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Analyzing Procurement Performance of Public Infrastructural Sector Using Procurement Maturity Model

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Abstract

The measurement of procurement performance is a continuous exercise that includes the task of determining the efficiency and effectiveness of the procurement function in an organization. One of the most effective methods is to evaluate the organizational procurement maturity level. The research aims to develop the strategies for improvement of a procurement process by comparing with the best practices and analyzing the gap with the current procurement maturity level in public infrastructural sector of Karachi, Sindh, Pakistan. Procurement Maturity Model of Stephen R. Guth (2010) was selected for developing an improvement plan for procurement performance. For acquiring the necessary information, a literature study was successfully conducted to gather information related to different procurement maturity models. Furthermore, an assessment survey was distributed to respondents containing questionnaires for collecting primary data on the procurement maturity index of the respective organization and by using the PMM Guth Model (2010), the procurement performance was evaluated. Thereafter, with the help of the literature review, strategies were formulated for the improvement of procurement performance. The strategies were formulated only for selected indicators having value of high significance and correlation with the dependent variable, procurement performance. These correlations were determined by using SPSS software. As a result of the research process, after the analysis of the previously defined strategies, a proper action plan was developed in form of recommended strategies to initiate the improvement in the performance of the procurement processes and mitigate the gap between the existing practices and approved benchmarks of the procurement functions.

Keywords: *Procurement Maturity Index, Efficiency, Effectiveness, Maturity Model, Maturity Assessments, Supply Chain Management, Supply Chain Performance.*

Introduction

Globally, governments are spending a high volume of budget on the procurement functions both nationally and internationally. A significant portion of budget is spend on the procurement of goods and services. Public Procurement covers 15% of the world's GDP (Hussein et al., 2021). In developing countries, Public procurement in one form or another accounts for 70% of government expenditure (E-procurement strategy PPRA, 2015). According to the financial budget of Pakistan 2022-2023, 71% of the current expenditure is estimated to be spent on general public services by the public sector of Pakistan which equals to 6245.478 billion (Federal Budget, 2022-23). Public procurement in developing countries is predominantly executed in the infrastructural and social sectors. As per Asian Development Bank, the reforms in the procurement sector improve the spending performance by 1% of GDP (The national procurement strategy PPRA, GoP, 2013-2016). Therefore, it is crucial to continuously monitor and regulate the public procurement practices in order to ensure optimization in the procurement sector.

Due to malpractices of suppliers and contractors, the public funds are wasted creating financial burden on the national economy. The regions who are developed have undergone the reform procedures with respect

to public procurement while the developing countries are currently in the reform stage (Khan, 2018). For the improvement of the public procurement processes, it is vital to apply the concepts of legislation, rules, policies, regulations, skill development and capacity enhancement at individual and organizational level (Darnall et al., 2018).

A robust procurement strategy related to public infrastructure must address the inefficiencies owing to weak capacity of procuring agencies and time consuming processes. The National Procurement Strategy by Public Procurement Regulatory Authority, Government of Pakistan, 2013-2016 entails that the existing legal framework (5.1) encourages fairness, transparency, efficiency and accountability in the procurement process. Based on the key audit findings in Audit Report for public sector enterprises by government of Pakistan, year 2021-22, Sixty cases of mis-procurement due to violation of regulations and rules, procedures & standards were recorded amounting to Rs. 23,223.370 million. The report also recommends procurement in government sector must consider streamlining of processes to achieve economy, transparency, efficiency, fairness and value of money as per Rules of Public Procurement, 2004. In addition to this, according to the key findings of the audit report on the accounts of government of Sindh 2020-21, due to the non-compliance of SPPRA rules, Sindh government committed procurements related irregularities worth of over Rupees 41,985.317 million. It is evident that the public procurement of Pakistan certainly require improvement in the procurement processes. Firstly, it is important to determine the loopholes and critical areas contributing in inefficient public procurement processes.

Appropriate procurement strategies in public infrastructural sector will help in achieving optimal solutions in terms of cost, time and quality to meet the approved objectives. According to Stephen R. Guth (2010), the improvement in the procurement processes can be carried out by the determination of maturity level of the procurement process (Stephen R. Guth, 2010). The previous research in the same area of procurement maturity implies that there exists a positive interdependence among the level of procurement maturity and subsequent performance of the procurement method (Plomp et al., 2009). Also, the performance of the procurement process has a direct relationship with the maturity of allied strategies in planning stage of the procurement function (Rozemeijer et al., 2003). The higher level of procurement maturity implies better strategically development of the procurement functions which results in improvement of procurement performance. (Ubeda et al., 2014). Thus, the research aims to determine the procurement performance of the public infrastructure sector using maturity model as a tool to measure the gaps between the existing practices and approved procurement benchmarks and subsequently, providing strategies in form of recommendations for bridging the calculated gap for increasing the procurement maturity index. One of the main findings of the thesis is that the most suitable and extensive model to determine the procurement maturity is presented by Stephen R. Guth (2010) covering maximum aspects of procurement areas to be measured.

Problem Statement

The research surrounds on the evaluation of procurement maturity level and its correlation with the procurement efficiency and effectiveness which in combination is known as procurement performance. The research will proceed with the identification of maturity levels variation between the existing and expected conditions as per procurement maturity model under study to increase the performance of procurement sector. Subsequently, determination of the relations and linkage of the dependent variables with the independent variables will be carried out. After successful estimation of relation between the variables under study, the most significant and closely linked variables will be highlighted. Strategies will be developed for those variable having high correlation values so that procurement maturity level of public procurement sector can be increased. The outcomes projected in this research are recommended procurement indicators that must be taken under consideration for improving the working conditions of public procurement sector in Karachi, Sindh.

