitioners and professionals in the local construction industry to respond appropriately in planning and control the project cost. It also helps realistic cost estimation of project while preparing the feasibility of the construction projects. In addition, China as a part of one road one belt (OROB) initiatives promised to invest US $60 billion mostly in infrastructure projects in Pakistan under the banner of China Pakistan Economic Corridor (CPEC) (Farooqui and Aftab 2018). Therefore, this study will also provide guidelines for international construction companies working for infrastructure development under CPEC projects in Pakistan.

In this paper, we take our initial step towards reviewing the literature, introduction, and background information of the Pakistani construction industry. In the second step, we will elaborate upon research method employed in the study. The third step will focus on reporting the results, its analysis and discussion. In the final step, the report will be concluded with practical implication, recommendations, and future directions.

2. Literature Review

It is imperative to explain the definition of TCs first because the way TCs are defined in the literature has been highly fragmented (Farajian 2010). Li et al. (2014) define TCs as a cost incurred by the principal for drafting, preparing, advertising and negotiating an agreement for contracting, which may vary with the project design and size. Conversely, TCs have been defined as the cost of monitoring and contract enforcement (Williamson 1996). It also includes costs for quality checking, negotiations, scheduled follow-up, dispute settlements, coordination between the principal and agent, distortion, expropriation, and renegotiation, etc. (Ho et al., 2015). According to Furubotn and Richter (2005), TCs may be the result of various activities during project execution, for instance to establish performance measures and its monitoring, enforcing contractual obligations, processing information, enforcing agreed-upon terms and conditions of the contract, and protecting each party's rights. Upon closer examination of the definitions, it is clear that TCs are incurred to the owner in two phases, i.e., before and after the contracting out of a project (Williamson 1985). However, TC is the cost, other than the production cost, which increased the total project cost till the project completion (Coase 1937). TC could be in any form in the construction projects. This could be direct or opportunity cost (Rindfleisch and Heide 1997) and some has used hidden cost (Lu et al., 2015).

However, drawing on TCE theory a variety of scholars, researchers and institutions around the globe investigated various issues in construction management literature. For instance, a study conducted in Tanzania found that TC arises due to the problems in the public institutions, financial constraints, and attitude toward transparency, accountability and efficiency in public work (Rasheli and Rasheli, 2016). However, the risk of contracting services is always very challenging for the contracting parties. For example, a study conducted in UAE proved that when the owner transfers all risk to the contractor, the contractor, after winning the bid, may respond to these risks by increasing their markup, which ultimately increases the contract cost (El-Sayegh, 2008). Another study revealed that TC arises due to the uncertainties associated with the projects. This study suggested that TC can be controlled if the project design is complete, have good relationship of project participants, contractor selection practices and allocation of risk (Guo et al., 2016). In a similar study conducted in Pakistan, Ali et al. (2018) generated a detail list of uncertainty factors that contributed in enhancing TC. The significant uncertainty factors that escalate the TCs are incomplete design and specification, conflict management, competitive tendering, and delay possession of project site. Similarly, another study conducted in Norway regarding collaboration and its TC. This study also found project uncertainty as main cause of TC escalation and identified four other significant factors such as quality of communication, organizational efficiency of owner, frequency of change orders and trust that influence both project TC and collaboration level (Haaskjold et al., 2020). On the other hand, a study conducted in transport infrastructure project of different European Union countries explored that negotiation procedure in the procurement phase are very critical to overcome the TC escalation issues

(Soliño and Santos, 2010). Jergeas and Hartman (1994) in Canada evaluate contractor's construction claims; however, one of the underlying reasons of claims was owner's inadequate investigation and preparation before bidding due to a lack of time that may increase TCs. In contracting relationship due to the asymmetry of information, many owners fail to detect the contractor's characteristics before awarding projects can increase TCs (Rindfleisch and Heide, 1997). In the similar lines, a study in Egyptian construction project assessing the reason for TC escalation is again attributed toward the ex-ante incomplete investigation of the contractor such as financial capacity of a contractor, contractor experience and qualification, contractors and their relationship with the previous clients and contractor's experience in similar type projects (Abdel-Galil et al., 2020).

However, the ex-ante phase of a project is also very critical to escalate the TC. There are various studies identified transaction in ex-post phase of project which directly or indirectly cause to escalate the TC in construction industry. For instance, Li et al. (2015) investigated general determinants of TCs in USA and found that when the project complexity is high, the contract clauses remain ambiguous and difficult to understand. If project uncertainty is high, the initial drawings and specifications at ex-post are likely to change, which can incur TCs. On the other hand, Ozorhon et al. (2010) studied Turkish construction companies and identified an important variable, i.e., timely payment to the contractor that can potentially influence TCs. Owner's late payment to the contractor can develop into a dispute, resulting in claims that are demanded from the project site. On the other hand, a study conducted by Bristow and Vasilopoulos (1995) in Canada identified various causes of the contractors' ex-post claims, including unclear contract documentation, failure of the owner to address the unexpected event, the owner unrealistic expectations and lack of good communication, etc. Similarly, in an investigation on the contractor-subcontractor relationship, Manu et al. (2015) argued that the relationship between them is challenging/problematic and that it may negatively affect general contractor performance; the weaker the relationship of both parties, the more TCs are expected.

The above discussion shows that different researchers repeatedly identified some cause and variables; some had a direct influence, and others had an indirect impact, but all the identified factors had the potential to increase the TCs in construction projects. Table 1 illustrates various causes identified from the literature.

Building on these grounding works, it is concluded that causes of TCs escalation can be distinguished into two distinct phases of project such as ex-ante phase and ex-post stage. The primary contention is that causes in both phases enhance the TCs. Studies unable to establish general critical causes that enhance TC in the construction projects in developing countries. This study particularly focuses on identifying and assessing the critical causes of TCs escalation in Pakistan construction industry which will help the industry practitioners to deal with the TCs escalations issues that consequently influence total project cost. The discussion made above provide us basis to formulate the questions from the 30 cause. This study categorized the 30 key attributes into five broad factors for

the better understanding of the questions and appropriately structuring their responses to address the issue.

Table 1: The Summary of Transaction Cost Causes

S. No	Causes	Description and References
1	Differing Site Conditions	TCs can increase when contractors find a different project site condition not mentioned in the bid package and ask for a rate revision (Diekmann and Nelson, 1985) hence TC increases.
2	Unforeseen Conditions	The unexpected project site is not control of trading partners that effect the compaction, excavation and structure of the project. The contaminated soil conditions are not described in the drawing cause additional cost to the owner (Shane et al., 2009), which increase TC.
3	Local Concerns And Requirements	During project operations the concern of local stakeholders' (community and NGOs) typically include mitigation of the project negative influence on the surrounding community which cause negotiation for scope change that incurs additional cost to the owner (Shane et al., 2009). All mitigation measure increase TC to the owner.
4	Inclement Weather Conditions	The inclement weather conditions may jeopardize the contractor schedule for timely completion, and rate revisions occur (Semple et al., 1994) that potentially increase TCs.
5	Restricted Access	Organizations' delayed possession of the project site (i.e., litigation) restricts the contractor access to the project site, resulting in the contractor forwarding claims (Semple et al., 1994) and hence increasing TCs.
6	Project Uncertainty	If project uncertainty is high, initial information and specifications are likely to change (Li et al., 2015) which can increase the TCs.
7	Political Uncertainty	The political uncertainty in the country increases the cost of doing business because of work stoppage and delays of various expected work revisions (Collier and Gunning, 1999) causing increases in TCs.
8	Project Complexity	The more complex the project environment, the more uncertainty there is in the environment; hence, more resources are needed to renegotiate the large contracts, (Jobin, 2008) resulting in an increase in TCs.

