The Determinants of the Traditional Procurement Method

Sithy Safeena M.G.H[1], Athambawa Haleem[2], U.K.M. Musajith[3]

[1]Department of Management,

[2]Department of Accounting and Finance, Faculty of Management and Commerce, South Eastern University of Sri Lanka, Oluvil.

[1]ssafeena@seu.ac.lk, [2]ahaleem@seu.ac.lk

ABSTRACT

Selecting a suitable procurement strategy is becoming an increasingly important issue due to a dynamic decision-making process that customers must take early in the project lifecycle. The objective of this work is to investigate and strengthen the procurement system to achieve sustainable development in the construction industry by identifying, evaluating and ranking absolutely crucial factors affecting traditional procurement method selection. The data was collected from Deputy General Manager (DGM), Assistant General Manager (AGM), Project Directors (PD), Chief Engineer(CE), Procurement experts and consultants using the structured questionnaire. 90 respondents were response to this study from 11 construction companies/firm in Trincomalee, Battcaloa and Ampara district in the Eastern Province of Sri Lanka. The collected data was analyzed using the Statistical Package for Social Sciences (SPSS Version 20).

Initially, the reliability and the validity of the data was analyses and the result showed the collected data was fit for further analysis. Consequently, correlation and regression analysis were carried out the result revealed that there is a significant positive correlation between independent variables such as Client, Project Characteristics, External Environment with traditional procurement method whereas Cost, Time and Risk has a negative significant relationship with traditional procurement method. Further found that open tendering method preferred by most of the respondents in Eastern Province in Sri Lanka. Also, found that it is no significant difference for selecting the traditional procurement method among the different level of employees such as Deputy General Manager (DGM), Assistant General Manager (AGM), Project Directors (PD), Chief Engineer(CE), Procurement experts and consultants. Further, Client, Project Characteristics, External Environment Cost, Time and Risk has a significant impact on the traditional procurement method.

Keywords

Procurement, Procurement Methods, Construction, Construction Industries Affecting Factors, Eastern province

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

The construction industry is a key backbone of Sri Lanka's economy and it provides a prominent output to the economy by playing the role of an economic regulator. Political uncertainties which took place in the country during 1977 and late 2014 and 2015shifted the focus of construction industry towards rural construction from urban construction paving way for the development of new construction policies and procurement management. These changes are aimed at creating a stable economic environment and sustainable employment.

This study examines the factors that affect the traditional procurement method. The procurement system functions in the construction industry for over 60 years and increases its efficiency in Sri Lanka. In 1966, on behalf of the government, the Sri Lankan General Treasury published its Financial Regulations. It contains a chapter on procurement of public sector goods and services and construction works. In 1992, it was revised. These revisions were made to bring the efficiency process of procurement and to reduce the barriers in practice. As the revision was not given expected effectiveness, there was a need to change the existing practices. The General Treasury, therefore, issued a new guideline in 1996 and revised it in 1997. The executive board, known as 'National Procurement Agency' (NPA Guideline), was currently created for review. Current procurement procedure adopted is considered comprehensive. However, it does not prevent any irregularities as it is complex, high cost, low quality, high risk and takes prolonged time for finalization (Procurement guideline, 1997). Compared to private sector organisations, the public sector is hesitant to take effective decisions in this context. Therefore it is essential to examine the public sector procurement method in order to determine the factors that affect the procurement method to achieve better quality deliverables.

1.1 Statement of the Problem

Selections of procurement systems are not done with deliberate though by many clients. Most of the clients are selecting it to stay with the trend and as a default approach. A procurement seminar for Procurement Management organized by NWSDB that claimed that during the period 2005 to 2015, 89% of the respondents were dissatisfied with the procurement system. This was mainly due to the fact where the inexperienced client had to rely on the expert advice to select the procurement system which may not ultimately suit their requirement and experienced clients have a dependency on the conservative decision of the in-house experts.

The procurement process adhered by the government is expected to be structured in a manner to reduce delays and deliver the most cost-effective and quality output (Daya

Liyanage, 2006). However, the bidding process causes substantial delays on the process and failure to provide the expected output in a timely manner (International Labor Organization -ILO and World Bank). Most of the projects completed in the past such as road construction, building construction, water supply and irrigation have not met the required standards and expectation of the stakeholders. Hence, it leads to the question of which factors affect the traditional procurement methods? This research aims to analyses the factors affecting the selection of a traditional procurement method to address the problem at hand.

Literature Review

A Study conducted by Luu, Thomas & Chen (2011) describes procurement as "the process of acquiring or obtaining material, property or services at the operational level" and building procurement is described as "the combination of activities undertaken by a client to obtain a building" which are derived by tracing and linking various descriptions (Kumaraswamy & Dissanayaka, 1998). With the changing demands in the industry, it is imperative to adopt contemporary procurement methods which facilitate not only procurement management but also facilities management, financing and operating management (Masterman, 2002). Procurement method can be referred to as project delivery, procurement delivery or project approach in the construction industry (Mathonsi & Thwala, 2011).

Procurement methods are mainly classified into two types namely traditional procurement method and nontraditional procurement method. Non-traditional procurement method or contemporary method considers different factors such as design, construction, financing, facility management and operation (Masterman, 2002). Many clients in the current environment are seeking for alternative procurement methods due to increasing high complexity of the demands (Natasha , 2007). Further, Davis, Love & Baccarimi (2008), state that many procurement methods are available to choose for the construction industry. However, it is critical to decide which methods use during the early stages of the project implementation to get the best results and meet client expectations. Traditional procurement method can be categorized into three subcategories: Open tendering, Selective tendering, Negotiated tendering.

