

Inter-Relationship between Cost Overrun and Quality of Provincial Public Sector Development Projects (PSDP) Analyzing Dynamics Involved in Provincial Projects of Punjab, Pakistan

Ali Adnan Joiya¹ Rana Saifullah Hassan² Ali Zeshan Joiya³ Dr Anwar Hassnain⁴

1.SIMS, Health Department, Punjab, Pakistan

2.M.Phil Scholar, Lahore Leads University

3.Research Scholar, UCP, Lahore, Pakistan

4.Dean Evening Business School, NCBA&E, Lahore, Pakistan

Abstract

Aim of Study

This study aims to understand the relationship between cost overrun and quality within Public sector development projects (PSDP) executed in Punjab, Pakistan.

Need of Study

Quality and cost relationship has always been a challenge in the execution of PSDP. These two issues are inseparable and generally have a profound bearing on the success of a project. There are numerous of projects accomplished at very higher cost than expected whereas less attention has been paid to overall project quality. There are records of projects executed at a cost far higher than expected. Others suffer high percentage of delay whereas some suffer less attention been paid to quality.

Research Approach

This research was executed through survey and interviews, using the self-managed questionnaires among the respondents including top level management to lower level management of the PSDP, Punjab, Pakistan. The data was analyzed through Statistical Package for Social Sciences (SPSS-20).

Research Findings

This study revealed that there is highly positive and significant relationship between cost and quality of the PSDP, Punjab, Pakistan. This study has also categorized the most vital factors affecting cost and quality within PSDP, Punjab, Pakistan respect to their significance. This study also subsidizes by enabling the contractor/consultants to succeed with maximum quality ensuring at reasonable cost, thus confirming safety performance within PSDP, Punjab, Pakistan.

Limitations

This study is limited to the PSDP, Punjab, Pakistan only.

Importance and Contribution

The findings of the present study are also important for all the stakeholders (clients, project managers, contractors and consultants). This study will enable management of PSDP, Punjab, Pakistan for taking suitable actions in improving the performance of cost and quality in the PSDP, Punjab, Pakistan.

Keywords: Cost, Quality, Public Sector Development Projects (PSDP)

1. Introduction

Cost is the main reflection within the life cycle of Project Management and major consideration towards the success of the project. It is very common for a project and fixed as the most significant limitation, failing to achieve the objectives within the predefined cost. Within developing and under developing countries cost overruns are the major problems and sometimes becomes uncontrollable. The trend is more serious in nature sometimes when it exceeds from 100% of the predetermined cost in the developing countries.

Quality is the satisfaction measurement criteria for every part of project deliverable. It's a common perception that projects cannot completed within predefined Quality standards or exceeds cost. Quality can be explained in numerous ways in contrast of costs. Quality define the degree of structure properties that follow the requirements (Yasamis et al. 2002). Numerous projects cannot meet with approved quality standers and by the customer necessities, so this research scrutinized the analysis of relationship between cost and quality within Public Sector Development Projects (PSDP), Punjab, Pakistan.

Cost and quality both are relevant issues which are inseparable on the project, Duttonhoeffer (1992). The commonly supposed notion is that "quality" has a direct relation with "cost".

In Pakistan, Public development projects starts from planning, Approval, Execution and then Evaluation as per instructions issued by the Planning Commission, Govt. of Pakistan. Same as other countries; in Pakistan development projects are very important, significantly in the growth for the development under socio-economic schemes as it generates employment opportunities, rotates capital in the economy and creates development

activities etc. Punjab has the largest development budget as compared to other provinces of the Country. During 2013-2014, a target of 1576 development projects (including both ongoing and new schemes) having a total investment volume of Rs. 262.2 billion in Punjab had been set. Later on the Punjab Govt. of Pakistan put an increase in the volume of the annual development budget for 2014-15 to Rs. 345 billion. On 1st June 2015, National Development program was approved by the National Economic Council (NEC) for the year 2015-16 at Rs. 400 billion. It shows that a massive portion of the budget is being spent on the Public Development Projects due to which development sector is always kept to on priority as the provisions are increasing day by day after realizing the importance. PSDP are facing various challenges like Expenditure (cost) exceeding from the predetermined budget, low quality ultimately delays to the project in time. Accomplishment of the project completion within the prescribed parameters of Time and within budget is major criterion. This required a study of cost and quality relationship of PSDP in Punjab, Pakistan.