9	Strong Relationship Seldom Achieved	The strong relationship between owner and contractor is hard to achieve and may decrease cooperation and increase disagreements (Bresnen and Marshall, 2000) the destabilized working relations may increase TCs.
10	Owner Neglect Responsibilities	In a contracting relationship, the owner also has some responsibilities. Neglecting these responsibilities may cause the unethical contractor to take undue benefits opportunistically during a transaction (Brown and Potoski, 2005) which can increase TCs.
11	Dispute On Claim Evaluation	The disagreement on claim evaluation of the work on a project site in which owner and contractor have differences and fail to reach agreement (Kumaraswamy and Yogeswaran, 1998), that can increase TCs.
12	Trust Deficit	The lack of trust between the owner and contractor in which the owner uses more monitoring resources on the untrusted contractor (Jobin, 2008), which increases TCs to the owner.
13	Conflict Management	Frequent filed claims by the contractor because of unpleasant potential conflicts between the contracting parties sometimes lead to disputes, resulting in project management inefficiency (Arditi and Pulket, 2010) that generates TCs.
14	Contractor-Subcontractor Relationship	If the contractor's relationship with the sub-contractor is challenging and problematic, it may negatively affect the general contractor performance, weaken the relationship between both parties (Manu et al., 2015) and increase TCs.
15	Bilateral Dependency	The intimate connection (Asset specificity) between owner and contractor increases the coordination cost because of frequent meetings and project site visits (Jobin, 2008) and increases TCs.
16	Unrealistic Project Estimation	The unrealistic tender estimate of a project may change the ex-post project scope, which may increase costs to the organization (Jergeas and Hartman, 1994) including an increase in TCs.
17	Fair Risk Allocation	Fair risk allocation between contracting parties is preferred. Whenever risks (unexpected events and others) are transferred to the contractor, the contractor responds to these risks by increasing their contingency and markups (Cheung and Pang, 2013). This may increase TCs.

18	Unclear Work Scope	When the scope of work in a project is ill-defined, initial drawings and specifications are likely to change in the ex-post phase, prompting many change orders that can make the contractor ask for claims (Semple et al., 1994) and cause an increase in TCs.
19	Failure to Find the Contractor's Attributes	The failure (because of information asymmetry) of an owner to detect the contractor's characteristics before awarding a project (Rindfleisch and Heide, 1997) can increase TCs.
20	Work Acceleration	Due to the delay in the project schedule, an acceleration of work may be demanded by the organization, which causes the contractor to mitigate the concerns by taking overtime, increasing the number of workers and extending the work week; these actions escalate the costs for the owner (Semple et al., 1994) and increase TCs.
21	Bidding Behavior	The manager's failure to investigate the bidding behavior in which a contractor as a part of an ex-ante settlement with other bidders wins the contract at higher rates will likely increase costs to the owner (Chotibhongs and Arditi, 2012), thus increase TCs.
22	Competitive Procurement Process	Project cost escalation also depends upon the competitive procurement process; the higher the competitive procurement process (Farajian, 2010), the higher will be the TCs.
23	Incomplete Design And Specification	The incomplete design (plan and specifications) can increase the ex-post disputes and disagreements between contracting parties (Cheung and Pang, 2013), and this, in turn, increases TCs.
24	Late Issue of Design and Drawings	The late issue of design and drawings resulting in demands for rate revisions and time extensions (Kumarswamy 1997) may increase TCs.
25	Inadequate Investigation	An owner's inadequate investigation and preparation before bidding due to a lack of time may cause various ex-post changes and claims demanded from the contractor (Jergeas and Hartman, 1994) that may increase TCs.
26	Manager's Discretionary Financial Limit	The contractor may exploit the ex-post manager's discretionary powers, claiming additional budget changes on technical grounds and thus causing an increase in TCs (Establish through interviews).

27	Corrupt Practices	A contractor seeking personal gain, concealing relevant information, misreporting and making incidental payments without an objective basis can increase TCs (Establish through interviews).
28	Late Payment	Late payments to the contractor for the work completed can increase the chances of disputes and hence increase the probability of the contractor claiming an additional amount, (Ozorhon et al., 2010) causing an increase in TCs.
29	Rate Escalation Clauses	If a contractor opportunistically claims the cost related to an organization's provision for a rate escalation clause during a natural disaster and severe economic conditions, TCs will increase (Establish through interviews).
30	Additional Incentive Payments	The incentive payment made to motivate the contractor to efficiently manage the project (better, quicker and cheaper) (Bresnen and Marshall, 2000) increases TCs.

3. Research Methodology

The research methodology comprises of three steps. The first step of research was to obtain preliminary causes of the TCs escalation after an extensive review of literature. The second step was qualitative research (semi-structured interview) to improve the variable identified in step one and conducted. Then this study followed a quantitative method for data collection. The questionnaire survey was employed to determine the level of importance of the final causes. The detail description of the interviews and survey questionnaire preparation given the following section.

3.1 Semi-Structured Interview

To collect the construction project data in Pakistan, a detailed literature review was conducted to identify the initial list of variables that escalate TC in construction projects Table 1. This initial literature review provided us with almost 27 items that likely to increase the TCs. The literature is limited to the cause of TC escalation which enable us to conduct semi-structured interviews to ensure that all the stated questions were sufficiently reported, which was applied by many studies (Albuam and Oppenheim, 1993; Ye et al., 2015). The identified variables were presented to 8 key informants, who were either practitioners or academicians engaged in construction-related projects. Semi-structured interviews were conducted with six experienced practitioners (project managers, resident engineers, and associate engineers) and two senior academicians from different public-sector construction-related industries. The identified factors from literature, and semi-structured interview helped to remove confusion and inexplicit wording in questions to make final questionnaires. During interviews, interviewee were provided with the list of items identified from the literature. They were given freedom to modify (add or subtract) or rephrase the questions to make it understandable for the respondents. Before interviews, it was assured that the interviewees' have sufficient

knowledge, experience, and face such problems frequently in their respective area. During interviews, the following addition to the proposed framework were made: 'rate escalation clauses', 'Managers discretionary financial limit' and 'corrupt practices' were considered crucial factors for TCs escalation in the local context. The list of variables from the literature covered by the professionals' interviews helped us to pinpoint the list of real causes. These variables were included in the list to prepare the final questionnaire. The new framework of causes of TC comprises of 30 items are given in Table 1.