Procurement methods can be commonly classified as traditional and conventional methods in developed countries. These methods are unchanged and in use for over a century (Larmour, 2011). New types of procurement methods had emerged from 1945 and over the fifty years. Many methods had risen and fallen with the changes the industry had faced and the change in the structure of the project team. According to Larmour (2011), "the evolution of procurement methods can be classified into five phases. Phase 1 (1945-1972) is sustained economic growth, Phase 2 (1973-1980) is recession phase, phase 3 (1981-1990) is post-recession recovery, phase 4 (1991-2000) is recession and recovery and phase 5 (2001-2010) is sustained economic growth followed by recession".

2.1 Traditional procurement method

Traditional procurement method or conventional procurement method is a commonly used method for building works which are also referred to as bid build or design bid build. A traditional two-step contract method is called an accurate conventional method where design and construction work is carried out in parallel to give early start-up capability and lower cost security (Davis, Love & Baccarimi, 2008). Construction and design in the traditional procurement method are sequential and results in excessive cost (Larmour, 2011).

According to this method, the client is expected to design the project and prepare a tender with all relevant documentation and submit at a single stage in a competitive manner. The employer sees design work separate from construction in the traditional approach. Cost control and design are taken care of by consultants and the overall responsibility flows down to sub-contractors and suppliers. Usually, the contractor is appointed using a competitive tender. However, the contractor also is selected early based on negotiation and notional information.

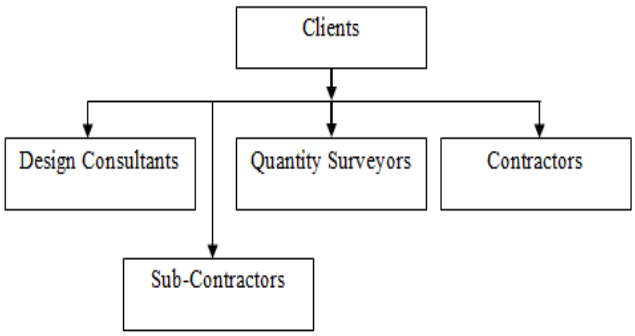

Figure1: User of Traditional procurement method. Source: Davis, Love & Baccarimi (2008)

The greatest strength of the traditional method is its simplicity where the contractor is responsible for the construction and the designer is responsible for the design. This gives the responsibility of coordinating with the sub-contractors to the contractor where each party knows where they stand what their responsibility is. The traditional method of procurement is a weakness in that the contractor has no right to take part in the design, risk allocation and costs since the consultant is responsible.

2.2 Key Points for Traditional Procurement Method

- A complete set of the document is required to be submitted before the tender is invited for a lump sum project which requires adequate time.
- Express terms should be included in the contract where concerns are foreseen that contractor does not have any design obligation due to the general assumption that a designer or consultant is responsible for design work.
- Consultant remain in total control over design and quality as the client appoints them to provide advice on matters related to the project
- A contractor having a dependency on the architect to provide the required instructions and information in a

timely manner creating a risk of a claim in the event of a delay

- Client's preference to use specialist entities during the project leading the contractor to maintain precautions about performance levels
- Employer's consultant having responsibility for all matters of payment and valuation
- Ability to use approximate quantity and nature of work where accurate information is not available under the traditional method.

2.3 Procurement Methods in Sri Lanka

When considering the context of Sri Lankan construction industry, price and quality are the key factors that decide the procurement methods for the acquisition of goods and services with the view of increasing profitability (Rameezdeen, & Ratnasabapathy, 2006; Ratnasabapathy, Rameezdeen & Lebbe, 2008). Most of the construction projects in Sri Lanka use the method of considering the value and pay methods while taking account of transparency and accountability. A very limited number of projects are procured by prime cost, lump sum and management contract approaches during the study period. Design and building procurement had appositive trend during the year 1996 and declines during the year 2000. When compared against other developing countries, the growth of design and building methods is not up to the expected level while the traditional procurement methods are more popularly used in Sri Lanka.

2.4 Procurement Methods in Eastern Province of Sri Lanka

Velnampy and Kamalarupan (2006) state that measure and pay procurement method is commonly used in the Eastern province from 1956. Low quality and high duration are the problems associated with this procurement method. Additionally, the study points out that unskilled professionals, lack of technical knowledge, inadequate fund and incorrect requirement assessment are the factors influencing the low quality and delay in the construction service in the region. Therefore, it is critical to conduct a study in the context of Eastern Province to accelerate growth and development. Further, very few studies in the field of procurement management have been conducted in the Eastern Province which makes this study significant for the policymakers to identify and address the shortcoming in the industry and develop new policies.

The stakeholders can not benefit from the hospital construction contract because of insufficient access for staff in the region (Report of the Auditor General, 2006). There are three X-ray plants that have not been used or maintained for the last three years because of technical shortages for Valachenai Hospital (Auditor general report, 2006). The 42 computers are not in use and are placed in stores for more than one year because computer technicians are not available (Provincial Audit Report, 2006). Dues to the fund not issued by the government and the lack of materials in the region, 52 percent allocation was not used by a project (NECORD Monitoring and Evaluation Report, 2006). The 43% grant was not used as a means of developing inadequate funds for the treasury, the shortage of professional personnel and building industry material and the shortage of construction industry (Provincial Treasury Administrative Report 2005).