2. Review Of Literature

The definition of cost overrun is not always clear cut, quite a lot of Empirical studies on cost overruns since Arditi et al. (1985) and Flyvbjerg et al. (2002) was of the view that escalation in cost is actually the gap of actual cost and estimated cost. A project is said to be successful that is accomplished within agreed budget and in accordance with the required specifications to the satisfaction of stakeholders, Long et al. (2004). Parallel interrelated definitions were used by Avots, 1969; Gaddis, 1959; Handa & Adas, 1996; Kerzner, 1998; Morris & Hough, 1987; Olsen, 1971; Trauner, 1993; Tuman, 1983 & 1986 and Williams, 1993. Furthermore, cost has proven its strong focus on quality for the want of raised quality in the projects (Topcu, 2004). In 2010, Ali found that measurement of quality level is associated with appraisal cost.

Idiaki et al. (2015) determined the relationship between cost and quality within private projects. The study also explore the knowledge ways by enabling the consultants/contractors general understanding to achieve highest level of quality at reasonable cost.

Dragan and Bojan (2014), were of the view that Cost and Quality is closely related and change of one effect on other. Moreover there is direct relationship of cost with quality, Duttonhoeffer (1992). Liberatore and Pollack-Johnson (2008), described non-linear programming model in order to deal with the cost, quality and time in addition to rank the quality position for the realization of project success. According to Ashworth (1991), relationship of the cost-overrun with quality of the construction project shows the significance level. Whereas, performance & quality are the factor of the structural module with high ration when cost is penetrating.

Clamp et al. (2007) identified that: "there may be clients who . . . think it is now possible to construct a quality building at break neck speed and for a knock down price. Any such unfounded euphoria needs to be dispelled at the outset. . . The reality is that although the three most important considerations for any client are usually cost, time and quality, the business of building procurement invariably calls for some compromise or a consensus balancing of these priorities. This requires adequate thinking time and careful thought."

Hvenegaard et al. (2009) found the relationship between cost and quality differs which depends upon the level of the quality to be achieved lower costs associated with the compromise with ultimate quality standards. This was further buttressed by Fleming (1991), a positive association explore that quality and cost travel in the same direction, an increase in the project quality is being associated with rise in cost.

Kneler and Zhihong (2008), Baldwin et al. (2011) and Johnson (2012) integrated the quality of project into a model of heterogeneous firms by supercilious, that quality is determined as firm's idiosyncratic marginal cost. Shugan (1984) found that it becomes more and more costly as the quality increases.

Fleming (1990) has shown that most hypothetical models explore that a positive relationship is strongly presents in the association of cost towards quality. Quality can be increase with the help of increase in cost factors. Moreover, they both (cost and quality) travel parallel in the similar direction, Stavrou et al. (2011).

Hagan (1986) identified that inter-relation of cost, quality and schedule, without giving the attention to the dissimilar, can results in unbalanced schedule and cost of the project and frequently damage the quality. This can imbalance the quality which correlates with the cost incurred. The above statement further endorse the statement with Hart's (1994) "inter-relationship between cost, quality and schedule are depends upon each other (qualifying construction quality cost)

- a. Within project, when costs are controlled too strictly, quality can suffer which means cost and quality are directly proportional with each other.
- b. When quality controlled without looking anything else than the cost of the project can be affected."

The trend is more severe in developing countries where these overruns sometimes exceeds 100% of the anticipated cost of the project. Low quality materials cause higher construction cost than expected because of the loss of materials during construction. This fact was pointed out by the Thungphanich (1997).

Nawaz et al. (2013) found that this unethical practice (Corruption and bribery in construction industry) is leading towards cost overruns in every construction project. Incompetence and ineptitude of the site

management outcomes in to poor quality, frequent change order, and reworks. Javed et al. (2013) pointed out that overall project hinge on the cost to be incurred, when it is ended appropriately only than it results into the successful completion of the project. In construction projects, lack of **quality** results in delays, **cost overrun**, and unsafe structure (Quality of Construction by FIDIC).