3.2 Questionnaire Survey

This study designed a survey questionnaire before conducting a survey. While designing a survey questionnaire, more considerable care was taken using simple language to make it easy to understand (Aibinu and Odeyinka, 2006; Ye et al., 2015). The questionnaire is divided into two sections. The first section was designed to collect demographic information of the respondents. The second part is the main body of the questionnaire comprises a list of the items of TCs. To measure the importance of each item, a five-point Likert scale (1-5) was used in the questionnaire, in which 1 denoted "strongly disagree" and 5 denoted "strongly agree". The respondents had to choose any item on the Likert scale according to their importance. Before properly collecting data for this study, pilot study was conducted from 10 respondents to ensure that all the stated questions conveyed our intended meaning and to avoid misunderstandings. The finalized version of the questionnaire was distributed during April to June 2019 in four provinces (Balochistan, Sindh, Khyber Pakhtunkhwa (KPK) and Punjab) and Gilgit-Baltistan (GB), as shown in Table 2. Table 3 shows the experience and job title of the respondent. The survey questionnaires were distributed among project managers, resident engineers, and associate engineers. Table 4 shows the distribution and collection of the 360 questionnaires by different delivery methods. The questionnaires were delivered by hand (172), by postal carriers (70) and by email (118). The total number of questionnaires returned in three months was 275, representing 160 by hand, 55 by postal carriers and 60 by email; a total of 40 questionnaires were discarded because of incomplete or invalid information and physical loss. A total of 238 out of 360 questionnaires were considered valid, and a 66% response rate is deemed reliable for further analysis (Aibinu and Odeyinka, 2006).

Table 2: Details of Data Collection

Designation	Provinces					Total
	Balochistan	Sindh	KPK	Punjab	GB	
Project Manager	15	20	12	28	8	83
Resident Engineer	21	22	16	36	9	104
Associate Engineer	10	11	11	10	9	51
Total	46	53	39	74	26	238

Table 3: Detail of Respondents' Experience

Designation	Experience (Years)			
	1-10	11-20	21-30	>=31
Project Manager	20	40	20	3
Resident Engineer	24	58	15	7
Associate Engineer	18	20	11	2
Total	62	118	46	12

Table 4: Questionnaire Response Rate

Survey Method	Total Distribution	Total Collection	Valid Questionnaires	Response rate %
By hand	172	160	153	89
Postal	70	55	45	64
E-mail	118	60	40	36
Total	360	275	238	66

Table 4 also summarizes the response rates; the lowest response rate was 36% from e-mail delivery, and the highest response rate was 89% for responses hand delivered at the project site. Email usage in public offices is not very common, but personal visits to the project site for collecting data were helpful to the respondents in providing them with the opportunity to ask questions (if any) and in making it easy for research associates to explain any items that were confusing to the respondents. Personal visits were also helpful in lowering the discard rate and ensuring that questionnaires did not remain unfilled. However, this research was designed to use factor analysis as a primary statistical tool for new factor identification (Field, 2009). Factor analysis is multivariate statistical technique suitable to examine the relationship of the considerable number of variables and decrease them to a manageable level and to interpret them appropriately which was also applied in previous studies (Doloi, 2008; Lu et al., 2015; Ye et al., 2015).

4. Data analysis and Results

4.1 Respondents' General Information

The data collected from 238 respondents were analyzed using a software SPSS 24. Table 2 shows that data was collected from five regions and maximum responses were collected from Punjab because it is the largest province. Table 3 illustrates the experience of project manager, resident engineer and associate engineer from the public sector organization. Among the total responses 34%, 44% and 21% responses were taken from project managers, resident engineers, and associate engineers respectively. Table 4 shows the response rate of the questionnaire distributed through different mode. The self-administered questionnaire was handed over to respondents had the highest response rate of 86%. This study ensures that the collected empirical data provide us valid representation to address the issue in the Pakistani construction industry.

4.1.1 Analysis and Importance of the Ranking of Causes that Escalate Transaction Costs

The first step is to test the reliability of the questionnaire using Cronbach's alpha coefficient (α). It determines the internal consistency and correlation of items mentioned in the survey instrument. The cumulative Cronbach's alpha (α) result (0.955) of five factors suggested that the questionnaire instrument used in the research was acceptable because an alpha value greater than 0.80 is considered appropriate (Field, 2009). Table 2 shows the respondents' profile participated to find the causes. The importance of each cause that escalates TCs is ranked using the mean value (MV) and standard deviation (SD) (Table 5). The decisions to select one item, if two items have same mean value, is based on selecting the cause with the lower SD value (Lu et al., 2015). Most of the causes of TCs have a mean score greater than 3.00, which is considered imperative for rating on the scale. The items on the list with high ratings for increasing TCs include inadequate investigation, unclear work scope, project complexity and incomplete design and specification, which had a mean value ≥ 3.6. This shows that projects are contracting out without the proper project design, adequate preparation of tendering, detail specifications or the latest project procurement methods. In the public construction industry in Pakistan, there has been a limited trend for using project control techniques in construction projects. The computer-based project management practices are only used in the ex-ante phase and are not very common in all regions (Farooqui et al., 2008). The industry still relies on the traditional project management approaches, which are not helpful in controlling the TCs, resulting owner maintains a special provision in their Annual Development Program (ADP) to pay off these costs occasionally.

Table 5: Mean Score and Ranking of Causes of Transaction Cost

Causes	Mean	SD	Ranking
Inadequate investigation	3.794	1.000	1
Unclear work scope	3.765	1.000	2
Project complexity	3.681	1.006	3
Incomplete Design and Specification	3.601	1.062	4
Inclement weather conditions	3.563	0.901	5
Manager's discretionary financial limit	3.500	0.997	6
Late payments	3.466	1.000	7
Rate escalation clauses	3.412	1.035	8
Strong relationship is seldom achieved	3.412	0.984	9
Unforeseen conditions	3.408	1.026	10
Project uncertainty	3.403	1.042	11
Owner neglect responsibilities	3.399	0.996	12
Restricted access	3.391	1.037	13
Differing site conditions	3.391	0.987	14
Conflict Management	3.391	0.987	15
Corrupt practices	3.282	0.998	16
Political uncertainty	3.231	1.028	17
Local concerns and requirements	3.168	1.074	18
Contractor-subcontractor relationship	3.084	1.019	19
Trust deficit	3.071	1.055	20
Failure to find the contractor attributes	3.055	1.114	21
Competitive procurement process	3.013	1.025	22
Bilateral dependency	2.992	1.019	23
Bidding behavior	2.979	1.069	24
Work acceleration	2.920	1.026	25
Fair risk Allocation	2.870	1.089	26
Additional incentive payments	2.840	0.998	27
Late issue of drawings and design	2.832	1.058	28
Unrealistic project estimation	2.798	1.048	29
Dispute on claim evaluation	2.706	0.962	30

4.2 Factor Analysis

Factor analysis was applied in this study to categorize and classify the major causes of TCs escalation. As a first step, we conducted the exploratory factor analysis to develop the classification of the 30 variables. To review the adequacy of the survey data, we have performed the Kaiser Meyer Olkin (KMO) test and Bartlett's Test of Specificity. For an interpretation of the KMO test results, there is a rule of thumb that if the KMO value falls between 0 and 1, then the correlations are relatively compact. The recommended threshold for the satisfactory factor analysis test is that the result should be more than 0.50 (Field, 2009; He, 2007). According to the data results in Table 6, the KMO value is 0.876, which is considered meritorious. The Bartlett's Test of Specificity was 6508.088 at a (0.000) level of significance, which shows that the causes are sufficiently correlated and confirms that the data are suitable for factor analysis. Thus, we chose the commonly used Principle component analysis (PCA) which extract five factors that have eigenvalues greater than 1, which is the standard criterion to determine the number of factors. The factor identification based on Varimax rotation is shown in Table 7. These five factors account for 74.549% of the entire variance. The cut off criterion for the variance described is 60%, which is considered adequate in our case for construct validity (Malhotra, 2008). As shown in Table 7, the factor loadings for each item in each factor category are greater than 0.50 which suggests a very strong loadings of each item in their respective factor. The detailed explanation of each factor required factor rotation (Field, 2009; Norusis, 1992). Table 4-7 indicates the rotated component matrix. This study follows .(Lu et al., 2015) for classification of factors that one-factor loading table for each factor is named by combining the meaning of those variables with the highest cross factor loading in each classification. This classification of the factors is named as follow: Procurement and contract management (Factor 1), Contract relationship Management (Factor 2), Project External Environment (Factor 3), Managing project Finance (Factor 4), Transaction Environment (factor 5).

