

## Analysis of Cost Control Techniques Used on Building Construction Projects in Sri Lanka

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### Abstract:

*It is an eminent fact that the Sri Lanka construction industry is important for economy as well as fisheries sector and tourism sector. It plays a crucial role to accelerate the economic development of Sri Lanka. It is noted that in the current context, many construction projects in Sri Lanka have not been achieved their goals and targets in terms of cost. Therefore, good cost control techniques would be essential to solve those problems. This research is for mainly identification of costs overruns in the building construction projects in Sri Lanka. During past few years various project control techniques have been developed time to time. These may include, Earn value management(EVM), Gantt Chart, Review Technique (PERT), Program Evaluation and Bar Chart, Critical Path Method (CPM), Network Diagrams etc. in addition to that, software applications such as Asta Power Project, Primavera, Microsoft Project are available to control the costs incur in the construction projects. However, there are no sufficient evidences to verify those various methods and software packages have been useful for Sri Lanka cost controlling purpose and given better end results on construction project delivery to the beneficiaries. Therefore, this research*

*is aim to find out most effective cost control technique use in Sri Lanka.*

**Key Words:** Cost overrun, Cost Control, Project management.

### Introduction

The construction industry of Sri Lanka is a vital sector of the country's economy and has been a key driver of economic growth in the country. However, construction industry can be considered as an industry that is constantly faced for various uncertainties due to the dynamic economic situations, technological advancements, environmental influences, project inherent factors and capabilities of the project management team. Due to these uncertainties, many stake holders of construction projects are difficult to manage their projects cost increases and final delivery of the projects successfully. Therefore, it is valuable to evaluate whether there are impact on cost control techniques on final delivery of the construction projects.

In the construction industry, the objective of project management is to ensure the completion of project on time within the budget that implemented before the project. Project planning and controlling plays a

significant role in project management, without proper plan and control project can lead to many problems. However, in practical sense, being within the budgeted costs is rather a challenging task for project managers because they have to be in a continuous process of measuring the progress, evaluating implemented decisions and taking remedial actions (Kerzner, 2003; Lowden and Thornton, 2015).

Most of the literature has been documented that recent construction projects experience failures since they became unsuccessful to manage cost and time during the project implementation stage. Thus, cost controlling has become a dominant factor to be considered in the constructions projects (Koushki, Al-Rashid and Kartam, 2005). In general most construction projects experience cost overruns and time delays during the implementation stage. Cost overruns can be considered as one on the main issue during the execution of the project. Further, this issue of cost overrun is an inherent challenge for developing countries and Developed economies cope up with cost obstacles in construction projects as well (Mansfield, Ugwu and Doran, 1994). Therefore, cost control aspect is essential with the background information related to the construction projects and investigation. The impact of cost control on constructions project delivery has been becomes a significant research area in the current industrial community.

### **Research Problem**

The construction industry can be viewed as a vigorous industry that is often confused and disturbed with uncertainties coming from weather changes, economic factors political and legislative factors. This ambiguous situation creates poor cost

management and ultimately leads to cost and time overruns, conflicts, and sometimes relinquishing projects. Thus, successful execution of construction projects is often affected by financial constrains due to the high cost. Accordingly, in construction project cost overruns can be identified as one of the major and challenging issue (Kerzner, 2003). As a solution, project management applies various project management tools and techniques to control the higher costs. Most of literature has focused on cost control techniques to overcome the financial constraints. However, a few researches have been conducted regarding effect of cost control techniques on construction project delivery.

### **Aim and Objectives**

This study focuses to analyse the impact of cost control methods related to project delivery with respect to the building construction industry in Maldives. Further, study intents to address the following research questions:

1. Do cost control techniques affect construction project delivery?

The key objective of this study is to analyse cost control techniques used in building construction industry and to examine whether there is an impact of those applied cost control techniques on final project delivery. This intended to be achieved by the following objectives.

1. To analyse impacts of cost control techniques on building construction project delivery
2. To analyse factors relate to the final project delivery
3. To identify cost control techniques used in building construction projects.
4. To identify the most effective cost control technique use in Sri Lanka.