Ibironke and Ibironke (2011), due to deficiencies in scheduling and planning, untrue exercise, kickback and non-availability of clear Evaluation criteria, are the most important factors that are affecting cost, time and quality in construction project. Cost overrun is also occurred due to the use of low quality material which resulted ultimately into higher cost of construction as associated to the expected cost because of material loss, Sriprasert (2000). Whereas, variations in the prices of material is only the foremost reason which badly effect the financial calculation of the project and ultimate results into cost overrun and quality affected on the other hand, Hameed et al. (2014).

Parquet (2010) has shown positive expectations of budget (cost) have been found to declined quality and efficiency in the concluding creation (service or product). Iyer and Jha (2005) and Shane et al. (2009) studied that as cost factor increases than cost related concept is affected. Finally, Koushki (2005), Kaliba et al. (2009) and Olawaley et al. (2010) studied that time is inter-related with cost, which endorsed by Hanchr and Rowings (1981) that any project is known to be successful it meets with expected cost decided and limit to the agreement. Wong (2000) endorsed this with the further addition that when a tenderer is selected on the lower cost based method, it doesn't mean to provide very good quality values to the client.

In Pakistan, PSD is an important sector where it plays significant and vital role in the economy. Even though it is not working with its completest potential, still to be known as the leading interest to this country. Development in this region is very acute to participate in the National Income. Within the region it is the largest segment that engenders great employment opportunities and also has become a key indicator towards the economy of Pakistan.

3. Research Method

The methodology of the study is basically, the phases that will be conducted in order to originate and valid answers to questions, Leedy & Ormrod (2005). This section deliberates the methodologies implemented in the collection of data which supported the study of cost and quality relationship in PSDP, Punjab, Pakistan. Research design adopted was quantitative research approach in which Quantitative surveys are designed to obtain information (Rossi et al. 1983). In such surveys, information level about the population gathered through sampling method (Rea and Parker 2012).

3.1 Identification of Questionnaire Factors

Factors affecting cost and quality in the PSDP were pointed out with the help of literature review and expert opinions. In this study literature review from both developed and developing countries have been studied. The finalized factors affecting cost and quality within PSDP are shown below in Table # I. A total of 30 factors are selected having 15 factors affecting cost and 15 factors affecting quality in order to come out with this study. To measure the impact of each factor on cost and quality, an ordinal five point Likert scale was used, from Strongly Disagree = 1 to Strongly Agree = 5 (impact) similar to the one used by Doloji (2012). Data were clustered using Survey (Ramboll 2014) and also sent by e-mail to a few highly executive consultants (questionnaire respondents) as added by the Danish Social Science Research Council (SSRC) (2002).

Table # I :- (Factors affecting Cost and Quality)

Sr.#	Factor ID	Factors affecting COST	Sr.#	Factor ID	Factors affecting QUALITY
1	CST1	Change in scope by client.	1	QTY1	Too many change orders from owner.
2	CST2	Variation in qualities/cost proposed by contractor as per site.	2	QTY2	In-efficient design.
3	CST3	Contractual claims of additional work.	3	QTY3	Inappropriate hiring and evaluating consultants.
4	CST4	Extension in the timeline of the projects.	4	QTY4	Lesser allocation of funds.
5	CST5	Rework due to replacement of material or any component desired by the client.	5	QTY5	Poor quality control by line department.
6	CST6	Cost Escalation.	6	QTY6	Poor quality control by TPV / Resident supervisor.
7	CST7	Variation in prices of goods/services.	7	QTY7	Ambiguities and mistakes in specifications and drawings.
8	CST8	Leakages of funds due to misappropriation/ Corruption.	8	QTY8	Unavailability of experienced and qualified personals.
9	CST9	Litigation/disputes with contractual party or any other third party.	9	QTY9	Incompetent technical staff assigned to the project.
10	CST10	Improper cost estimation/ missed out scope.	10	QTY10	Non-Conformance to specification of work.
11	CST11	Poor cost monitoring/ auditing and control system.	11	QTY11	Low quality equipment used.
12	CST12	Due to illegal subcontracting of work.	12	QTY12	Inefficient construction equipment.
13	CST13	Cash flow problems/delays in fund releases and utilization.	13	QTY13	Lack of technical capabilities of consultants, engineers, contractors and staff assigned to the project.
14	CST14	Due to faulty design/Re-design.	14	QTY14	Lack of trainings.
15	CST15	Increase in cost of resident supervisor/consultant.	15	QTY15	Less effective Monitoring, control and Feedback by project manager.