Table 6: Results of KMO and Bartlett's Test

Parameters		Values
Kaise-Meyer-Oklin Measure of Sampling Adequacy		.876
Bartlett's Test of Sphericity	Approx. Chi-Square	6508.088
	df	435
	Sig.	0.000
Note. Df = Degree of freedom, Sig = probability		

Table 7: Factor Profile

Details of the Factors and causes of Transaction Cost	Factor Loading	Variance Explained %
Factor 1: Procurement and contract management		43.966
Failure to find the contractor's attributes	.933	
Fair risk allocation	.893	
Inadequate Investigation	.870	
Unclear work scope	.866	
Work Acceleration	.797	
Competitive procurement process	.784	
Late issue of Drawing and Design	.761	
Incomplete design and specifications	.753	
Bidding behavior	.701	
Unrealistic project estimation	.642	
Factor 2: Contract relationship Management		11.338
Trust Deficit	.888	
Owner neglect responsibilities	.885	
Dispute on claim evaluation	.879	
Contractor-subcontractor relationship	.878	
Strong relationship seldom achieved	.863	
Conflict Management	.788	
Bilateral dependency	.750	
Factor 3: Project External Environment		7.566
Inclement weather conditions	.877	
Local concerns and requirements	.857	
Differing site conditions	.815	
Unforeseen conditions	.796	
Factor 4: Managing project Finance		6.714
Late payments	.923	
Rate escalation clauses	.857	
Additional incentive payments	.815	
Manager's discretionary financial limit	.780	
Corrupt practices	.755	
Factor 5: Transaction Environment		4.966
Project complexity	.874	
Political uncertainty	.848	
Restricted access	.840	
Project uncertainty	.797	
Accumulative Variance Explained (%)		74.549

5. Discussion

5.1 Factor 1: Procurement and Contract Management

In our study, Factor 1 accounts for 43.96% of the total explained variance. It means those responsible for TCs escalations are related to ex-ante which appears higher importance for TCs. The respondents as shown in Table 3, concern on procurement and contract management especially identification of the appropriate contract for contracting. Because of the inadequate investigation in the ex-ante phase, organizations fail to follow the correct contractor bidding behavior and unable to do the appropriate qualification for bidding in the tendering process; ultimately right contractor is not selected. Studied found that selection of appropriate contractor will not only ensure the project's overall quality but also provide opportunity of cost saving (Yawei et al. 2005). This brings some practical implications since both ex-ante and ex-post of projects are important but mainly more demanded in ex-ante phase. The deficiencies left in ex-ante phase of projects due to improper procurement process are carried forward in shape of various issues in the ex-post phase of the project, this finding is supported by many other studies (Rajeh et al. 2015; Rasheli and Rasheli 2016). This factor carries ten variables, but respondents ranked factors such as failure to find the contractor's attribute, fair risk allocation, inadequate investigation, unclear work scope, work acceleration, competitive procurement process, late issue of drawing and design, incomplete design and specification, bidding behavior and unrealistic project estimation highest. Ofori (2006) argued that it is due to the application of western procurement and administrative methods in developing countries. Noor et al. (2012) suggested to revisit the current procurement practices in Pakistan for better understanding and their implementation in local context. This can be confirmed from other developing countries such as a study conducted by Quartey (1996) in sub-Saharan African counties found that project procurement and implementation methods did not successfully support project operations which causes an increase in the total project cost. Since, contract procurement and management practices need improvements in developed countries that was confirmed from previous studies conducted in the USA and Europe (Blanc-Brude et al., 2006; Soliño and Santos, 2010, 2008), but it is resonated more in developing countries. It is suggested to customize the procurement practices of developed countries in a local situation and allocate considerable time and effort in the procurement phase to overcome ex-post problems.

5.2 Factor 2: Contract-Relationship Management

Factor 2 account for 11.338 % of the total variance explained, as shown in Table 7. The project management literature pointed out various discussions on relational contracting topics but our study in Pakistan context, find ex-post relationship management of trading partners, particular emphasis on trust deficit, owners negligence to undertake responsibilities, dispute on claim evaluation, contractor subcontractor relationship, strong relation seldom achieved, conflict management and bilateral dependency, are the main concerns of the respondents, as shown in Table 3. Studies found that improper trading relationship establishes the TCs in construction projects (Lee et al. 2009). This study

finds that formal contracting shows mistrust and confidence deficit between the contracting parties that enhances ex-post dispute, for instance, the dispute on claim evaluation, frequent file claims and litigations and arbitrations. However, studies showed that collaborative practices in project reduce the TCs and increase efficiency (Miller et al., 1999). The major problem arises in ex-ante phase, where procurement arrangement is improperly made which may cause ex-post differences between the contracting parties. However, Pakistan Engineering Council (PEC) is the construction regulatory body for registering contractors. The registration process is rather unstructured and cursory manner which create effectiveness issue (Nawaz et al., 2005). Since PEC registers the contractors based on the required documents. In this process of registration less efforts are made for physical verification of contractors' capacity to execute the projects. This cause to develop an idiosyncratic relationship between the owner and contractor in ex-post phase of the project. The weaknesses between the contracting parties bring bilateral dependency and they become involved in endless haggling till project completion which cause to increase the ex-post TC. Similarly, Public Procurement Regulatory Authority (PPRA) is a public sector organization which regulates the procedures for public procurement. It ensures the transparency, accountability, and quality of the services. However, North (1990) argued that informal constraints imbedded in society dominates the formal rules. This can be witnessed in the Pakistani context, for instance, in competitive tendering due to project complexities and uncertainties, distinctive relationship develops between the parties in which both parties do not follow the written legal mechanisms but follow mutually acceptable social guidelines (Kumaraswamy et al. 2005). Thus, regulatory body only caters the hard side of the project and soft side of the project is neglected which create integrity issue. To improve the trading relationship, it is suggested to focus on the strict compliance on the rules and regulations.