Conceptual Framework

The conceptual framework gives direction to the study based on the researcher's own stance about the problem at hand using an existing framework adopted in a previous study or alter it to suit the current requirements. In addition to giving direction for the study, the framework also helps to identify the variables related to the research and clarifies the relationship between them. This ultimately drives towards linking the research problem and questions to forms the objective of this study which is illustrated in the following Figure 3.1.

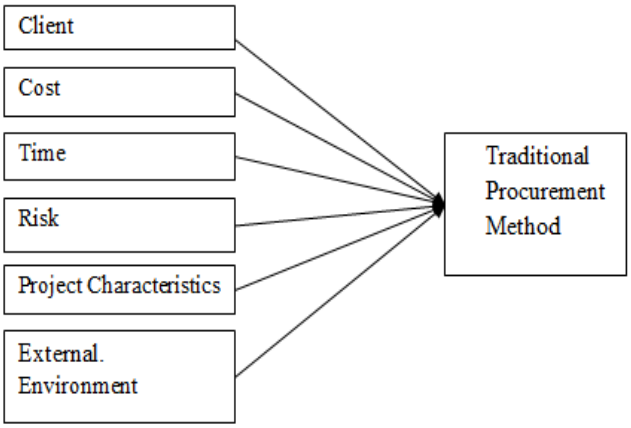

Figure 2: Conceptual Framework

The following alternate hypotheses are developed as follows.

Hypotheses

H_{a1}: There is a significant relationship between client and Traditional Procurement Method

H_{a2}: There is a significant relationship between cost and Traditional Procurement Method

H_{a3}: There is a significant relationship between time and Traditional Procurement Method

H_{a4}: There is a significant relationship between risk and Traditional Procurement Method

H_{a5}: There is a significant relationship between project characteristics and Traditional Procurement Method

H_{a6}: There is a significant relationship between the external environment and Traditional Procurement Method

H_{a7}: The selected factors affecting the procurement method has a significant impact on Traditional Procurement Method.

3.1 Methodology

Research Design

The research design will help to understand the various factors affecting the selection of an effective procurement method by answering the research questions. It will also help to identify the approach, philosophy, logic and outcome of this research which will help to maximize the controls

over the factors affecting the effectiveness of traditional procurement methods (Frazer and Lawley, 2000).

Sample and data collection

This research covers three districts falling such as Trincomalee, Battcaloa and Ampara of Eastern Province. The population of this research are the construction and consultant firm within the Eastern Province. 125 questionnaires were issued to collect data from 6 public Organization and 5 private Organization and the sample is planned as 35 of direct procurement professionals and as 65 of direct procurement officers from 06 public Organizations, 25 procurement processionals from 5 numbers private organization in the Eastern Province. The total 125 offices are classified as follows: the 45 Engineers; 55 offices and 25 private construction and consultant firm officers. Finally, the researcher selected only the Deputy General Manager (DGM), Assistant General Manager (AGM), Project Directors (PD), Chief Engineer (CE), Procurement experts and consultants due to the fact of them having a vast experience in procurement method management for large scale projects in Eastern Province. finally, 90 respondents were a response to this study.

For this research, a structured questionnaire was developed to gather data that is commonly used to collect data for research. A comprehensive structured questionnaire is designed to gather data from different professionals in the construction industry using Likert's five-point scale. The questionnaire consists of three sections; first section is focused on the demographic data of the respondents, the second section is focused on the main factors affecting procurement methods, the third section is focused on the traditional procurement method.

Data Presentation and Analysis

Demographic variables (General Information) were summarized in table 1.

Table 1: Summary of Demographic data

General Information	Levels	Frequency	Percentage (%)
District	Ampara	35	38.9
	Batticalloa	29	32.2
	Trincomalee	26	28.9
Position	DGM	2	2.2
	AGM	5	5.6
	PD	26	28.9
	CE	34	37.8
	Eng. /Any Others	23	25.6
Qualification	Ph.D	0	0
	Master	28	31.1
	Bachelor	42	46.7
	Diploma	17	18.9
	Any Others	3	3.3
Institution Type	Private	14	15.6
	Public	66	73.3
	Local Government Authority	10	11.1
Name of Place of Work	NWSDB	20	22.2
	RDA/RDD	23	25.6
	CEB	18	20.0
	Building Department	5	5.6
	LGA (MC, UC & PS)	10	11.1
	Privates Organization	14	15.6
Type of Project	Water Project	17	18.9
	Highway project	28	31.1
	Ele.Mechanics Project	11	12.2
	Building Project	10	11.1
	Adminis. Procurement	24	26.7
Years of Experience	From 1 to less than 5 yrs	2	2.2
	From 5 to less than 10 yrs	26	28.9
	From 10 to less than 15 yrs	22	24.4
	From 15 to less than 20 yrs	26	28.9
	More than 20 years	14	15.6

In the above table1, only 90 respondents were responded to the study, among these respondents, 35 (38.9%) respondents in Ampara district, 29 (32.2%) respondents in Batticalloa district and 26 (28.9%) respondents in Trincomalee district. Considering the position in the place of work demographic factor 2 (2.2%) respondents are DGM, 5 (5.6%) respondents are AGM, 26 (28.9%) respondents are PD, 34 (37.8%) respondents are CE and 23 (25.6%) respondents are engineers/others respectively. The distribution of qualification of respondents are 28 (31.1%) having a master degree, 42 (46.7%) having a bachelor degree, 17 (18.9%) having a diploma and 3 (3.3%) having certificate/others qualification.