## Literature Review

As per the study background, identification of what drive successful delivery of construction projects is essential because many projects today are not successful compared to their expected results with the final outcome. In the current context, project managers are influence by both time and cost constrain to complete the project as expected. By identifying this issue, various cost control techniques are adopted by the project managers with the aim of mitigating the cost uncertainties during the project implementation. However, the knowledge regarding the relationship between those cost control techniques and construction project delivery is not certain, contradicted and have less researched on it. The literature review essentially carries out the detailed elaboration of various aspects and justifications regarding the effect of cost control methods on building construction projects.

### Factors that effect for project cost overruns

Different literatures have demonstrated various factors that lead to cost overruns based on diverse justifications. As per Azhar et al. (2008) there are 42 main factors which affect cost overruns in the construction industry of Pakistan. Some of those factors are high cost of machinery, improper planning, modes of financing and payment methods, high interest rates of banks, and unstable costs of the manufacturing materials.

According to Aibinu and Jagboro (2002), inflation of prices causes to fail projects. Project Budget is prepared by considering those economic factors, though unexpected price increases may not be in set budget. Further, fluctuation of exchange rates (Baloi and Price, 2003), unstable interest rates (Dlakwa and

Cuplin, 1990), lead to project cost issues with respect to economic conditions. As experienced in 2012 unexpected inflation created major effect in Maldives construction industry since the Maldives construction industry mainly depends on the imported resources.

In contrast, not only the economic conditions, but government and political aspects also influence to overrun the estimated cost of construction projects. Sonuga et al. (2002) depicted that unstable government policies majorly account for financial constraints in the construction industry. Moreover, according to Koushki et al., (2005) weak government regulation and control, political interferences are the leading cost control inhibiting factors in the construction projects. Unpredictable weather conditions also make a huge impact on cost control expectations specially in building constructions (Iyer and Jha, 2005; Kaming et al., 1997; Koushki et al., 2005). In addition to the micro and Macro economic factors, a large and growing body of literature points out project specific and management related features drives construction projects to the failures. These may include lack of proper guidance and experience of project management, unavailability of proper cost management software, inaccurate project evaluations, design changes, conflict between project parties, project frauds and corruptions, risk and uncertainty associated with projects and dependency on imported materials, (Egbu et al., 1998; Iyer and Jha, 2005; Frimpong et al., 2003; Kumaraswamy and Chan, 1998; Baloi and Price, 2003).

Further, Resources management plays a major role in construction industry. Managing resources in different construction projects in different locations can be difficult to keep track. When any piece of the construction project is not in the right place, it creates cascading effects on the project which



resulting lack of productivity, idle equipments and waste of materials. Thus, bad resource management can cause to lose money and time on project. Therefore, project success depends on the performance of input resources when controlling costs (Hendrickson, 1998). According to Hendrickson (1998), materials wastage can take place during the procurement process, storage, and during utilisation. Large amount of materials wastage can cause problem on most building sites and effect to the financial management constraints (Saidu and Shakantu, 2016). In addition to above mention factors, design changes, scope changes, inappropriate and inadequate procurement also can leads to delays and cost overruns (Olawale and Sun, 2010).

### Cost Control Techniques

The primary responsibility of project management is to control the cost of the project, time, performance and quality goals. Cost management is a one of the important task which drives project to a successful completion. This includes resource planning, cost budgeting, cost estimating and cost control. This cost management process can be enhanced through different software's, tools and techniques in order to control the costs. According to 'Project management book of knowledge (PMBOK)' there are few techniques which would be useful for monitor and control construction project .Some of those techniques are earned value management(EVM), Project cost-value reconciliation, forecasting, To-complete performance index (TCPI), Contract variance analysis(Unit costing) and performance review, reserve analysis.