5.3 Factor 3: Project External Environment

In this study, giving attention to the third factor named project external environment, our findings predict that the project manager and engineers are considering issues related to the project external environment that escalate TCs. This factor is composed of four variables with higher importance such as unforeseen condition, inclement weather condition, local concerns and requirements, and differing site condition. The variables identified from the survey sampled in Pakistan better describe the situation. The project external environment is independent of the ex-ante contract procurement management. However, the external environment can influence the TCs due to metrological climate, geographical settings, political issues and economic factors (Akinsola et al. 1997). Table 3 shows that most of the respondents have experience between the ranges of 11 to 20 years can better describe the situation. Since, political, economic and managerial environment of both developed and developing countries is different (Ika et al., 2012). Pakistan like other developing countries has gone through the critical law and order situation past for a decade. The limited access to the project sites due to security incidents influence the project's progress most, and many projects fail to complete on time. The extended time is compensated allocating extra fund to the project has increased the TC in construction projects. Moreover, despite the sensitivity of the external environmental less

time is allocated for the feasibility study in construction projects which cause ex-post issue to the contractors for the project operations (Saqib et al., 2008). In addition, many project sites due to geographical challenges and severe weather condition are inaccessible that cause project delays. In general, the external environment is not remarkably influential in escalating TCs in developed countries except limited cases (Coggan et al., 2013). On the contrary, developing countries like Pakistan are more sensitive to be influenced from the external environment. The similar findings reported in a study conducted in Palestine, where project time extended due to a security issue (Mahamid, 2011). The adverse effect of the external environment on TCs can still be minimized through suitable measures. For instance, security issues can be addressed through proper security arrangements and working in coordination with law enforcement agencies. The close coordination between the works and Planning and Development (P&D) department for site selection and allocation of land acquisition charges on time may reduce the TC.

5.4 Factor 4: Managing Project Finance

The fourth factor is related to the project finance, which is linked with both ex-ante and ex-post phase of the construction project. In this factor importance of the variable based on importance are late payments, rate escalation clauses, additional incentive payments, manager's discretionary financial limit and corrupt practices. The respondents on this study found that late payment to the contractor causes to demand rate escalation which potentially increase the total project cost which is consistent with the previous findings (Ozorhon et al., 2010). However, the construction project in Pakistan are approved through proper channel, but post budget approvals and timely payments to the projects need coordination between the P&D and works departments. The lack of coordination between these department cause a difference of the prevailing market rates and offer rates reflected in tender document which create problems for contractors to maintain the initial project cost during project operation. Moreover, due to the volatile market situation, contractors avail not only the provision of rate escalation clauses but also claim managers' discretionary financial limit, which requires additional payments; thus TCs escalate. The governance of public institutions in developed countries are comparatively efficient than the developing countries (Kulshreshtha, 2008). However, our respondents from Pakistan construction industry find that the construction industry is experiencing malpractice in project tendering and project execution. For instance, If the contractors win a contract result of pre-bargain with other contractor on the overstated tender rates may recover the loss from the projects which cause to escalate the TCs. Similar findings were reported by Quartey (1996) that in developing countries due to misappropriation of financial resources causing an increase in total project cost. To overcome such issues realistic rate estimation is needed outset of contracting. Moreover, strict supervision on ex-post phase to discourage opportunistic contractor on financial gain.

5.5 Factor 5: Project Transaction Environment

Factor five consist of four variables namely project complexity, project uncertainty, political uncertainty, and restricted access. However, construction projects are always

known to be complex. The project engineers and managers, as shown in Table 3, found that in Pakistan project complexity starts from ex-ante phase. The project complexity due to technical complexities influences uncertainty in transaction environment of the projects. In addition, the local industry follows competitive tendering and due to insufficient project preparation project uncertainty increases which influence the transaction environment, hence enhances TCs. Li et al. (2015) stated that project complexity concerns with the project environment if it is stable or not. Similarly, project uncertainty relates to the information available to perform a certain task (Guo et al. 2016). However, these factors influence the project environment as Ali et al. (2018a) studied construction project in Pakistan argued that transaction environment depends upon the uncertainty associated with the project environment which increase the TC. In this study uncertainties that arise from the project site, commercial, and technical groups are more critical that enhance the TC. In another study conducted by Ali et al. (2018b) argued that internal risk is more influential that increase the risk of TC escalation in Pakistan. These studies found high level of uncertainty in transaction environment which force the contractors to forward extra amount of work and claims which increase the TC. Similar findings were reported in the studies conducted in developed countries (Guo et al. 2016; Li et al. 2013). To make the transaction environment less complex and uncertain, it is suggested that a focus should be made on ex-ante project design arrangements. The capacity building of the existing staff is necessary to mitigate the influence of transaction environment. Moreover, the technical design team needs to work in coordination with the field staff and also with the contractor to reduce the TC respective managers to identify potential areas which make the transactions complicated in a transaction environment.

5.6 Comparison with Developed Countries

The literature review explains that the TCs escalation is very critical in the construction projects. Table 8 shows the top five TCs escalation causes that occurred in different countries which were marked with X. To express the causes as a percentage of a total number of selected countries frequency counts is made (Figure 1). The Symbol X was counted and marked at the end of Table 8. The frequency count of each factor is expressed in percentage. The selected studies show that the causes procurement and contract management and transaction environment is the most encountered causes. These causes are also found in the Pakistani construction industry and many other developed countries with the occurrence percentage of 50%. It is because of the reason that developed countries are also facing problems in procurement and contract management, albeit less frequently. It was followed by another cause such as project external environment, which yields 20%. The contract relationship management and managing project finance were ranked last which account for 10% each, and it is found only in the Pakistani construction industry. It is worth mentioning that a cause contractor external environment was ranked third in both Pakistan and Australia. Similarly, the causes, i.e., contract relationship management and managing project finance are only found in Pakistan. Table 8 shows the top five ranked causes, i.e., procurement and contract management, contract-relationship management, project external environment, managing project finance and project transaction environment were not emphasized in any other

country except Pakistan. It is further noticed that most of the developed countries find the procurement and contract management and transaction environment are the most important causes that escalate the TCs. The analysis of the causes of TCs escalation confirms that procurement phase and the project environment in which transaction occurred plays a pivotal role to control the TCs. In Pakistani construction industry perspective contract relationship management and managing project finance are identified as additional causes, which are critical for the TCs escalation in the industry.

Table 8: Details of TCs Escalation Causes in Some Selected Countries

	Top Ranking Cause of TC Escalation in Different Countries				
	Procurement and contract management	Contract Relationship Management	Project External Environment	Managing Project finance	Transaction Environment
USA (Guo et al. 2016)	-	-	-	-	X
USA (Li et al. 2013)	-	-	-	-	X
EUROPE (Blanc-Brude et al. 2006)	X	-	-	-	-
USA (Soliño and Santos 2008)	X	-	-	-	-
USA (Li et al. 2014)	-	-	-	-	X
EU (Soliño and Santos 2010)	X	-	-	-	-
New Zealand (Rajeh et al. 2015)	X	-	-	-	-
USA (Li et al. 2012)	-	-	-	-	X
USA (Brown and Potoski 2003)	-	-	-	-	X
Tanzania (Rasheli and Rasheli 2016)	X	-	-	-	-
Australia (Coggan et al. 2013)	-	-	X	-	-
Pakistan (this study (2017)	X	X	X	X	X
Frequency	6	1	2	1	6
X = Number					