The institution type data is distributed as 14 (15.6%) private sectors, 66 (73.3%) public sectors, and 10 (11.1%) Local Government Authority. Likewise, place of work is distributed as 20 (22.2%) are working in the NWSDB, 23 (25.6%) are working in the RDA/RDD, 18 (20.0%) are working in the CEB, 5 (5.6%) are working in the Building Department, 10 (11.1%) are working in the Local Government Authority (as MC, UC and PS) and 14 (15.6%) are working in the private organization.

The types of the project dealing distributed as 17 (18.9%) are doing water project, 28 (31.1%) are doing highway project, 11 (12.2%) are doing Electro-Mechanics project, 10 (11.1%) are doing a building project and 24 (26.7%) are doing Administrative Procurement.

Let's consider the distribution of years of experience, 2 (2.2%) of the respondents having less than 5-year experience, 26 (28.9%) of the respondents having 5 to 10-year experience, 22 (24.4%) of the respondents having 10 to 15-year experience, 26 (28.9%) of the respondents having 15 to 20-year experience and 14 (15.6%) of the respondents having more than 20 year experience. Finally, the value of the executed project is distributed as 16 (17.8%) projects are

1-2 million dollars, 20 (22.2%) projects are 2-5 million dollars, 41 (45.6%) projects are 5-10 million dollars and 13 (14.4%) projects are more than 10 million dollars.

4.1 Reliability Test

Conducting reliability of the scale testing prior to statistical analysis is very critical as it indicates the extent to which the measurements will be made in a consistent scale. According to Hair (2008), the commonly agreed Cronbach's alpha value is 0.7 which may decrease to 0.6 when conducting exploratory studies. Cronbach's alpha values derived from the study are shows in Table 2.

Table 2: Summary result of Reliability analysis

Main Factor / Variable	No. of Items / Sub Factors	Cronbach's Alpha
Client	9	0.874
Cost	5	0.959
Time	7	0.836
Risk	4	0.812
Project Characteristics	13	0.856
External Environment	16	0.963
Traditional Method	3	0.730

From the above table 2, the Cronbach's alpha values derived for variable client is 0.874, cost is 0.959, time is 0.836,risk is 0.812, project characteristics is 0.856, external environment is 0.963 traditional method is 0.730. The Cronbach's alpha results clearly indicate that the values are greater than 0.7 which explain that the reliability of the data was assured.

4.2 Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin (KMO) test is a measure used to check the suitability of data for factor analysis which provides an index value between 0 to 1. According to SPSS software package standards, it suggests that a KMO value of 1.0 supports a factor analysis and any value less than 0.5 is not agreeable to use for a useful factor analysis. KMO and Bartlett test results for variables are given in table 3.

Table 3: KMO and Bartlett's Test Results

Main Factor / Variable	KMO Test Value	Bartlett's P - Value	Adequacy
Client	0.853	0.000	Significant
Cost	0.886	0.000	Significant
Time	0.800	0.000	Significant
Risk	0.761	0.000	Significant
Project Characteristics	0.808	0.000	Significant
External Environment	0.934	0.000	Significant
Traditional Method	0.655	0.000	Significant

In the above table 3, KMO and Bartlett's test results show that all variables are statistically significant at 1% significance level because all p-values are equal to 0.000. This means that sub-factors under a particular main variable is consistence to measure the main factor. From the above statistical analysis results, it is confirmed that the traditional procurement method is commonly used in the Eastern Province.

4.3 Factor and Principal Component Analysis

Factor analysis and principal component analysis were carried out to reduce the respondent's response from sub-variables to main variables. In this research study, there are 6 independent main variables consisting of 54 sub-factors/sub variables and one dependent variable name as traditional method consisting of 3 sub-factors / sub-variables. The sub-factors/sub variables of the main variable are reduced by factor and principal component analysis. To explain the main variable, it is required a minimum 70% variation of principal components. The following table 4 clearly describes the number of principal components required to estimate the main variable and cumulative proportion of variation extracted by the principal components.

Table 4: Required Principal Components and Cumulative Proportion

Main Variable	No. of Principal Components Required	Cumulative Proportion of Variation Extracted by Principal Components
Client	3	70.233%
Cost	1	86.213%
Time	1	70.111%
Risk	2	86.481%
Project Characteristics	3	71.856%
External Environment	2	70.358%
Traditional Method	2	87.269%

From the above table 4 it has been considered first three principal components of variable client and subfactors extracted 70.233% original information, one principal component of variable cost is extracted 86.213% of original information, first principal components of variable time extracted 70.111% of original information, first, two principal components of variable risk extracted 86.481% of original information, first three principal components of variable project characteristics extracted 71.856% of original information, first two principal components of variable external environment extracted 70.358% of original information and first two principal components of variable, traditional procurement method extracted 87.269% of the original information. The above mentioned principal components of the particular variable are reduced to one main variable and this main variable is used for statistical analysis and take final decisions and policymaking.