The research outcomes is in shape of strategies, developed in this research after deep analysis will be applicable in the different procurement agencies of Karachi, Sindh. This differentiates this study from prior works. Up till now, there is not any research conducted in Karachi, Sindh, Pakistan perspective that have developed a strategy for raising procurement maturity level based on the evaluation results of the procurement maturity model. The model is used only as an assessment tool.

Objective of the Research

The research is limited to the aim of the research which is to determine the procurement maturity level of different governmental departments in Sindh, Karachi. After successful data collection, the research objective is to evaluate the variation of the determined conditions with the best and ideal conditions in the model under study and thereby provide with recommendations in form of strategies to improve the level of maturity hence performance. The targeted public institutions are working to provide infrastructure services such as utility service, construction services, regulatory services etc. in Karachi, Sindh. The level of procurement maturity are mapped with the use of procurement maturity model by Stephen R. Guth (2010). The research utilized data collection tools such as survey, questionnaires and panel discussions. Literature study was conducted to gather the relevant data both for initial research work and for strategy development. Descriptive analysis was carried out to throughout the research work. The research outcomes are limited to strategies for successful improvement of procurement maturity indicators thereby improving procurement performance through both literature study and correlation analysis.

Literature Review

Procurement

Broadly, Procurement is defined as a process or an activity to get the goods and services needed by the organization in terms of their requirement and uses according to the value they perceive which includes quality, quantity, delivery time, customer service, packaging and affordable prices (Yukins and Schooner, 2007). According to United Nations, all major activities for the acquirement through purchasing or leasing of assets such as property that includes goods, products, items and real property and also of all services and works are defined as procurement. It includes the activities for the acquisition of goods and services. The acquisition process reflects all steps essential to acquire goods and services that begins with the stage of identifying and developing specifications also known as requirements, subsequent planning, costing and budgeting, engaging with invitations, acquiring necessary approvals, performing contract negotiations, and lastly closing the process through contract signing (United Nations, 2020). As per World Bank Procurement Guidelines, 2020 Procurement Process is stated as the process that begins with the identifying demand and need and followed by planning, developing requirements also known as specifications, budgeting, bid selection, award of contract, and contract supervision. The overall procedure completes at the end of the period of warranty (World Bank Procurement Guidelines, 2020). The procurement policy by Asian Development Bank encourages the practice of procurement processes upholding six core procurement principles that includes economy, efficiency, fairness, transparency, quality and value for money (ADB Procurement Policy, 2017).

The PPRA (Public Procurement Regulatory Authority), Pakistan ordinance, rules and regulations are also derived from the procurement manuals, guidelines and policies of World Bank and Asian Development Bank. Both the documents of PPRA are the combination of the manuals of World Bank and Asian Development Bank. According to the PPRA Ordinance 2020, public procurement definition entails the acquirement of goods, works and services that is funded completely and partially through public finances and includes provision of assets related to public and transactions that are commercially executed between procuring agency and other party. On basis of which the private party is permissible to engage in procuring agency's directed activities, that includes operations services and management, on its behalf, assume the use of public asset; or receive a benefit either from budget or revenue of the Federal Government or from fees

or charges to be collected by the private party for performing the procuring agency's function or any combination thereof (Amended PPRA Ordinance 2002, Public Procurement Regulatory Authority Ordinance, 2020 (As amended up to July 7, 2020). The guiding rules of PPRA states that the procuring agencies must ascertain that the procurement process executes justly, honestly and transparently, the objective of procurement activities is to ensure value return on each spend to the procuring agency and the procurement procedure upholds efficiency and economically executed. (Public Procurement Rules, Pakistan, 2004).

Procurement Performance

In this study, procurement performance is the dependent variable which will be measured through determining efficiency and effectiveness of the procurement process. Performance measurement holds a key position in modern public sector governance, as many developed and developing countries need to indicate the red tapes of the processes to measure organizational and individual efficiency and gaps by comparing it with the benchmarks. This practice helps and ensure that public sector organizations fulfill their mission and objectives (Rhodes et al., 2012).

Performance is the building block for the assessment of an organization. It entails the progress of an organization of accomplishing its pre-qualified objectives, identifying areas related to strengths and weaknesses and deciding on future initiatives with the aim to initiate the up gradation in the performance. According to cost- value equation, Measurement of procurement performance is dependable on the efficiency and effectiveness of the procurement function (Axelsson et al., 2005).

Procurement Maturity

In an organization, maturity means systematically and strategically execution of process that aims for improving the competency, potential and capacity of business matters and procedures and their parent organizations to achieve and deliver progressive outcomes with better and higher performance over a time period (Van Looy, 2014). The maturity is an aspect of organizational performance. It is the comparison of expected performance versus existing, actual, or current performance in practice (Van Looy et al., 2012).

The success of Procurement Maturity depends upon the how much the procurement processes are integral, consolidated, value-oriented, strategically adaptive, proactive, and centralized. Procurement Maturity can be defined as the measure of level of performance, effectiveness, efficiency and organization of a procurement department, compared to best practices.