From above mention techniques most popular decision making tool for project management is earn value concept. This system was firstly used by the

United States Department of Defense. Earn Value Management (EVM) is a precautionary advisory system for risk planning and cost accounting. The return value provides a fixed measurement unit which analyses the actual cost and schedule performance with what is intended to give a complete picture. The EVM technique facilitates a proactive approach to observe project progress and respond to the variance (Hayes and Miller, 2002). Earned Value Management Method engages many principles of PERT/CPM and WBS and is frequently found as an analysis tool in most mainstream project management software packages. Project Evaluation and Review Technique (PERT) is developed and tested as a cost control method which allows management to identify the estimated probability of project completion within a certain amount of time and cost. PERT method is similar to Critical Path Method (CPM), but Pert is more events oriented whereas CPM is activity oriented. This PERT chart provides the graphical illustration of the entire growth of the project indicating major events, dependent tasks, parallel tasks and tasks that should be accomplished in order, but that do not require resources or finishing time. Thus, PERT is used to schedule, organize, and coordinate tasks within a project as a project management (Burke, 2013).

To-complete performance index (TCPI) is one of the forecasting tolls of earned value management. It is a useful tool for people who are engaged in construction field (project managers, team members and other stakeholders). TCPI calculate projection of the cost performance of the project based on the value of reaming work. TCPI helps to reach set goal by improving cost performance of the project (Scott, 2012). Cost value reconciliation (CVR) is used in scrutinizing profitability of a project comparing cost

with value and time. This process is based on the comparison between payments received from the client for the interim bills issued by the contractor for the cost incurred in executing the work. CVR assists in providing management information for identification of problems, reasons for loss, necessity for reserves and provide information to avoid repeating of losses. Compared to Earned value analysis, Cost value reconciliation does not provide expanded details. Therefore, CVR is more suitable as a monitoring tool for upper management (Potts, 2008). In Contract variance – unit costs is calculated by dividing actual cost from each type of work that has been completed in the project. This provides actual unit costs that can be compared with the rates mention in contract document (Potts, 2008). Using above generated rates report can prepare to forecast final profit/loss situation of the project. Further, the final report is prepared based on monthly interim valuations agreed and approved by the client. As highlighted by Potts (2008) this method is mostly useful for projects with repetitive works, where urgency of corrective action possible. Therefore, this will help to reduce cost of future repetitive similar tasks in projects.

Further, Gantt Charts or Bar Charts are useful in the construction projects as a cost control tool because it enables to schedule resources in an effective and efficient manner. To complete a project successfully, it must control a large number of project activities and make sure that they are arranged in a sequential manner. If an activity passes beyond a certain time period, the end result will be affected by the rest of the project. As a result, project could be delayed and a higher amount of money would spend. Accordingly bar charts help to identify everything that needs to be done when each activity completed (Ahuja, Dozzi,

and Abourizk, 1994). In order to comply with estimated cost expectations during the project executions, construction industry uses Cost Breakdown Structure (CBS) with the assist of Work Breakdown Structure (WBS). Every item in the project is classified and identifies the list of expenditure categorization to obtain a more detailed assessment of cost. Therefore, CBS allows construction projects to identify Labour, material, equipment, overhead costs other related costs and further facilitate to control the costs as optimizing the core activities (Burke, 2013).

#### **Cost control Techniques on Construction Project Delivery**

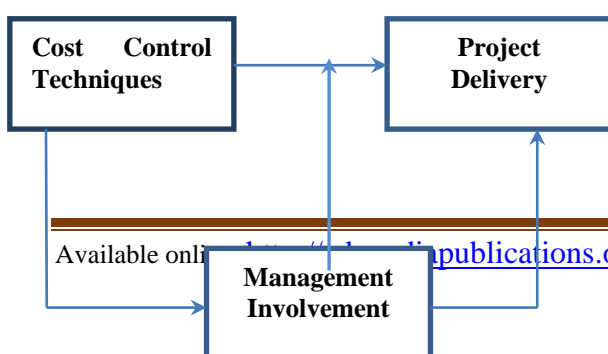
Most of the construction professionals and other planning bodies have recognized the importance of cost control techniques in the practical context. As per the study, Olawale and Sun (2010) there are 84% of respondents indicate that larger extent of cost control techniques use during their projects and 16% of respondents reflects that they are continuously applying cost control measures for their projects. The survey shows that there are no respondents or do not use cost control techniques. Therefore, findings of the study reveal that the importance of controlling the cost leads to the successful delivery of projects in the UK. The supportive evidence from Sohail and Baldwin (2004) reveals that professionals in the construction field have identified that cost control as the most crucial factor which impact to the on-time delivery of construction projects other than time controlling factors and project specific factors.