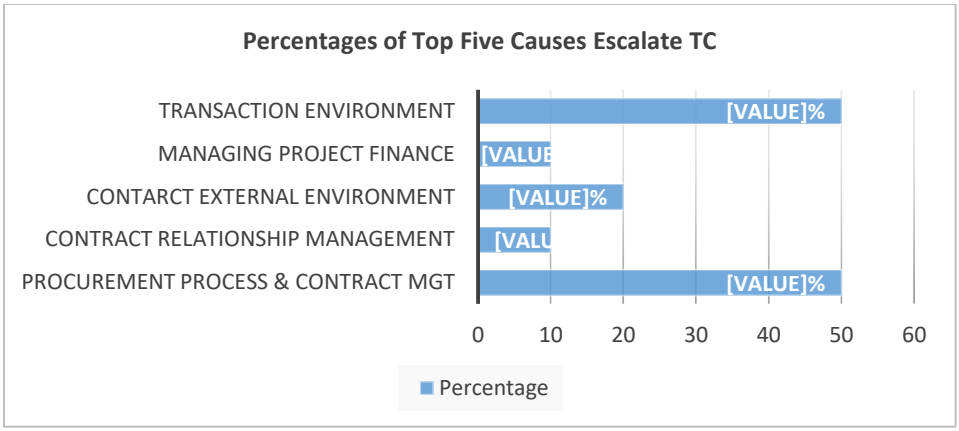

Figure 1: Percentage of top five Causes escalate TC ranking in 12 countries

6. Conclusion

The escalation of TCs in construction projects is a significant problem around the world, especially in developing countries. However, little is known about the causes of TCs escalation in developing countries such as Pakistan. Pakistan is the 6th most populous country in the world. The CPEC and OROB initiative has opened Pakistan construction industry for investment to the rest of the world whereas local construction industry is experiencing project cost overrun issues. This study attempted to approach the problem by using a survey of 238 professionals in public-sector construction projects. The application of factor analysis provided the basis of an interesting set of findings. There were five latent factors extracted from the results such as procurement and contract management, contract-relationship management, project external environment, managing project finances, and the transaction environment. This study consolidates the available knowledge with additional evidence from Pakistan because most of the causes found were in line with the previous reviews from developed countries. However, contract-relationship management and managing project finance are significant factors in the construction industry that will help existing and new entrant construction companies to overcome the TCs problems in the construction industry of developing countries.

The findings of this research give some practical implications and recommendations. This study finds that TCs in construction projects are escalated due to deficiencies in both phases of the projects, but the project procurement phase is very critical. The insufficient preparation in this phase provides space for ex-post variation and changes in projects scope. Thus, more hard work is suggested on ex-ante phase to minimize the chances of TCs escalation. The additional finding in the local construction projects implies that a dimension contract-relationship management is very critical in developing country that can significantly escalates TCs. The major problem arises in contract-relationship management is due to trust deficiency between contracting parties. The relationship of owner and contractor in traditional project contracting is taken lightly. The relationship consists of cursory actions that are undertaken for symbolic reasons, and least attention is given to strategic relationship management to

overcome the TCs escalation issues. It is suggested that merely contractor selection on tangible parameters is insufficient unless the strategic ex-post relationship based on trust is not strengthened to achieve the desired project performance. The owner in this relationship has a leading role must accept more responsibility. Therefore, trust-based relationship between contracting parties can be initiated if the owner makes a complete and clear work scope of projects. To strengthen trust between contracting parties' regular meetings are suggested for information sharing on the project's progress and problems, which reduces ex-post, disputes. In addition, identification, and devolution of risk in advance are also recommended with the provision of enough time to mitigate it. The owner can offer professional advice to the contractor to minimize the risk factors that can significantly help developing a good relationship and fewer chances of claims from project sites.

Moreover, managing project finance was another critical finding; hence value engineering is required on this factor. There are few challenges which influence managing project finance. First, realistic project estimation is required with market rate instead of schedule rate while preparing for project documentation due to the volatile market situation. It is suggested to review tender rates on a monthly basis or at least quarterly basis to reduce rate differences (market rates vs schedule rates). Second, when the progress payments are delayed, it extends the work schedule. The owner in such cases asks for work acceleration, which is compensated with incentive payments to contractors, hence, enhance TCs. Therefore, it is suggested to delegate financial control to the site project managers to avoid delay payments. It decreases the schedule overrun, which indirectly reduces the frequency of additional claims. Additionally, strict policies are needed to ensure good governance and management training and implementation of TCs accounting systems would be appropriate outset of the projects to reduce TCs escalation problems.

7. Theoretical Contribution

There are few key theoretical contributions to this study. First, this study highlights different causes which escalate TCs in construction projects of developing countries like Pakistan. There are very limited studies in developing countries focus on the construction industry. This study may provide a foundation to create an academic debate on each cause in different industrial settings. Second, this study finds new factors such as contract-relationship management and managing project finance are most critical in developing countries for TCs escalation which require detail understanding of how these factors influence the TCs. Finally, the informal constraints are embedded in the developing societies that are also very critical to enhance TC in projects which is never discussed in the literature of developing countries. This study theoretically contributes highlighting those informal constraints from the perspective of developing country. Therefore, this is the first study which documents such informal constraints that could be a point of reference for further studies in developing countries.

8. Practical Implications

The practical implications can be manifested in two ways. First, practitioners need to consider the reality of TC escalation phenomenon and make efforts to prepare realistic

contingency while preparing the feasibility reports to minimize the TCs escalation issues in construction projects. The more realistic contingency estimation may reduce the ex-post frequency of claims. Second, practitioners require to work more on procurement management phase. The more practical ex-ante scrutiny may reduce ex-post changes and variation in work scope. This study helps the practitioners prioritizing the important cause of TC escalation prior to contracting out projects may reduce the critical nature of ex-post relationship between contracting parties that help the owner to manage finance rationally. Third, soft project management approach is as important as hard project management approach to overcome the TCs escalation issues. This study justifies the importance of soft side of the projects controlling project cost escalation. The practitioners will understand and consider importance of this neglected side while dealing with the project parties in the contracting relationship.

9. Limitations

The construction projects are executed by the contractor and owner monitors the project progress. This study has captured only the owner's perspective. However, in real market situation multiple parties are involved for project execution including contractor, thus, their role is significantly important, merely considering the owner role do not fully capture the real causes of TC escalation. Secondly, without incorporating the environmental differences of public and private sector construction projects, capturing only public sector construction project is insufficient for drawing general conclusion. Thirdly, in this quantitative research only close-end questionnaire were used for data collection and analysis which limit the researchers to explore the issue in detail and in-depth analyses of the real causes of TC escalation. The observations, interviews, archival data, and other hard data are equally important to explore the real issues.in construction projects.

10. Future Research Directions

This study suggests several directions for future research. First, this study can be more robust and comprehensive incorporating the opinion of multiple parties involved in the project execution. The execution of formal sector (public) and informal sector (private) is reality in the Pakistani construction industry. In the future, more advanced third generation statistical tool can be used for contract-relationship management involving informal sector organizations focusing on effective partnering, alliances and managing project finance in contracting to overcome TCs escalation issues. Although this study has identified the general cause of TC escalation which are somewhat consistent with the extant contracting literature. The process of contracting is comprehensive. This study requires further empirical scrutiny separating ex-ante and ex-post contract arrangements for the detail investigation and general conclusions.