According to Schweiger, a procurement maturity model is a tactical and strategic tool or instrument for extensively evaluating the relative aspects such as the existing policies, current processes, in hand resources and structural elements of the supply chain management and procurement function. It is measured in accordance with the predefined steps and predefined dimensions that are completely based on key measuring scores. The higher points indicate better maturity condition. The evaluation and point scoring of the achieved performance level can be logically executed independently by the parent company itself or by a third party. The overall objective is to create and sustain transparency in the procurement processes and about strengths and weaknesses of the procurement function to create a room for initiating improvement practices in order to achieve better responsiveness to present obstacles and forecasted or unpredictable challenges in future (Schweiger, 2016). Conclusively, Procurement maturity is a way to determine the procurement performance of the organization (Andreasen, 2012). In 1984, Van Weele also developed the link between procurement maturity and procurement performance. The organizations with high level of maturity observe advanced measures comparatively to organisations where procurement is a secondary function (Van Weele, 1984). In addition to this, Schiele proved that high level of maturity is inter connected with the success of procurement innovation introduction (Schiele, 2007). Modern tools and techniques such as e-procurement help in adding value in the procurement processes and makes them more

center-led. Enhancement of procurement function can be achieved my using updated technology and updated information. Mechanization of procurement functions is important to improve the procurement performance. It will help to achieve the objectives of cost reduction, expedition of procurement processes, ensuring improved inventory system hence improving procurement efficiency and effectiveness (Kalaskar et al., 2016).

Currently, evaluation of procurement performance not only deals with the traditional process but also measure the technological advancement of the organization in terms of procurement. A number of methods were studied to identify the models which include the analysis of procurement maturity in all the areas especially adaptation of technological tools as the Procurement maturity is an independent variable in this research. Thereafter, Procurement Maturty Model of Stephen R. Guth (2010) was selected as it covers all the aspects of measuring procurement maturity index.

Research Questions

The research employed the Procurement Maturity Model of Stephen R. Guth (2010).

Theoretical Framework

The research revolves around the accomplishment of the objective to probe into the factors which help to build an improved procurement efficiency in the government sector which is continuously working for providing timely services for infrastructural development in Sindh, Pakistan.

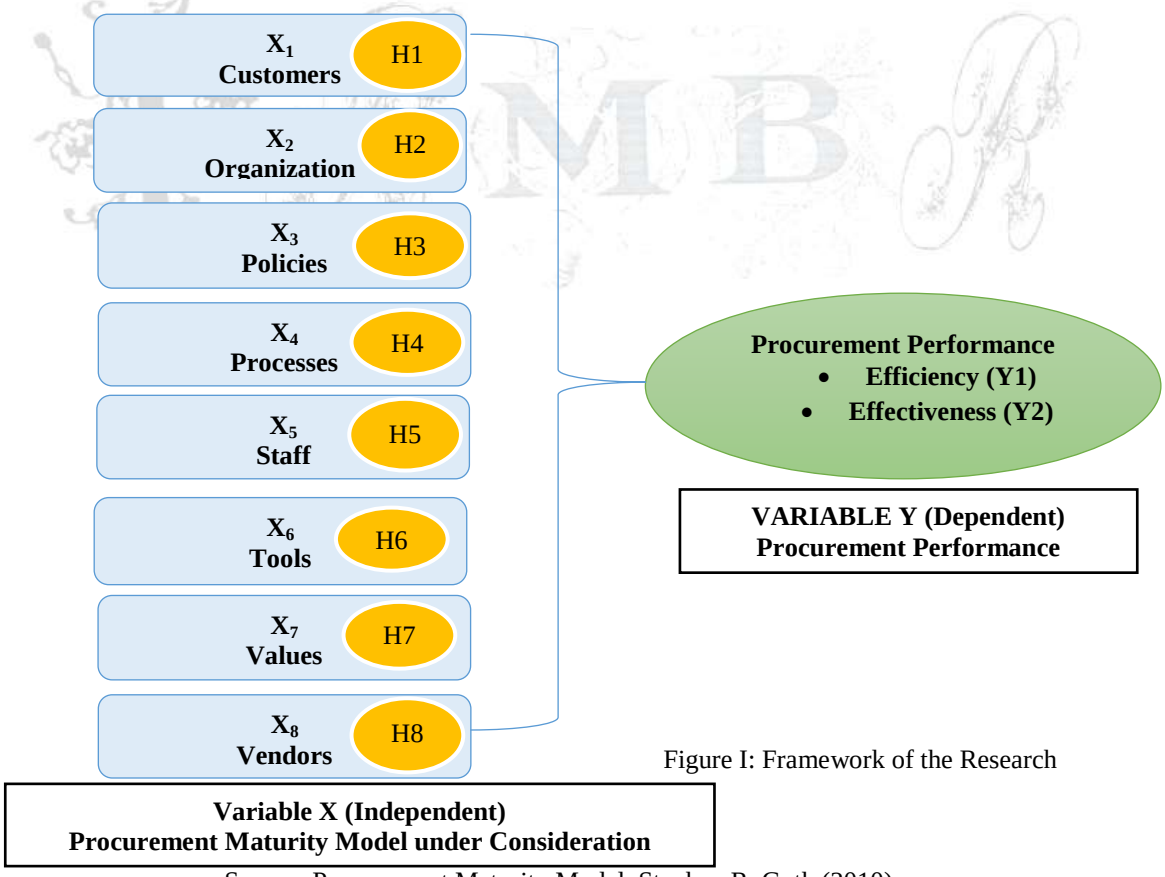

Figure I: Framework of the Research

Source: Procurement Maturity Model, Stephen R. Guth (2010)

The series of independent variables which are needed to be studied are given in the framework below which will help to determine the efficiency and effectiveness of the governmental procurement departments under consideration.