In addition, a total of 54 factors that determine method selection were grouped into six principal and independent

variables, such as cost, client, time, external environment, project characteristics and risk. Out of these 54 factors, 12 factors were the most significant determinants in the selection of the construction procurement method of the Eastern Province listed below;

- Under **client** variable the following factors are high positive inter-correlation among the other factors, hence these are the deciding factors of client variable.
  - Client's experience in procurement methods.
  - Client's financial capability.
  - Availability of qualified personnel.
- Under **cost** variable, price competition has a high positive inter-correlation among the other factors, hence this is the deciding factors of cost variable.
- Under **time** variable, time constraints of the project has high positive inter-correlation among other factors, hence this is deciding factors of the time variable.
- Under **risk** variable the following factors are high positive inter-correlation among other factors, hence these are deciding factors of risk variable.
  - Risk avoidance/allocation.
  - Responsibility allocation.
- Under **project characteristics** variable the following factors are high positive inter-correlation among the other factors, hence these are the deciding factors of project characteristics variable.
  - Degree of project technical complexity.
  - Project size.
  - Project type and nature.
- Under the **external environment** variable, the following two factors have high positive inter-correlation among the other factors, hence these are the deciding factors of external environment variable.
  - Procurement policy.
  - Availability of the procurement system in the local market.

4.4. Correlation Analysis between Determinants and Traditional Procurement Method

Pearson correlation analysis is one of the key statistical tool used to check the relationship between dependent and independent variables to achieve the objective of the research study. In this section, correlation analysis is elaborated to prove the hypothesis of research goals. Pearson correlation test result between independent variable **client** and dependent variable traditional procurement method under the procurement method is given in table 5.

Table 5: Summary Result of Correlation Analysis between Determinants and Traditional procurement method

Variables	R-value	P-value
Client	0.217*	0.040
Cost	-0.351*	0.001
Time	-0.231*	0.028
Risk	-0.380*	0.000
Characteristics	0.431*	0.000
Environment	0.261*	0.013

From the above summary result of correlation analysis table 5 confirmed that a significant positive relationship exists between the client and traditional procurement method at 5% (p=0.040) significance. This means that 95% confirm that there is a positive correlation between client and the traditional procurement method. But the result showed that there exists a negative significant correlation between cost and traditional procurement method at 1% significance level since the P-value is less than 0.05 (p=0.001, r=-0.35). This explains that 99% sure that there is a negative significant correlation between cost and the traditional procurement method.

Further, It shows that there is a negative significant correlation between time and traditional procurement method at 5% (p=0.028) significance level. Hence, 95% confirm that there is a negative correlation between time and procurement traditional method. The above correlation table clearly describes that there is a negative significant correlation between risk and procurement traditional method at 1% significance level since p=0.000. It can be confirmed that 99% sure there is a negative correlation between risk and the traditional procurement method. It can be confirmed that there is a positive significant correlation between project characteristics and traditional procurement method at 1% significance level since p=0.000. This value explains that 99% confirm that there is a positive correlation between characteristics and procurement traditional method. Further, it shows that there is a positive significant correlation between the external environment and procurement traditional method at 5% significance level, because of p=0.013. This means that 95% confirm that there is a positive correlation between environment and procurement traditional method.

4.5 Simple Regression Analysis for Determinants and Traditional Procurement Method

Simple regression analysis is an advanced statistical tool used to check the relationship between dependent and independent variables.

The following tables 6 and 7 shows the result of simple regression output of client and traditional procurement method

Table 6: ANOVA for Client and Traditional Procurement Method

Model		Sum Squares	ofdf	Mean Square	F	Sig.
1	Regression	2.050	1	2.050	4.346	0.040[b]
	Residual	41.503	88	.472		
	Total	43.552	89			

a. Dependent Variable: Traditional Procurement Method

b. Predictors: (Constant), Client

Table 7: Coefficients-Client and Traditional Procurement Method

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.130E-016	0.072		0.000	1.000
	Client	0.290	0.139	0.217	2.085	0.040

a. Dependent Variable: Tradition Procurement Method

Simple regression model, procurement method on client is:
Traditional Procurement method = 1.13E-16+0.29*client
Result of simple regression ANOVA table 6 results it is confirmed that a simple regression model is significant at 5% (ANOVA table probability P=0.040). This means there is a significant relationship between the client and the traditional procurement method. Also, the coefficient of the client variable is significant at 5%. Also, a sign of the client variable in a simple regression model is a positive sign this indicates that there is a significant positive relationship between client factor and traditional procurement method (r=0.217, p=0.040). The following tables 8 and 9 shows the result of simple regression output of cost and traditional procurement method.
Simple regression analysis of cost and traditional procurement method is given below in table 8 and 9.

Table 8: ANOVA for Cost and Tradition Procurement Method

Model		Sum Squares	ofdf	Mean Square	F	Sig.
1	Regression	5.353	1	5.353	12.331	0.001[b]
	Residual	38.200	88	0.434		
	Total	43.552	89			

a. Dependent Variable: Tradition Procurement Method
b. Predictors: (Constant), Cost

Table 9: Coefficients-Cost and Traditional Procurement Method

Model		Unstandardized Coefficients		Standardizedt Coefficients		Sig.
		B	Std. Error	Beta		
1	(Constant)	9.006E-018	0.069		.000	1.000
	Cost	-0.245	0.070	-0.351	-3.512	0.001

a. Dependent Variable: Tradition

Simple regression model, procurement method on cost is:
Tradition Procurement Method = 9.006E-18-0.245*cost
Studying the above result of simple regression ANOVA table 8 results it is confirmed that a simple regression model is significant at 1% (ANOVA table probability P=0.001). This means there is a significant relationship between Tradition Procurement Method and cost factor. Also, the coefficient of cost variable is significant at 1%. Furthermore, a sign of the cost variable in a simple regression model is negative sign this indicates that there is a significant negative relationship between cost factor and Tradition Procurement Method (r= -0.351, p=0.001)
The following tables 10 and 11 shows the simple regression output of time and traditional procurement method.