Further, researchers found that cost control techniques applied in the planning stage may not practical in the project implementation. Therefore, those unrealistic cost targets derived through cost control tools and techniques cause to the final project delivery to the clients since revisions for costs, tasks,

and designs may add further time and additional costs. In this sense, cost control techniques affect negatively on construction project delivery (Mansfield, Ugwu and Doran, 1994, Kumaraswamy and Chan, 1998). On the contrary, typically, the cost control methods developed before the implementation of construction projects play vital role in successful project delivery. Empirical studies have found that cost control techniques allow to identify their financial scope and resources and to allocate cost by identifying the future uncertain circumstances. Thus, in line with the planned and budgeted costs, project teams can carry out the rest of the project effectively. Those techniques focus on cost check aspects in every stage of the project in an efficient way (Kartam *et al.*, 2000). As per the extensive review of previous literature, cost control techniques have both positive and negative influence on project delivery. Some researchers reveal that cost controlling may lead to the quality of the final delivery. Further, expected techniques may not practice due to the economic, technological and project specific factors.

**Conceptual Framework**

Since the main aim of this study is to assess the impact of cost control techniques on construction project delivery, it will be helpful for development of the research to provide a conceptual model of the study as illustrated in figure1. This model has three variables, where cost control techniques acts as key independent variable and project delivery as the key dependent variable. Further, model consists of management involvement as moderating variable.



**Figure 1: Conceptual Framework**

**Research Methodology**

This study will examine whether the final project delivery of a project would be affected by cost control techniques used by construction industry in Sri Lanka. As a descriptive study, relationship between cost control techniques and construction project delivery will be analysed. The study expects to adopt a composition of qualitative and quantitative approach to conduct the research process. The role of cost control techniques in determining the project delivery will be widely scrutinized and questioned in relation with academically and theoretically due to the absence of universally accepted theory.

**Population and Sample**

The target population is consisted with different occupations employees who are working in leading Construction Companies in capital city of Sri Lanka. Sample will be selected 50 persons including both male and female with different working experiences. Non- probability sampling is the method of sampling in this research and convenience sampling will use as the sampling technique. Propose to conduct the research process using a quantitative method through a questionnaire and qualitative method using semi-structured interviews. The questionnaire is planned to develop based on the information gathered during the preliminary surveys in the form of onsite interviews. Further, it will be distributed at the interviews and also will send through Google forms.

Table 1: Sample Composition

### Data Collection and Analysis

The study expects to gather data through primary and secondary sources. Preliminary information will be gathered from structured questionnaires and semi structured interviews. Secondary data will be sourced from company publications. The questionnaire will be consisted with multiple choice scale questions related to cost control techniques and on time project deliveries. The questionnaire will be initially generated in English, and it will be translated into Sinhala for the purpose of getting better responses from non-managerial level employees. The questionnaire will be given for appropriate persons who responsible for cost controlling and implementation of the construction projects. This will ensure that data collection method addresses the rich details regarding the study. 25 questionnaires will be distributed among both managerial and non-managerial staff. Nearly 75% of respondents who complete the questionnaire will be managerial level persons who have significant experience in the construction industry with their knowledge and the Balance, 25% of respondents will be consisted of non-managerial portion that have greater experience in project implementation.

Table 2: Respondent Composition

Position	Number (Total 40)	Percentage
Senior Management	5	12.5%
Construction Management	10	25%
Financial Management	15	37.5%
Other Employees	10	25%

Population	400
Sample	50
Male respondents	32
Female respondents	18
Managerial respondents	38
Non managerial respondents	12

As the qualitative approach, this study aims to obtain semi-structured interviews from 06 respondents and expect to discuss on cost control techniques on construction project delivery.

#### 1.1. Descriptive Analysis

Descriptive analysis has been undertaken under the two basic aspects the part one check the internal consistency of the data set by checking the reliability of the data set. The following section of the chapter present the reliability analysis for the study.