Research Variables

The extensive research through literature review and validation from experts implies that total key characteristics which are needed to be studied in this research for measuring the strength and level of Procurement Maturity are eight (8) in numbers. These aspects will be helpful in assessing the procurement process of the government organizations in Karachi, Sindh, Pakistan. In this research, the dependent variable is the Procurement Maturity Model variables whereas the independent variable is the procurement performance (efficiency and effectiveness). The indicators (sub-variables) of the dependent variables is also enlisted as under:

Table I: Procurement Maturity Variables and Sub-Variables (Independent or Predictor Variables)

S. No	Measurement Area of Procurement Maturity (Variables)	Measurement Elements of Procurement Maturity (Indicators / Sub-Areas)
X_1	Customers	Engagement, Procurement Instructions, Relationship Management, Satisfaction, Status Reporting
X_2	Organization	Best Practices, Business Plan, Executive Support, Mission Statement, Strategic Plan, Structure, Vision Statement
X_3	Policies	Approval Authority Levels, Business Continuity Plan, Delegation of Spend, Procurement Authority, Procurement Policy, Procurement Standards, Record Retention
X_4	Processes	Audit, Competitive Bidding Plan, Cost Reduction Plans, Forecast, Negotiation Planning, Purchase Order Generation, Spend Profile
X_5	Staff	Certification, Commodity Training, Customer Engagement, Employee Engagement, General Training, Job Qualifications, Performance Management, Performance Objectives, Procurement Training, Training Plan
X_7	Tools	Contract Approval Workflow Automation, Contract Labor Sourcing System, Contract Management System, Contract Templates, eRFx, External Website, Internal Website, P-Cards, Procure-to-Pay Process, Requisition / Purchase Order System, Reverse Auctions, RFx Templates, Third-party Research, Vendor Profile System / Vendor Portal, Vendor Relationship Management System
X_7	Values	Contract Disputes, Contract Risk Level, Contract Template Ratio, Contract Turn-around Time, Cost Avoidance / Cost Savings, RFx Turn-around Time
X_8	Vendors	Approved Vendor List, Measurements and Metrics, Vendor Categorization, Vendor Qualification, Vendor Rationalization, Vendor Recognition

Source: Procurement Maturity Model by Stephen R. Guth (2010)

The above mentioned determinants of Procurement Maturity will be measured in this research by collecting survey responses from different public entities. The analysis will quantify the level of procurement efficiency and effectiveness to subsequently determine the procurement performance. The efficiency and effectiveness with respect to the procurement business is defined in the table below:

Table II: Dependent Variables of Procurement Performance

S. No	Variable	Description
Y_1	Procurement Efficiency	It implies the optimal relationship between input and output. The procurement efficiency asserts that all the procurement operations, procedures, policies and processes are performed as per the approved plans and objectives.
Y_2	Procurement Effectiveness	When the goods and services are obtained in consonance with the defined objectives and target by the user, achieving high quality, reasonable and competitive advantages at optimal prices and dependable suppliers/vendors.

Source: Van Weele (2006)

Research Tools

The content and construct of the research instrument were validated with the help of experts. Moreover, a pilot survey of potential respondents was conducted to analyze their understanding of the questionnaire. The form was made available through Google Forms as well as distributed in person too. The level of procurement maturity was established by validating all 8 variables containing 63 indicators in total. These 63 sub-variables are considered to be procurement maturity assessment indicators.

The Procurement Maturity Model defined by Stephen R. Guth (2010) indicates the summative scale which is applied in this research method. The scale has values ranging from 0 to 3, with 0 being the lowest value and 3 being the highest value. The scale as mentioned in the questionnaire is based on Procurement Maturity Model scale having 4 different levels (0 to 3). It is a 4-point Likert Ordinal and interval scale having values beginning from 0 to ending up at 3. Each value has a description of practices which the respondents have to choose based on the current practice in their organization. There are 8 variables and 63 indicators. Each indicator has four different choices with interval value of one between them. The scaling is conducted by selecting one of the options from 0 to 3 that best represents the current situation of the organization. The weights of all the indicators are finally combined in the end to measure the Procurement Maturity Model value of the organization. In order to perform detail analysis, Guth (2010) further break down the four point Likert scale into six levels. This was achieved by dividing the scale of each interval into half to thoroughly analyze the procurement function and include more values with further minor differences such as 0.5, 1.5, and 2.5. With help of 6 point Likert Scale the scoring of the resulting procurement maturity was done more accurately and precisely. Resultantly, the division of maturity level as indicated in Procurement Maturity Model is represented in six phases with intervals of 0.5 as follows:

Table III: Score Scale of PMM

Maturity Level	**Range of PMM Score Value**	**Conditions**
Inhibiting	0-0.5	Users view the procurement process as a barrier, therefore they avoid purchasing through and do not really pay close attention to staff feedback
Performing	0.5-1.0	
Enabling	1.0-1.5	In general, procurement may add value, invest in system improvement, and users and vendors are satisfied. Procurement also gives attention to employee feedback and is oriented on improvement to adopt Best
Optimizing	1.5-2.0	

		Practices
Best in Class	2.0-2.5	Strategic procurement that uses a procurement automation system, has a high degree of user and vendor satisfaction, employs highly qualified professionals, and is focused on improving performance
World Class	2.5-3.0	

Source: PMM, Guth (2010)

Data Collection and Research

The research instrument specifically questionnaire for the collection of responses was formulated with the help of the variables and indicators from the PMM of Stephen R. Guth. The score scale was also developed by the same PMM model. The questionnaire was validated by the two experts having extensive experience in the procurement of goods, works and services both consulting and non-consulting. The validation is a significant step that is performed to determine the interdependence between indicators of procurement maturity and performance of organizational procurement. This will verify that by the help of measuring these indicators, it is possible to estimate the level of maturity of the procurement function and subsequently achieve objectives of improvement in procurement performance. It will provide the research a direction in a number of ways which includes that whether the indicators as mentioned in the PMM will help to identify the procurement maturity level, what is the volume and magnitude of influence of each sub-variable on procurement efficiency and effectiveness (procurement performance), and if the options of available answer for each sub-variable (indicator) against each score provides required relevance to evaluate the procurement function and ultimate process maturity of the organization. Furthermore, a pilot survey was performed by distributing questionnaires to five potential respondents to assess the depth of understanding of the survey questions and determine whether this survey questionnaire is aligned with the objective of the study.