The primary data was collected with main concern within PSDP, Punjab, Pakistan includes 135 valid questionnaire respondents out of targeted 150 (Table # II).

3.2 Cronbach's Alpha Test For Data Validation

Prior to investigation data was checked for reliability. Statistically when the value of alpha goes above from 0.7 than the reliability is considered to be satisfactory (Sekaran, 2003). Cronbach's alpha for this study measures to be **0.917**, which indicates the internal consistency at *high level*. The collected data is 100% as shown in Table # IV.

Table # IV:- (Data Collected)

		N	%
Cases	Valid	135	100.0
	Excluded	0	.0
	Total	135	100.0

Table # III:- (Cronbach's Alpha)

Cronbach's Alpha	N of Items
.917	2

4. Data presentation, analysis and discussion of results:

4.1 Correlation Results

The **Table # V** below, shows high positive correlation between cost and quality with the value of **r=0.844**. This indicates as cost increase the quality will also increase in the PSDP. This results validate the literature review with high positive relation between them.

Table # V:- (Correlation between Cost and Quality)

FACTOR	ANALYSIS	COST	QUALITY
COST	Pearson Correlation	1	.847
	Sig. (2-tailed)		.000
	N	135	135
QUALITY	Pearson Correlation	.847	1
	Sig. (2-tailed)	.000	
	N	135	135

Correlation is significant at the 0.01 level (2-tailed).

4.2 Coefficient of Determination Results

In our analysis coefficient of determination ($r^2 = 0.718$), **Table # VI** shows that 71.8% of the variation in quality (dependent variable) is due to the cost (independent variable) and remaining 28.2% of the variation is due to some other factors/variables that have been unseen.

Table # VII:- (Coefficient of Determination)

Sr.#	r	R Square	Adjusted R Square	Std. Error of the Estimate
1	.847	.718	.716	.09989

4.3 Standard Error of Estimate Results

Table # VI indicates, the standard error of estimate **0.09989** is very small so the predicted values by using this simple regression model will be reliable.

4.4 ANOVA Test Results

ANOVA **Table # VII** assessing the over-all significance of the estimated model can be accomplished by performing a simple F- test.

Table # VII:- (ANOVA Test Results)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.379	1	3.379	338.649	.000 ^b
Residual	1.327	133	.010		
Total	4.706	134			

a. Dependent Variable: QUALITY

b. Predictors: (Constant), COST

Here the p-value = **.000** < 0.05, the simple regression model is significant. We can say that at least one regression coefficient is playing a significant role.

Table # VIII contains the estimated regression coefficients, and hence the estimated simple regression equation written as **Quality = 0.617 + 0.821(Cost)**. Here the $p = 0.000 < 0.05$ indicates beta coefficient is significant. It means that quality will increase by 0.821 as we increase a unit change in cost. While we take cost is zero then the quality will be 0.617.

Table # VIII:- (Coefficient Results)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.617	.169		3.643	.000
COST	.821	.045	.847	18.402	.000

a. Dependent Variable: QUALITY

5. Conclusion

On the basis of the study it can be concluded that balancing between quality and cost relationship has always been a challenge in the execution of PSDP, Punjab Pakistan. These two issues are inseparable and generally have a profound bearing on the success of a project. There are numerous of projects accomplished at very higher cost than expected whereas less attention has been paid to overall project quality.

- Based on the findings of the data within this study it is concluded that as the quality upsurge/increase the cost will also be increases. There is very strong positive relationship between the cost and quality.
- Inter-relationship of the cost and quality explore the major and foremost factors affecting the PSDP, Punjab, Pakistan. This study has also categorized and prioritizes the factors affecting cost and quality inter-relationship with respect to their significance.
- This study however subsidizes the foremost and leading factors affecting cost and quality relationship and will also enable stake holders of a project know-how to understand these factors to achieve maximum quality at reasonable cost, thereby certifying maximum level of safety performance.
- The relationship between cost and quality is not confined or limited to public sector, it also carries the same relation the context of private sector and developed countries too, as suggested by previous studies.

Recommendation

The study is based on the inter-relationship between cost and quality in the PSDP, Punjab, Pakistan. The results of this study need to be further validated on a wider data set. The measures may further be improved with the help of the results of this study. However, reliability of the study is good, which is based on sample population. The data used in the study was collected by researcher. The results of this study are limited to the population and its results may not be generalized to other population.

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