Table 3: Reliability Analysis

#### Reliability Statistics

Cronbach's Alpha	N of Items
.793	2

Source: Survey Data, 2018

According with the findings of the study it has been concluded that the data set is having the internal consistency because the alpha value is greater than the 0.7 which is 0.793. The other important fact is that the descriptive analysis of the data which explains the behavior of the data set for the purpose it has been used the central tendency measures. The following table demonstrates the descriptive measures for the two variables of the study as the dependent and the independent variables.

Table 4: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std.	Variance	Skewness	
								Statistic	Std. Statistic
Project_Deli	50	2.00	3.00	5.00	4.0040	.46509	.216	.411	.337
Cost_Contr	50	1.79	3.21	5.00	4.0714	.39441	.156	.633	.337
Valid (listwise)	50								
very ol	50								

The both the variables are having the mean value which is close to the 4 which identifies that the majority of the respondents agreed on the indicators testing in the conceptual model of the study. Furthermore it has been identified that standard deviation which is less than 0.5. By analyzing the data it can be identified that the all the variables are having the positive skewness which is below 1.5. And the social role shows the highest skewness value. With this it can be identified the same tendency in the data set with the same standard error. The positive skewness further emphasis the tendency of the data towards the agreed opinion which shows the positive relationship with each other variable. The level of the relationship will be varied according with the data behavior. But still with the available data it seems that all the variables are having the same tendency which says the positive relationship between each variable. Furthermore the study has been identified the tendency of data set with the

understanding the study has been testing the hypotheses to reach the objectives of the study. According with the analysis of the descriptive it has been identified the normality of the data set by which the researcher has been used the parametric test for the testing the hypotheses. In other words the base assumption of using the parametric test for testing the hypotheses is that the normality of the data set which has been observed by the researcher.

#### 4.1. Hypotheses Testing

With the developed objectives of the study it has been developed the hypotheses for the study and tested the hypotheses for the study which has been demonstrated in the following section of the study report.

##### Objective One

- To analyze impacts of cost control techniques on building construction project delivery

According it has been developed two hypotheses to achieve the identified objectives for the study. According the following hypotheses has been developed and tested.

H1a: There is a significant relationship between project delivery and the cost control.

H1n: There is no significant relationship between project delivery and the cost control.

Since the hypothesis developed was a relational hypothesis it has been used the correlation analysis for testing the hypothesis. The following tables demonstrated the results of the hypotheses testing for testing the hypothesis.



Table 5: Correlation Analysis

		Project_Delivery	Cost_Control
Project Delivery	Pearson Correlation	1	.666**
	Sig. (2-tailed)		.000
	N	50	50
Cost Control	Pearson Correlation	.666**	1
	Sig. (2-tailed)	.000	
	N	50	50

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

Source: Survey Data, 2018

According with the table it has been identified that the significant value is 0.000 which is less than 0.01. This demonstrates that there is a significant relationship between project delivery and the cost controlling techniques. On the other hand it has been shown the correlation coefficient as 0.666 which demonstrate the moderate positive relationship between project delivery and the cost controlling techniques. Accordingly it has been identified the significant moderate positive relationship between the project delivery and the cost controlling techniques used by the organizations. With the result it has been accepted alternative hypothesis and rejected the null hypothesis developed by the researcher.

In achieving the first objective it has been further develop a hypothesis to check the impact of the cost control techniques on the project deliver of the

organization. The hypothesis has been developed as follows,

H2a: There is a significant impact on project delivery by the cost controlling techniques.

H2n: There is no significant impact on project delivery by the cost controlling techniques.

Table 6: Regression analysis

Coefficients <sup>a</sup>						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.807	.519		1.554	.127
	Cost_Control	.785	.127	.666	6.185	.000

a. Dependent Variable: Project\_Delivery

Source: Survey Data, 2018

As per the result it shows that the significant value is 0.000 which is less than 0.5 which indicate that the cost controlling techniques are having the significant impact on the project delivery. On the other hand it has been demonstrated that the beta value is 0.785 by which it can be drawn the regression line as follows,

$$\text{Project Delivery} = 0.807 + 0.785 (\text{Cost Controlling Techniques})$$

Furthermore with the testing result of the hypothesis it has been acted the alternative hypothesis and rejected the null hypothesis. In which it conclude as

there is a significant impact on the cost controlling techniques on the project delivery.