Target Population Sampling and Sampling Technique

According to Mugenda and Mugenda, sampling is the one of the statistical technique which is related to selection of individuals, persons, observations with prime objective to gather information from the respondents of the target population under study. It is suggested that for an accurate and logical research work, with quality-oriented results and conclusions, it is advisable to use 30% of the concerned and target population to making up a sample. An acceptable and representative sample plays a pivotal role to achieve best results.

The research targeted fifteen (15) procurement departments of public infrastructural sector of Karachi, Sindh currently employing procurement staff in a range of fifteen (15) to twenty (20) in numbers. These responsive procurement personnel were engaged in the procurement practices at the executive and senior level, middle management as well as some responses were also collected to determine the practices at lower-level officials. The majority of the respondents were qualified and performing procurement practices in public sector from about fifteen to twenty years. The mandatory certification that is needed by the officials for the participation in the procurement practices in government sector was also acquired by most respondents. This certification is been conducted under the umbrella of Sindh Public Procurement Regulatory Authority (SPPRA), to officially permit the government representatives for taking part in procurement processes. All in all, the respondents were qualified, experienced and possess adequate knowledge to indicate the loopholes and critical factors in the current practices and put forward the ways to improve the procurement function collectively.

Thus the sample size was determined to be seventy five (75) respondents with a target population of two hundred and fifty (250) procurement practitioners. During the data collection phase, data was gathered from eighty two (82) public procurement professionals and was proceeded for analysis. Thus, the sample size was increased from 75 to 82 respondents by the population rise from 250 to 275 respondents.

After the data collection related to the critical procurement areas that needs improvement, from the officials engaged in public procurement of infrastructure services, extensive analysis of literature works were carried out to formulate strategies and bridge the gaps between the identified current practices and approved best practices of the procurement agencies involve in acquiring of goods, works and services in Pakistan. This exercise will result in developing a framework needed to be followed by the government sectors to achieve improved procurement performance.

Analysis

The collection of data was a time-consuming and strenuous process but after the successful acquirement of relevant data, the resulting inputs of the respondents were tested using SPSS software to check whether the gathered data is reliable, adequate, and valid. This step was significant to ensure that the collected data will lead the research toward desired error-free results. The Pearson Product Moment Correlation test, KMO & Bartlett test and Cronbach's Alpha test were used as a tool to measure the aforementioned characteristics. The tests results are as follows:

Pearson Product Moment Correlation (Validity Test)

The correlation values of the collected data was found to be all positive which shows that the dependent variable is correlated with the independent variables and hence valid.

Cronbach's Alpha (Reliability Test)

Cronbach's alpha of 0.70 and above is good, 0.80 and above is better, and 0.90 and above is best. The outputs achieved after the reliability test give us Cronbach's alpha is 0.987, which indicates a high level of internal consistency for our scale with this specific sample. Hence, the data pass the reliability test.

KMO & Bartlett (Data Adequacy Test)

The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. Here, we get KMO sampling adequacy 0.844. Next, Bartlett's test of sphericity is significant and the associated probability is less than 0.05. In fact, it is actually 0.015, i.e. the significance level is small enough to reject the null hypothesis. Thus, the data pass the adequacy test.

Next, after the data qualified the necessary requirements and give the required results, the analysis of the data was carried out by the researcher. This analysis was executed to find the difference of the recorded data in each area (63 indicators) with the approved benchmark in procurement maturity model. After the identification of the gaps between current practices and benchmarks, the mean score of the recorded data (X) was calculated. Moreover, with the help of SPSS software, the correlation of each indicator was checked with the procurement efficiency and effectiveness. This correlation gives us a clear picture of the dependence of X-independent variable (procurement maturity level) on Y-dependent variable (procurement performance) in this research.

The results of the research depicts the current and existing state of the procurement maturity of the public sector providing infrastructural services in Karachi, Pakistan. The gaps between the current procurement practice of government sector and the benchmarks specified in the procurement maturity model are portrayed using the radar or spider web chart. The figures elucidate the degree of variance evidently so that

the research proceed towards the development of strategies. These strategies will help in improving the procurement performance of Sindh government. It is necessary to conduct the gap analysis in optimal conditions in order to achieve the desired results of the research work. After the determination of procurement maturity index, literature study was performed by utilizing already available secondary data through reviewing prior research work, articles, journals, books and other research material. Moreover, interviews and panel discussions were also carried out to gather the information regarding the methods to improve the procurement performance of the public sector. A simple yet realistic solution were devised in form of strategies that will be best fitted to raise the procurement maturity level of selected sub-variable (among 63 indicators). The framework to perform the data analysis is given in the figure below:

Figure II: Process Framework for Data Analysis

Discussion

Measurement of Procurement Maturity Index

The responses acquired by the respondents practicing procurement in the public infrastructural sector served as the initial point for the assessment of procurement function. These eight (8) variables with altogether sixty three (63) indicators were the areas under study and their effect on the procurement performance was measured to evaluate maturity index.

Moreover, as described before, expert validation was carried out against the responses of each indicator. The substantial conditions of maturity level with respect to each sub-variable was evaluated to devise improvement strategies.

Identification of Variance between Expected and Current Procurement Practice in Sindh

The responses of the questionnaire was collected from the eighty two (82) respondents. The procurement practitioners scored the level of the current and existing procurement practice in their organization. After data collection, data was tested for validity, reliability, homogeneity and sufficiency using SPSS software. After qualifying all the aforementioned tests, the results of the questionnaire was subjected to data analysis process. Comparison of existing and benchmarked procurement quality conditions and procurement practices of the organization was performed. This activity measured the gaps between predicted procurement culture and current procurement culture in the public sector.