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REFERENCES

Abdel-Galil, E., Ibrahim, A. H. and Alborkan, A. (2020). Assessment of transaction costs for construction projects. *International Journal of Construction Management*, Published online: 03 Apr 2020, 1-14.

Aibinu, A. A., and Odeyinka, H. A. (2006). Construction Delays and Their Causative Factors in Nigeria. *Journal of Construction Engineering and Management*, *132*(7), 667-677.

Akinsola, A. O., Potts, K. F., Ndekugri, I., and Harris, F. C. (1997). Identification and evaluation of factors influencing variations on building projects. *International Journal of Project Management*, *15*(4), 263-267.

Albuam, G., and Oppenheim, A. N. (1993). Questionnaire Design, Interviewing and Attitude Measurement. *Journal of Marketing Research*, *4*(5), 1-154.

Ali, Z., Zhu, F., and Hussain, S. (2018a). Identification and Assessment of Uncertainty Factors that Influence the Transaction Cost in Public Sector Construction Projects in Pakistan. *Buildings*, *8*(11), 157-175.

Ali, Z., Zhu, F., and Hussain, S. (2018b). Risk Assessment of Ex-Post Transaction Cost in Construction Projects Using Structural Equation Modeling. *Sustainability*, *10*(11), 4017-4037.

Arditi, D., and Pulket, T. (2010). Predicting the Outcome of Construction litigation Using an Integrated Artificial Intelligence Model. *Journal of Computing in Civil Engineering*, *24*(1), 73-80.

Blanc-Brude, F., Goldsmith, H., and Timo, V. (2006). Ex ante construction cost in the European road sector: A comparison of public-private partnership and traditional public procurement. Working Paper: *EIB Economic and Finance Report No. 2006/1*. European Investment Bank (EIB), Luxembourg.

Boardman, A. E., and Vining, A. R. (2010). Assessing the economic worth of public–private partnerships. *International Handbook on Public–Private Partnerships*, G. A. Hodge, C. Greve, and A. E. Boardman, eds., Edward Elgar Publishing.

Bresnen, M., and Marshall, N. (2000). Building partnerships: Case studies of client-contractor collaboration in the UK construction industry. *Construction Management and Economics*, *18*(7), 819-832.

Bristow, D. I., and Vasilopoulos, R. (1995). The new CCDC 2: facilitating dispute resolution of construction projects. *Construction Law Journal*, *11*(2), 95-117,.

Brockmann, C. (2001). Transaction Costs in Relationship Contracting. *AACE International Annual Meeting Transactions*, AACEI, Morgantown, WV, 1–7.

Brown, T. L., and Potoski, M. (2003). Managing Contract Performance: A Transaction Costs Approach. *Journal of Policy Analysis and Management*, 22(2), 275-297.

Brown, T. L., and Potoski, M. (2005). Transaction Cost and Conracting: The Practitioner Perspective. *Public Performance & Management Review*, *28*(3), 326-351.

Cheung, S. O., and Pang, K. H. Y. (2013). Anatomy of Construction Disputes. *Journal of*

Construction Engineering & Management, *139*(1), 15-23.

Chotibhongs, R., and Arditi, D. (2012). Analysis of collusive bidding behaviour. *Construction Management and Economics*, *30*(3), 221-231.

Coase, R. H. (1937). The Nature of the Firm. *Economica*, *4*(16), 386-405.

Coggan, A., Buitelaar, E., Whitten, S., and Bennett, J. (2013). Factors that influence transaction costs in development offsets: Who bears what and why? *Ecological Economics*, *88*, 222-231.

Collier, P., and Gunning, T. N. W. (1999). Economic African Explaining Performance. *Journal of Economic Literature*, *37*(1), 64-111.

Diallo, A., and Thuillier, D. (2004). The success dimensions of international development projects: the perceptions of African project coordinators. *International Journal of Project Management*, *22*(1), 19-31.

Diekmann, J. E., and Nelson, M. C. (1985). Construction claims: frequency and severity. *Journal of Construction Engineering and Management*, *111*(1), 74–8.

Doloi, H. (2008). Analysing the novated design and construct contract from the client's, design team's and contractor's perspectives. *Construction Management and Economics*, *26*(11), 1181-1196.

Dudkin, G., and Timo, V. (2006). Transaction Cost in Public-Private Partnership: A first Look at the Evidence. *Competition and Regulation in Network Industries*, *1*(2), 75-89,.

El-Sayegh, S. M. (2008). Risk assessment and allocation in the UAE construction industry. *International Journal of Project Management*, *26*(4), 431-438.

Farajian, M. (2010). *Transaction cost model for US infrastructure public private partnerships*. (M.Sc Thesis), University of Maryland, Maryland, USA.

Farooqui, M. A., and Aftab, S. M. (2018). China-Pakistan Economic Corridor; Prospects and Challenges for Balochistan, Pakistan. *IOP Conference Series: Materials Science and Engineering*, *414*(1), 12–46.

Farooqui, R. U., Ahmed, S. M., and Lodi, S. H. (2008). Assessment of Pakistani construction industry-current performance and the way forward. *Journal for the Advancement of Performance Information and Value*, *1*(1), 51-72,.

Field, A. (2009). *Discovering Statistics Using SPSS*. SAGE Publications, Inc.

Furubotn, E. G., and Richter, R. (2005). *Institutions & economics theory: The contribution of new institutional economics*. The University of Michigan Press, Michigan, USA.

Guo, L., Li, H., Li, P., and Zhang, C. (2016). Transaction costs in construction projects under uncertainty. *Kybernetes*, *45*(6), 866–883.

Haaskjold, H., Andersen, B., Lædre, O., and Aarseth, W. (2020). Factors affecting transaction costs and collaboration in projects. *International Journal of Managing Projects in Business*, *13*(1), 197-230.

He, X. (2007). *Modern statistical analysis methods and applications*. China Renmin

University Press, Beijing.

Hillebrandt, P. M., and Hughes, W. (2000). What are the Costs of Procurement and Who bears Them? *Proceedings 2nd International Conference on Construction in Developing Countries.*, Botswana National Construction Industry Council and University of Botswana, Gaborone.

Ho, S. P., Levitt, R., Tsui, C., and Hsu, Y. (2015). Opportunism-focused transaction cost analysis of public-private partnerships. *Journal of Management in Engineering*, *31*(6), 1-11.

Hughes, W., Hillebrandt, P., Greenwood, D., and Kwawu, W. (2006). *Procurement in the Construction Industry: The impact and cost of alternative market and supply processess*. Taylor & Francis Group, New York, USA.

Ika, L. A., Diallo, A., and Thuillier, D. (2012). Critical success factors for World Bank projects: An empirical investigation. *International Journal of Project Management*, *30*(1), 105-116,.

Jergeas, G. F., and Hartman, F. T. (1994). Contractors' Construction-Claims Avoidance. *Journal of Construction Engineering and Management*, *120*(3), 553-560.

Jobin, D. (2008). A Transaction cost-based approach to partnerships perfromance evaluation. *Evaluation*, *14*(4), 437-465.