Table 10: ANOVA for Time and Traditional Procurement Method

Model		Sum Squares	ofdf	Mean Square	F	Sig.
1	Regression	2.331	1	2.331	4.976	0.028[b]
	Residual	41.221	88	0.468		
	Total	43.552	89			

a. Dependent Variable: Traditional Procurement Method
b. Predictors: (Constant), Time

Table 11: Coefficients-Time and Traditional Procurement Method

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.001	0.072		0.019	0.085
	Time	-0.299	0.134	-0.231	-2.231	0.028

a. Dependent Variable: Tradition

Simple regression model, Traditional Procurement Method on time is:
Traditional Procurement Method = 0.001-0.299*Time

Analyzing the above simple regression ANOVA table 10 results it is confirmed that a simple regression model is significant at 5% (ANOVA table probability P=0.028). This means there is a significant relationship between Traditional Procurement Method and time factor. Also, the coefficient of the time variable is significant at 5%. Further, a sign of the time variable in a simple regression model is negative sign this indicates that there is a significant negative relationship between time factor and traditional procurement method (r= -0.231, p=0.028).
Further, the simple regression output of Risk and traditional procurement method are given below in table 12 and 13.

Table 12: ANOVA for Risk and traditional procurement method.

Model		Sum Squares	ofdf	Mean Square	F	Sig.
1	Regression	6.285	1	6.285	14.841	0.000[b]
	Residual	37.267	88	0.423		
	Total	43.552	89			

a. Dependent Variable: traditional procurement method.
b. Predictors: (Constant), Risk

Table 13: Coefficients-Risk and traditional procurement method.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.009	0.069		-0.125	0.901
	Risk	-0.386	0.100	-0.380	-3.852	0.000

a. Dependent Variable: traditional procurement method.

Simple regression model, traditional procurement method. on risk is:
Traditional procurement method = -0.009-0.386*Risk
Above simple regression, ANOVA table12 results show that simple regression model is significant at 1% (ANOVA table probability P=0.000). This means there is a significant relationship between traditional procurement method and risk factor. Also, the coefficient of risk variable is

significant at 1%. Also, a sign of the risk variable in a simple regression model is negative this sign indicates that there is a significant negative relationship between a risk factor and traditional procurement method(r= -0.380, p=0.000).

Simple regression output of project characteristics and traditional procurement method is given in below tables 14 and 15.

Table 14: ANOVA for Project Characteristics and Traditional Procurement method

Model		Sum Squares	ofDf	Mean Square	F	Sig.
1	Regression	8.090	1	8.090	20.076	0.000[b]
	Residual	35.462	88	0.403		
	Total	43.552	89			

a. Dependent Variable: traditional procurement method.

b. Predictors: (Constant), Project Characteristics

Table 15: Coefficients - Project Characteristics and Traditional Procurement Method

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.034	0.067		-0.501	0.617
	Project Characteristics	0.716	0.160	0.431	4.481	0.000

a. Dependent Variable: traditional procurement method.

Simple regression model, traditional procurement method on project characteristics is:

Procurement method (traditional method) = -0.034+0.716*Project Characteristics

The result of simple regression ANOVA table 14 results explain that simple regression model is significant at 1% (ANOVA table probability P=0.000). This means there is a significant relationship between traditional procurement method and project characteristics factor. Also, the coefficient of project characteristics variable is significant at 1%. Furthermore, a sign of the project characteristics variable in a simple regression model is positive this sign indicates that there is a significant positive relationship between project characteristics factor and traditional procurement method (r=0.431, p=0.000).

Simple regression output of external environment and traditional procurement method is given in below tables 16 and 17.

Table 16: ANOVA for External Environment and traditional procurement method.

Model		Sum Squares	ofDf	Mean Square	F	Sig.
1	Regression	2.971	1	2.971	6.442	0.013[b]
	Residual	40.581	88	0.461		
	Total	43.552	89			

a. Dependent Variable: traditional procurement method.

Table17: Coefficients- External Environment and Traditional Procurement Method

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.001	0.072		0.012	0.991
	External Environment	0.284	0.112	0.261	2.538	0.013

a. Dependent Variable: traditional procurement method.

Simple regression model, the traditional procurement method on project characteristics is:

Traditional procurement method = 0.001+0.112*External Environment

From the above result of simple regression ANOVA table 16 results, it is confirmed that a simple regression model is significant at 5% (ANOVA table probability P=0.013). This means there is a significant relationship between procurement method (traditional method) and external environmental factor. Also, the coefficient of project characteristics variable is significant at 5%. Moreover, a sign of the external environment variable in a simple regression model is positive this sign indicates that there is a significant positive relationship between external environment factor and traditional procurement method (r=0.261, p=0.013).

4.6 Analysis of Traditional Procurement Method

Traditional procurement method is measured by three categories named as Open Tendering Selective Tendering and Negotiated Tendering. The respondents summary information of these three categories is given in table 18 to table 20.