**Objective Two**

- To analyze factors relate to the final project delivery

According with the developed objective it has been developed the hypothesis to test the impact of different cost controlling methods on the project delivery for the purpose it has been used the multiple regression analysis for the study.

H3a: There is a significant impact on project delivery by identified cost control techniques

H3n: There is no significant impact on project delivery by identified cost control techniques

The following section of the study report present the results of multiple regression analysis for the study.

Table 7: Multiple Regression analysis

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.428	.555		.771	.445
EVM	.147	.136	.153	1.082	.285
1 Project_Costvalue_Reconciliation	.283	.133	.326	2.131	.039

Forecasting	.316	.101	.407	3.132	.003
TCPI	-.164	.112	-.222	-1.457	.153
Unit_Costing	.312	.194	.311	1.609	.115
Performance_Review	-.202	.155	-.224	-1.307	.198
Reserve_Analysis	.170	.128	.179	1.322	.193

a. Dependent Variable: Project\_Delivery

Source: Survey Data, 2018

Accordingly, it has been identified only the project cost value reconciliation and the forecasting is having the significant value less than 0.05 which is amounting 0.039 and 0.003. All the other selected cost controlling techniques shows the significant value which is more than 0.05 as for EVM 0.285, TCPI 0.153, unit costing 0.115, performance review 0.198, reserve analysis 0.193. Accordingly it has been identified that only the project cost value reconciliation and the forecasting is having the significant impact on the project delivery. All the other cost controlling techniques are having the insignificant impact on the project delivery. Accordingly it has been partially accepted the alternative hypothesis which has been developed by the researcher.

**Objective Three**

- To identify cost control techniques used in building construction projects

As per the objective the study effort is to identify the cost controlling techniques used by the industry.

Based on the developed conceptual model it has been already achieved the objective in which the comprehensive review of literature it has been already identified the cost controlling techniques used in the industry.

#### Objective Four

- To identify the most effective cost control technique use in Maldives

In identifying the most effective tool in the cost controlling it has been used the multiple regression analysis which has been in testing the hypothesis three in which the study has been considered the beta value of the regression analysis. In which it has been selected the highest beta value for the regression analysis. Accordingly it has been identified forecasting as the most effecting factor since the beta value is 0.316 which is the highest positive value. Accordingly it has been identified that the forecasting is the cost controlling technique which is having the most effecting factor on the project delivery.

Accordingly it has been achieved all the objectives of the study by analyzing the data. But still it is important to identify the validity of the model used by the study. The nest section of the study provide the analysis of the model fit used by the study which conclude the usability of the information derived by the researcher in the study setting.

#### 4.2. Model Summary

The model summary describes the fitness of the model for describing the dependent variable for the study purpose. The following table demonstrates the model summary for the study.

Table 8: Model Summery

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.666 <sup>a</sup>	.443	.432	.35056

a. Predictors: (Constant), Cost\_Control

Source: Survey Data, 2018

The model summary explains the R value of 0.666 and the adjusted R square value of 0.432 which demonstrate that the model used by the study explains the 43.2% of the dependent variable. In other wordings the independent variable of the study explains 43.2% of the changes of the dependent variable. As per the results it can be identified that the model used in the study is suitable for the study in which it explains the 43.2% of the change in the dependent variable.

Accordingly it has been identified the reliability as well as the validity of the data set which has been collected by the researcher in which it has been consider as the reliable as valid information for the purpose of decision making. Therefore it has been used for the making conclusions and recommendations. According with the discussions that the researcher had with the industry experts it has been identified that the ideas or the opinions that the study findings has similar meaning.