Kulshreshtha, P. (2008). Public Sector Governance Reforms: The world Bank's Framework. *International Journal of Public Sector Management*, *21*(5), 556-567.

Kumaraswamy, M. M., Ling, F. Y., Rahman, M. M., and Phng, S. T. (2005). Constructing Relationally Integrated Teams. *Journal of Construction Engineering and Management*, *131*(10), 1076-1086.

Kumaraswamy, M. M., and Yogeswaran, K. (1998). Significant sources of construction claims. *International Construction Law Review*, 15(1), 144-160.

Kumarswamy, M. M. (1997). Conflict, Claims and disputes in Construction. *Engineering, Construction and Architectural Management*, *4*(2), 95-111.

Lee, H., Seo, J., Park, M., Asce, M., Ryu, H., Ph, D., and Kwon, S. (2009). Transaction-Cost-Based Selection of Appropriate General Contractor-Subcontractor Relationship Type. *Journal of Construction Engineering and Management*, *135*(11), 1232-1240.

Li, H., Arditi, D., and Wang, Z. (2012). Transaction-related issues and construction project performance. *Construction Management and Economics*, *30*(2), 151-164,.

Li, H., Arditi, D., and Wang, Z. (2014). Transaction costs incurred by construction owners. *Engineering, Construction & Architectural Management*, *21*(4), 444-458.

Li, H., Arditi, D., and Wang, Z. (2015). Determinants of transaction costs in construction projects. *Journal of Civil Engineering and Management*, *21*(5), 548-558.

Li, H., Arditi, D., and Zang, Z. (2013). Factors that affect transaction costs in construction projects. *Jurnal of Construction Engineering and Management*, *139*(1), 60-68.

Lingard, H., Hughes, W., and Chinyio, E. (1998). The Impact of Contractor Selection Method on Transaction Costs : A Review. *Journal of Construction Procurement*, *4*(2), 89-102,.

Lu, W., Zhang, L., and Pan, J. (2015). Identification and analyses of hidden transaction costs in project dispute resolutions. *International Journal of Project Management*, *33*(3), 711-718.

Mahamid, I. (2011). Risk matrix for factors affecting time delay in road construction projects: owners' perspective. *Engineering, Construction and Architectural Management*, *18*(6), 609-617.

Malhotra, N. K. (2008). *Marketing research: An applied orientation, 5/e*. Pearson Education India.

Manu, E., Ankrah, N., Chinyio, E., and Proverbs, D. (2015). Trust influencing factors in main contractor and subcontractor relationships during projects. *International Journal of Project Management*, *33*(7), 1495-1508.

Nawaz, T., Sharif, N. A., and IKram, A. A. (2005). Colonialism, decolonisation and growth rates: theory and empirical evidence. *Cambridge Journal of Economics*, *3*(2), 235-257.

Noor, M. A., Khalfan, M. M. A., and Maqsood, T. (2012). Methods used to procure infrastructure projects in Pakistan: An overview. *International Journal of Procurement Management*, *5*(6), 733-752.

North, C. D. (1990). Institutions, institutional change and economic performance. *The politiclal Economy of Institutions and Decisions*, A. James and D. C. NORTH, eds., Cambridge Univerity Press, Cambridge, 318-319.

Norusis, M. J. (1992). *SPSS for Windows: Professional Statistics User's Guide, Release 5.0*. SPSS Incorporated.

Ofori, G. (2006). Revaluing construction in developing countries: A research agenda. *Journal of Construction in Developing Countries*, *11*(1), 1-16.

Ozorhon, B., Arditi, D., Dikmen, I., and Birgonul, M. (2010). Performance of International Joint Ventures in Construction. *Journal of Management in Engineering*, *26*(4), 209-222.

Quartey E L, J. (1996). Development projects through build-operate schemes : their role and place in developing countries. *Internatonal Journal of Project Management*, *14*(1), 47–52.

Quartey, J. (1996). Development projects through build-operate schemes: their role and place in developing countries. *International Journal of Project Management*, *14*(1), 47-52.

Rajeh, M., Tookey, J. E., and Rotimi, J. O. B. (2015). Estimating transaction costs in the New Zealand construction procurement. *Engineering, Construction and Architectural Management*, *22*(2), 242-267.

Rasheli, G. A., and Rasheli, G. A. (2016). Procurement contract management in the local government authorities (LGAs) in Tanzania A transaction cost approach. *International Journal of Public Sector Management*, *29*(6), 545-564.

Rindfleisch, A., and Heide, J. B. (1997). Transaction Cost Analysis: Past ,Present , and Future Applications. *Journal of Marketing*, *61*(4), 30-54.

Saqib, M., Farooqui, R. U., and Lodi, S. H. (2008). Assessment of critical success factors for construction projects in Pakistan. *First International Conference on Construction in Developing Countries (ICCIDC-1), Advancing and Integrating Construction Education, Research and Practice, Karachi, Pakistan, August*.

Semple, C., Hartman, F. T., and Jergeas, G. (1994). Construction Claims and Disputes: Causes and Cost/Time Overruns. *Journal of Construction Engineering and Management*, *120*(4), 785-795.

Shane, J. S., Molenaar, K. R., Anderson, S., and Schexnayder, C. (2009). Construction Project Cost Escalation Factors. *Journal of Management in Engineering*, *25*(4), 221-229.

Soliño, A. S., and Santos, P. G. de. (2010). Transaction costs in transport public-private partnerships: comparing procurement procedures. *Transport Reviews*, *30*(3), 389–406.

Soliño, S. A., and Santos, P. G. de. (2008). *Transaction costs in PPP transport infrastructure projects:Comparing procurement procedures*. Working paper, European Investment Bank, Kirchberg, Luxembourg.

Turner, J. R., and Simister, S. J. (2001). Project contract management and a theory of organization. *International Journal of Project Management*, *19*, 457-464.

Walker, A., and Wing, C. K. (1999). The relationship between construction project management theory and transaction cost economics. *Engineering, Construction, Architectural Management*, *6*(2), 166-176,.

Whittington, J. (2012). When to partner for public infrastructure?: Transaction cost evaluation of design-build delivery. *Journal of the American Planning Association*, *78*(3), 269-285.

Whittington, J., and Dowall, D. (2006). *Transaction-Cost Economic Analysis of Institutional Change toward Design – Build Contracts for Public Transportation*. California, USA.

Williamson, O. E. (1985). *The economic institutions of capitalism. Firms, market, relational contracting*. The Free Press, New York.

Williamson, O. E. (1996). *The mechanism of Governance*. Oxford University Press, New York.

Williamson, O. E. (2002). The Theory of the Firm as Governance Structure : From Choice to Contract. *Journal of Economics and Perspectives*, *16*(3), 171-195.

Winch, G. (1989). The construction firm and the construction project: A transaction cost approach. *Construction Management and Economics*, *7*(4), 331–345.

Yawei, L., Shouyu, C., and Xiangtian, N. (2005). Fuzzy pattern recognition approach to construction contractor selection. *Fuzzy Optimization and Decision Making*, *4*(2), 103-118.

Ye, G., Jin, Z., Xia, B., and Skitmore, M. (2015). Analyzing Causes for Reworks in Construction Projects in China. *Journal of Management in Engineering*, *31*(6), 12-35.