The table below represents the procurement maturity level of the organization extracted from the results of the filled questionnaire and the deviation of the current practices from the approved conditions in the PMM model.

Table IV: Results of the responses about Level of each Procurement Maturity Indicator

Indicator (X)	Name of Indicator	Present Maturity Level	Deviation
1.1	Engagement	2	(1)
1.2	Procurement Instructions	2	(1)

1.3	Relationship Management	2	(1)
1.4	Satisfaction	1	(2)
1.5	Status Reporting	2	(1)
2.1	Best Practices	2	(1)
2.2	Business Plan	2	(1)
2.3	Executive Support	2	(1)
2.4	Mission Statement	1	(2)
2.5	Strategic Plan	1	(2)
2.6	Structure	2	(1)
2.7	Vision Statement	1	(2)
3.1	Approval Authority Levels	2	(1)
3.2	Business Continuity Plan	2	(1)
3.3	Delegation of Spend	2	(1)
3.4	Procurement Authority	2	(1)
3.5	Procurement Policy	2	(1)
3.6	Procurement Standards	2	(1)
3.7	Record Retention	2	(1)
4.1	Audit	2	(1)
4.2	Competitive Bidding Plan	2	(1)
4.3	Cost Reduction Plans	1	(2)
4.4	Forecast	1	(2)
4.5	Negotiation Planning	1	(2)
4.6	Purchase Order Generation	1	(2)
4.7	Spend Profile	2	(1)
5.1	Certification	2	(1)
5.2	Commodity Training	1	(2)
5.3	Customer Engagement	2	(1)
5.4	Employee Engagement	1	(2)
5.5	General Training	1	(2)
5.6	Job Qualifications	1	(2)
5.7	Performance Management	2	(1)
5.8	Performance Objectives	1	(2)
5.9	Procurement Training	1	(2)
5.10	Training Plan	1	(2)
6.1	Contract Approval Workflow Automation	0	(3)
62	Contract Labor Sourcing System	0	(3)
6.3	Contract Management System	1	(2)
6.4	Contract Templates	2	(1)
6.5	eRFX	1	(2)
6.6	External Website	2	(1)
6.7	Internal Website	1	(2)
6.8	P-Cards	0	(3)
6.9	Procure-to-Pay Process	0	(3)
6.10	Requisition / Purchase Order System	0	(3)
6.11	Reverse Auctions	1	(2)
6.12	RFx Templates	2	(1)
6.13	Third-Party Research	1	(2)

6.14	Vendor Profile System / Vendor Portal	0	(3)
6.15	Vendor Relationship Management System	0	(3)
7.1	Contract Disputes	2	(1)
7.2	Contract Risk Level	1	(2)
7.3	Contract Template Ratio	2	(1)
7.4	Contract Turn-around time	2	(1)
7.5	Cost Avoidance/Cost Savings	1	(2)
7.6	RFx Turn-around Time	1	(2)
8.1	Approved Vendor List	2	(1)
8.2	Measurements and Metrics	2	(1)
8.3	Vendor Categorization	1	(2)
8.4	Vendor Qualification	1	(2)
8.5	Vendor Rationalization	2	(1)
8.6	Vendor Recognition	2	(1)

Table V: PMM Level and Score of the Public Infrastructural Sector under Research

OVERALL PROCUREMENT MATURITY SCORE	PMM LEVEL	PMM MODEL MATURITY LEVEL
Mean of the Acquired Score	**1.44**	**ENABLING**

The observations collected under the research from eighty two (82) respondents undergoes the evaluation and with respect to the procurement maturity model presented by Stephen R. Guth the procurement maturity score came out to be 1.44. As per the defined model, the score of 1.44 lies in the stage named as Enabling. This level which ranges from (1.0-1.5) can be improved and the level can be raised to the Optimizing stage which ranges from (1.5-2.0) and subsequently further improvements can upgrade the procurement performance to Best in Class and then World Class level.

The Table IV above represents that there are gaps in each area of the public procurement sector and some aspects need more improvement having gaps of (3) and others having difference of (2) and (1) from the benchmark practices need comparatively less improvements efforts.

Total number of indicators are sixty three(63) among which thirty one (31) indicators have deviation of one (1) point, twenty five (25) have the deviation of two (2) levels and 7 indicators have zero (0) score having deviation of three (3) points. These 7 cases are either not applicable/ practiced or not improved entirely in the procurement fields of Sindh.

Analysis of the of Variance between Expected and Current Procurement Practice in Sindh

The next step is to define and pictorially represent the variances between the realistic procurement practices of the public sector in Sindh and the best practices defined by the model. The analysis is achieved by the deviations represented in Table IV. The values of the gaps are presented in the table which helped in analyzing the situation more clearly and precisely.

These gaps interprets that there are some factors that decreases the efficiency of the procurement activities and the overall performance of the purchasing and procurement process of goods, works and services falls down. The research aims to identify the possible underlying root causes and subsequently formulate strategies to meet these differences for successful improvement of the procurement performance. This will not only make the procurement activities efficient and effective, but also will helps to achieve the objectives of procurement in timely manner providing quality results.

The pictorial charts will help to access the magnitude of gaps and efforts needed to overcome the deviations from best practices.