#### 5.1. Conclusion

With the understanding the researcher created on the comprehensive review of the literature which has been making the construct validity for the used conceptual model. The study has been used the conceptual model which has been validated by the



support of the empirical evidences. The analysis of the data has been reach to the objectives which has been set in the initial stage of the study setting. The testing hypotheses for the study have been done with the objective of achieving the identified objectives of the study as the solutions for the identified study questions. According with the study it has been make the conclusion on the followings in the study. As per the study it has been identified that there is a significant impact on the project delivery by the cost controlling techniques used by the organization. The same has been identified by the (Aibinu & Jagboro, 2002) in the study in the different economic condition accordingly it has been identified that even the economic conditions are different the impact of the cost controlling techniques on the project delivery is having the same impact. Furthermore it has been identified that the organization has to make the proper attention on the used cost controlling techniques by the organization. Therefore it has been further analyzed the data for getting in depth understanding on the cost controlling technique it has been used the further data analysis for the collected data. The other important facts have been reviled by having that in depth analysis which is demonstrated in the above chapter. The next section of the chapter has been made the attention on deriving the conclusions on the detailed analysis undertaken by the researcher.

Accordingly it has been identified that the project cost value reconciliation and the forecasting is an effecting techniques on the project delivery among the selected cost control techniques for the study. In which it has been identified that the other factors are having the insignificant impact on the project delivery which is having the different findings than the empirical evidences that the researcher has in the

comprehensive review of the literature. In other wordings the prevailing literature the opinion was on the primary responsibility of project management is to control the cost of the project, time, performance and quality goals. Cost management is a one of the important task which drives project to a successful completion. This includes resource planning, cost budgeting, cost estimating and cost control. This cost management process can be enhanced through different software's, tools and techniques in order to control the costs. According to 'Project management book of knowledge (PMBOK)' there are few techniques which would be useful for monitor and control construction project. But still the study finding the providing the different opinion than prevailing acceptance in the industry. Since the study finding emphasis only the two tools are having the impact on the project delivery and the other tools are not having the significant impact on the project delivery. But still the identified two tools which is having the significant impact on the project delivering has been identified as the most commonly used and the most recommended tools in the identified context. The same fact has been emphasis by the (Clark & Edwards, 1999) which also been conducted in the same context. The other important fact is that the organizational employee's willingness in implementing the identified tools in the business context than the other tools available which has been identified the user friendliness as the ley reason for the situation identified in the study findings (Zaha, 2017).

The final point to make the attention is that in identifying the most effective tool out of the identified impactful tools on the project delivery. As per the analysis it has been identified the forecasting as the most significant tool impact on the project

delivery of the organizational product delivery process. The important fact is that the study findings are having the higher impact from the economic conditions in the country especially since the developing economies are having the higher probability of having the frequent fluctuations in the economic factors. With the context it has been identified the same behavior which has been identified by the (Sarker, Egbelu, Liao, & Yu, 2012) within the study as well. The other important fact is that the identified trend is having the higher tendency towards the changing with the economical and socio cultural factors of the country which the organization operating.

Accordingly it has been developed the recommendations for the organization based on the study findings which has been highly influenced by the identified factors under the conclusion. Therefore the next section of the chapter provide the recommendations for the organizations operating in the industry to improve the project delivery which is a critical aspect of the business success.

## 5.2. Recommendations

With the conclusion made it has been developed the following recommendations for the practice with the limitation of using the recommendations on the similar economical and the socio cultural background. Accordingly it has been identified the following recommendations,

- Use cost controlling techniques for the organization in achieving the effective results for the final output of the project in delivering the expected out come to the end customer of the organization. Since the duration spending on developing the project

is high the level of having the variations is high especially because of the time factor.

- The other important fact is that the organization has to select the most effective tool in implementing it in to the actual organizational context. In other wordings select the effective tools and use it as the cost controlling techniques for the organization. As per the result it can be recommend the project cost value reconciliation and the forecasting as the most effective two tools that organization can use
- The other important factor is that the organization has to make the priority attention on the most significant factor as per the analysis it is forecasting which has been implemented in the organization.

## Limitations of the Study

This research carries out within several constrains, strategies and procedures which may affect negatively to the final findings.

Firstly, the sample does not reflect a fair illustration to represent the entire building construction industry in Maldives.

Secondly, final project delivery can be influenced from project particular and external environmental factors. However, this research does not take into consideration those influential factors on final project delivery as control variables within the study model.

Last, there may be some bias information from the respondents since expectations of the company management towards company owners may vary.

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