Table 18: Respondents of Open Tendering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very High Important	33	**36.7**	36.7	**36.7**
	High Important	46	**51.1**	51.1	**87.8**
	Averagely Important	11	**12.2**	12.2	**100.0**
	Total	90	100.0	100.0	

Table 18 clearly describes the importance of open tendering the answers are: 36.7% of respondents satisfied by very high important, 51.1% of respondents satisfied by high important and 12.2% of respondents satisfied by averagely important.

Table 19: Respondents of Selective Tendering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High Important	29	**32.2**	32.2	**32.2**
	Averagely Important	31	**34.4**	34.4	**66.7**
	Low Important	19	21.1	21.1	87.8
	Very Low Important	11	12.2	12.2	100.0
	Total	90	100.0	100.0	

Table 19 clearly shows the distribution of selective tendering the answers are: 32.2% of respondents satisfied by high important, 34.4% of respondents satisfied by averagely important, 21.1% of respondents satisfied by low important and 12.2% of respondents satisfied by very low important.

Table 20: Respondents of Negotiated Tendering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very High Important	1	**1.1**	1.1	**1.1**
	High Important	15	**16.7**	16.7	**17.8**
	Averagely Important	20	**22.2**	22.2	**40.0**
	Low Important	18	20.0	20.0	60.0
	Very Low Important	36	40.0	40.0	100.0
	Total	90	100.0	100.0	

Table 20 explains the distribution of negotiated tendering the respondents' answers are: 1.1% of respondents satisfied by very high important, 17.8% of respondents satisfied by high important, 22.2% of respondents satisfied by averagely important, 20.0% of respondents satisfied by low important and 40.0% of respondents satisfied by very low important.

If we compare the above three tendering methods open tendering under the traditional method of procurement method 100% of respondents satisfied by averagely important and above, selective tendering only 66.7% of respondents satisfied by averagely important and above and negotiated tendering only 40% of respondents satisfied by averagely important and above. These results clearly show that the respondents prefer open tendering method for traditional procurement method in the construction project in Eastern Province in Sri Lanka.

Moreover, one way ANOVA analysis was carried out to find out whether there is any significant differences among the Deputy General Manager (DGM), Assistant General Manager (AGM), Project Directors (PD), Chief Engineer(CE) and Others to choose procurement traditional method or not. The test result is shown in table 21.

Table 21: Result of one way ANOVA test

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.987	4	0.497	1.016	**0.404**
Within Groups	41.565	85	0.489		
Total	43.552	89			

The above ANOVA table 21 showed the probability value is p=0.404 which is greater than 0.05. This explains that there is no significant difference of selecting the traditional procurement method among the DGM, AGM, PD, CE and Others at 5% significance level.

4.7 Multiple regression analysis

Multiple regression analysis was done to check the impact of all independent variables (cost, client, time, external environment, project characteristics and risk) on the dependent variable (traditional procurement method). Tables from 22 to 24 show the result of Multiple regression analysis.

Table 22: Multiple Regression ANOVAa Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.163	6	5.861	58.03	0.000[b]
	Residual	8.389	83	0.101		
	Total	43.552	89			

a. Dependent Variable: Traditional procurement method

b. Predictors: (Constant), Environment, Characteristics, Risk, Client, Time, Cost

Table 22: Multiple Regression Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.040	0.062		-0.648	0.519
	Client	0.251	0.048	0.190	5.229	0.000
	Cost	-0.228	0.099	-0.297	-2.303	0.013
	Time	-0.295	0.054	-0.974	-5.460	0.000
	Risk	-0.347	0.102	-0.342	-3.403	0.001
	Characteristics	0.679	0.155	0.409	4.393	0.000
	Environment	0.225	0.057	0.223	3.947	0.001

a. Dependent Variable: traditional procurement method

Table 24: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.8985[a]	0.8074	0.8201	.18484062

a. Predictors: (Constant), Environment, Characteristics, Risk, Client, Time, Cost

From the above ANOVA table 22 output, it can be confirmed that there is a significant impact of all independent variables (cost, client, time, external environment, project characteristics and risk) on traditional procurement method since the p value is less than 0.05 (p=0.000). Further, Table 23 clearly indicates that all independent variables significantly contribute to traditional procurement method. Table 24 explains 80.74% independent variables (cost, client, time, external environment, project characteristics and risk) contribute to measuring Traditional Procurement Method since the R^2 = 0.8074 and the remaining 19.36% or the variance is explained by other factors. Finally, based on the result the multiple regression model for independent variables and the dependent variable is developed as follows:

Traditional Procurement Method = -0.040 + 0.251*Client - 0.228*Cost – 0.295*Time – 0.347*Risk + 0.679*Characteristics + 0.225*Environment.

4.8 Summary of the Hypotheses Testing

Research hypotheses were tested based on the correlation analysis and simple regression analysis. and the decisions are summarized and given in table 24.

Table 25: Result of Hypotheses Testing

Hypothesis	Pearson correlation Value	P – Value	Decision
H_{a1}: Client factors has a significant relationship with procurement methods.	**0.217**	**0.040***	**Accepted**
H_{a2}: Cost factors has a significant relationship with procurement methods.	**-0.351**	**0.001****	**Accepted**
H_{a3}: Time factors has a significant relationship with procurement methods.	**-0.231**	**0.028***	**Accepted**
H_{a4}: Risk factors has a significant relationship with procurement methods.	**-0.380**	**0.000****	**Accepted**
H_{a5}: Project Characteristics has a significant relationship with procurement methods.	**0.431**	**0.000****	**Accepted**
H_{a6}: External environmental has a significant relationship with procurement methods.	**0.261**	**0.013***	**Accepted**

Further, According to the result of multiple regression analysis, Ha7 is tested and the decision are summarized and given in table 26.