X1.1 to X1.5
Customer (X1)

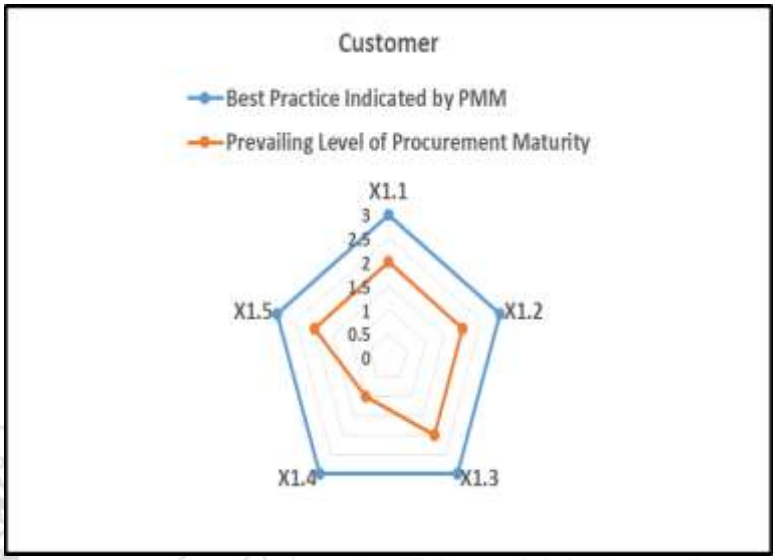

Figure III: Spider Web Plot based on Independent Variable Customer

According to the Figure III, total 4 indicators have the 1 point difference namely Engagement, Procurement Instructions, Relationship Management and Status Reporting while 1 indicator have the gap of 2 points from the expected procurement maturity level of 3. This indicator is Satisfaction.

The indicator X1.1 in PMM elucidates that the engagement of the procurement agency with the customer must be in a way that the staff of procurement gets engaged in the overall project life of the customer in the initial stage. This will help in conducting efficient bidding activity with maximum competitiveness. The procurement instructions X1.2 with accordance to best practices under PMM means that the procurement manual must be documented and the processes, procedure and methods should be clearly defined with no ambiguity. Moreover, the manual must be electronically available to internal staff. The next indicator having 1 point gap X 1.3 complies that the effective customer relationship management can be achieved by understanding the behavior of the customers in the procurement process (suppliers, contractors, consultants, bidders, stakeholders etc.) and improve the retention degree of the customers to acquire a long term relationship. Maximum attention to customer advantages through profits, purposeful communication and customer loyalty is needed for efficient CRM (Swift, R. S., 2001). Next for X1.5, Salcedo in 2017 defined Status Reporting an important factor for achieving best customer service. According to Salcedo, the means of improving the status reporting is to ensure that the all bidder requests are equally evaluated and addressed and the customer are updated about the overall procurement cycle (Salcedo, 2017).

A two level gap of X1.4 Satisfaction as defined by model indicates that the maximum customer satisfaction can be achieved through conducting feedback surveys and then corrective measures taken after the indication of the critical areas by the customer. The frequency of these performance feedback surveys should be regular, at least annually conducted.

X2.1 to X2.7
Organization (X2)

Figure IV: Spider Web Plot based on Independent Variable Organization

According to the Figure IV, total 4 indicators have the 1 point difference namely Best Practices, Business Plan, Executive Support and Structure while 3 indicators have the gap of 2 points from the expected procurement maturity level of 3. These indicators are Mission Statement, Strategic Plan and Vision Statement. The best practices X2.1 reflects the need of approved objectives, processes and procedures for achieving the determined goals of a business (Williams-Elegbe, S., 2015). According to PMM, Business Plan X2.2 indicates the requirement of document manual prepared by the internal procurement staff in accordance with the vision and mission of the agency. Executive support X2.3 reflects the management assistance in terms of skill development, budget allocation, provision of resources etc. to the procurement unit. Moreover, Structure of the Organization X2.6 stress upon the need of centralized system of procurement that not only encourage cost reductions, but also increase market competition among the bidders and provide optimal negotiations of commodity prices (Sorte, W. F.,2013).

For the 2 point gap of X2.4 Bartkus et al. elucidates that the mission statement of an organization must be understandable to the procurement staff, indicating the aims and objectives of the organization (Bartkus and Glassman, 2008). It is of vital importance that the processes of the procurement department must be aligned with the mission statement (Crotts et al., 2005). The strategic plan X 2.5 highlights the fact of documented framework that is comprehended by the procurement practitioners without any difficulties and is prepared by the management itself. At last, X2.7 Vision statement ensures the availability of documented vision statement in accordance with the organizational goals.

X3.1 to X3.7
Policy (X3)

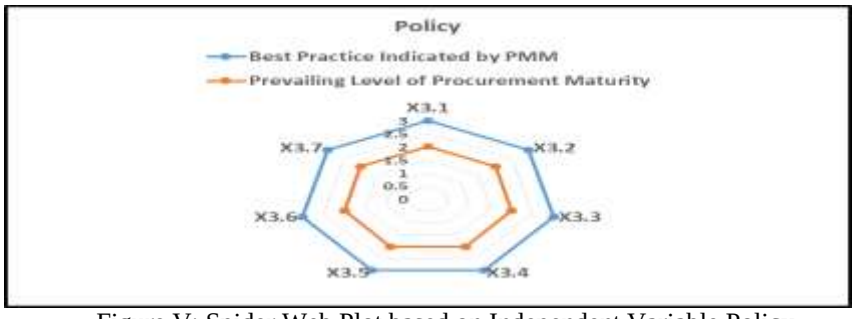

Figure V: Spider Web Plot based on Independent Variable Policy.

According to the Figure V, all 7 indicators have the 1 point difference namely Approval Authority Levels, Business Continuity Plan, Delegation of Spend, Procurement Authority, Procurement Policy, Procurement Standards and Record Retention from the expected procurement maturity level of 3.