Table 26: Hypothesis testing results and their decisions using multiple regression

Hypothesis	R-Square value	P - Value	Decision
H_{a7}: The selected factors affecting the procurement method has a significant impact on the traditional procurement method.	0.8074	0.000	Accepted

Conclusions

Six main variables were considered in this study and all main variables are measured by sub-variables / sub-factors. It has been concluded that all sub-variables under a particular main variable are appropriate to study the main variables this is tested by the reliability and KMO statistical tests. The sub-variables of a particular main variable are reduced by principal component statistical technique appropriate principal components are selected using minimum variation selection criteria. Accordingly, twelve most influential factors affecting the selection of procurement method for a construction project in the Eastern Province such as Client's experience in procurement methods, Client's financial capability, Availability of qualified personnel, price competition, Time constrains of project, Risk avoidance/allocation, Responsibility allocation, Degree of project technical complexity, Project size, Project type and nature, Procurement policy and Availability of procurement system in the local market. Moreover findings showed that there is no significant difference of selecting the traditional procurement method among the DGM, AGM, PD, CE and Others at 5% significance level. And also it has been concluded that open tendering method is appropriate selected by most of the respondents in the Eastern Province.

Moreover the findings showed that all six independent variable (Cost, Time and Risk, Client, Project Characteristics and External Environment) were significantly correlated with the traditional procurement method. Among these Client, project characteristics and external environment have a significant positive relationship whereas cost, time and risk have a negative significant relationship with traditional procurement method. Further cost, client, time, external environment, project characteristics and risk has a significant impact on traditional procurement method since the p value is less than p=0.000 which is less than 0.05. it is explained that 80.74% independent variables (cost, client, time, external environment, project characteristics and risk) contribute to measuring traditional procurement method (R^2 = 0.8074) and the remaining 19.36% or the variance is explained by other factors.

5.1 Recommendations

Following recommendations are the key outcomes of the research which can be used to improve the identified areas and pave way for future studies in a similar context. All Consultants and client involved in the Eastern Province construction industry should make themselves familiar about the different types of procurement methods available as it can help them to make a well-informed decision about the procurement method selection. Attempts should be made by the organizations to hire qualified procurement staff who can assist with the selection of the appropriate procurement methods. The client and consultants should take the responsibility of monitoring the performance and quality of the selected procurement method. The organization should encourage and facilitate additional training and workshops to improve the knowledge about procurement methods which will lead to selecting the methods in a mathematical manner. Client requirement, objective and project goal should be clearly communicated to staff at all level to ensure the requirement is clearly understood to enable the team to come up with a sound procurement strategy. Procurement managers should be motivated to learn alternative procurement methods to help them decide which method is appropriate to be selected. The procurement managers should be encouraged to study alternative procurement methods before deciding which approach to be selected. A clear procurement method must be established during the planning stage of the project defining the roles and responsibilities. All construction-related stakeholders should formulate a systematic procurement selection approach

which can eliminate unnecessary demands during the project.

5.2 Implication of the study

Appropriate procurement method selection plays a key role during the life cycle of a construction project and it has the following importance:
This study will help the client to make a well-informed decision about the selection of the right procurement method considering the alternatives. Understand the factors affecting the selection of procurement method and develop a multi-criteria decision support model to assist with the future procure method selection in Eastern Province. Various issues arising in the construction industry causing a delay in the project and impact the quality. This situation is worsening day by day creating a larger risk for the client which should be avoided in future. Gaining a detailed understanding of the factors affecting the selection of procurement methods in the construction industry will help to address the issues in a proactive manner. Further, this study has provided a comprehensive knowledge and fresh initiative for exclusive decision making to the clients, contractors and financial advisers to react in achieving the quality and sustainable development of this country. The researchers and policymakers could use the conclusion and recommendation to find future research areas.
From the above observation and findings, traditional Procurement method is defined that any contract and supply should be delivered with competitive or current market prices, dealing with all legal procedures associated with the contract, budgeting costs, quality of deliverable goods and financial trends to ensure that government or company money is being spent wisely without any corruptions.

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5.3 Recommendations for Future Research

Following are the key suggestions that can be considered for future research about procurement methods. Further, explore about non-traditional procurement method such as design and build which will help to get the best results in construction projects. This study focus only six factors such as Cost, Time and Risk, Client, Project Characteristics and External Environment but Future research should give consideration to project-specific factors such as degree of complexity, project type, and time constraints since these factors should be included in developing a practical model to help in the selection of the right procurement method. Further, data were collected from Deputy General Manager (DGM), Assistant General Manager (AGM), Project Directors (PD), Chief Engineer (CE), and Procurement experts and consultants perspective only. Future research can be further expanded to analyze the stance from the perspective of other stakeholders such as contractors, donors and investors. A follow-up study can be conducted taking consideration of the various procurement methods and their impact on the project performance which will give more relevant data which the organization can use to improve their performance. Analysis from this study is based on the data collected during a specific timeline and it represents the status for the selected period. However, it is recommended to repeat this study every five years to understand a more relevant and recent pattern.

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