According to PMM, the first indicator of Policy variable X3.1 Approval authority levels means that the official approvals for the procurement processes must be realistic in numbers and is well aware about the undergoing financial investment. For Business continuity plan, X3.2 reflects the documented framework which is religiously practiced to eliminate all form of risks and threats associated with procurement (Zsidisin et al., 2003). For X3.3 Delegation of Spend the PMM indicates that effective procurement practices ensures that spends are documented and formally conducted and is as per the standards specified by procurement manuals. X3.4, Procurement authority, according to Saddam Hussein et al. is effective if the procurement activities ascertain maximum value of return against each spend and is maintaining objectives of quality and transparency with efficient monitor controls. X3.5, Standard Procurement Policy under any public procurement agency is in line with the vision and mission statement of the procuring agency, updated and documented in such a way that it is easily understandable by the procurement team. X3.6 Procurement standards, according to Procurement Manual of United Nations dated 2020 allows the organization to uphold integrity, equity, fairness, and reduce risks associated with the procurement practices. The last indicator under this area, Record Retention, according to the model under research, necessitate that the procurement records are maintained regularly according to the policies and rules specified in the procurement manual.

X4.1 to X4.7
Process (X4)

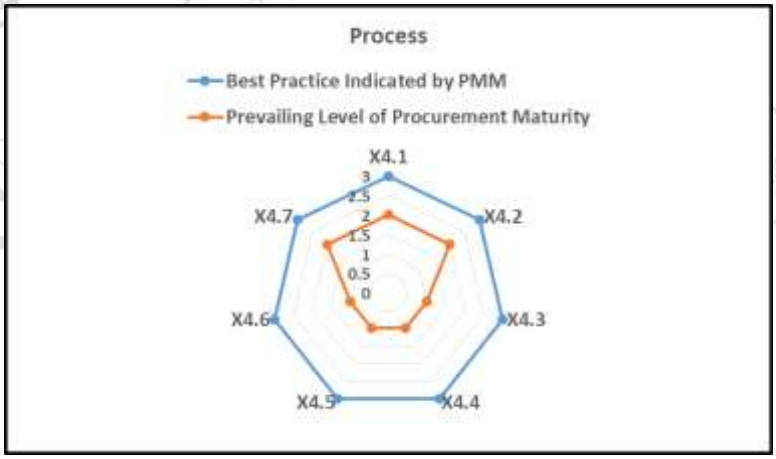

Figure VI: Spider Web Plot based on Independent Variable Process

According to the Figure VI, total 3 indicators have the 1 point difference namely Audit, Competitive Bidding Plan and Spend Profile while 4 indicators have the gap of 2 points from the expected procurement maturity level of 3. These indicators are Cost Reduction Plans, Forecast, Negotiation Planning and Purchase Orders Generation.

The indicator X4.1 Audit, according to Bender, the effective audit includes the measure of competency, compliance with the regulations and procurement standards, quality check of the processes and adhering to legal regulations (Bender, R., 2006). X4.2 Competitive Bidding Plan includes the need of yearly creation of the framework to execute the activities of termination, rebidding, and new purchasing as per standards specified in the plan. The indicator 4.7 Spend Profile indicates that the E-procurement technology is an essential tool to monitor and indicate bottlenecks in the spending by the procurement function (Morsinkhof,

2018). The user friendly software helps in making decision manually to improve the procurement performance.

The indicators having 2 point gaps are discussed here. X4.3 Cost Reduction Plans enforce the yearly formulation of plans to reduce spend associated with the procurement of existing commodities and services. For X4.4, Forecast, according to Ripin, D. J. et al., Forecasting is an annual requirement of an organization to minimize cost associated with the predicted future procurements, identifying suppliers, and locating expected procurement volumes (Ripin, D. J. et al., 2014). X4.5 Negotiation Planning stresses that the planned and meaningful negotiations must be conducted by the internal customers, complying with the strategic objectives. Lastly, X4.6, Purchase order generation means that the maximum financial consumption by the procurement function must be through the purchase orders using an automated system or electronic means to increase the quality of the process.

X5.1 to X5.10
Staff (X5)

Figure VII: Spider Web Plot based on Independent Variable Staff

According to the Figure VII, total 3 indicators have the 1 point difference namely Certification, Customer Engagement and Performance Management while 7 indicators have the gap of 2 points from the expected procurement maturity level of 3. These indicators are Commodity Training, Employee Engagement, General Training, Job Qualifications, Performance Objectives, Procurement Training and Training Plan.

The indicators under the staff variable having 1 point of difference from expected performance level are described here. According to Guth, the sub-variable X5.1 Certification entails that the procurement department officials are certified in the procurement field such as Certified Procurement Management Professional certification. Next X5.3, Customer Engagement, according to Patterson et al., effective customer engagement is the result of indulging customers physically as well as emotionally utilizing their cognitive skills in the enhancement of procurement processes of the organization (Patterson et al., 2006). Next, X5.7 performance management is the outcome of the evaluation of the performance of the organization, duly documented, to improve the loopholes and address the performance gaps of the procurement team.

The two point difference sub-variables first include X5.2 Commodity training, which requires at least twenty four hours of yearly training of the procurement professionals. X5.4, Employee Engagement refers to the need of the monitoring and evaluation by external parties to measure the level of engagement of the procurement staff followed by corrective actions. For X5.5, General Training, according to Tsui et al., the rate of importance given to employee training is directly proportional to commitment by the staff and thus

it maximizes the productivity of the organization (Tsui et al., 1997). Training (General or Relevant to the field), improves employee workflow and minimizes the errors in the regular tasks, leading to upgraded performance values (Yoo et al., 2007), cognitive ability and competitiveness of the individual (Colbert, 2004). For X5.6, Job Qualifications, the PMM entails that the procurement practitioners must have relevant professional qualification in field of procurement. X 5.8, Performance objectives in the model highlights the fact of necessary documented structure of key performance indicators to evaluate the capacity of the procurement department. X5.9, Procurement Training is the essential element of the staff variable as it stresses upon the requirement of training provided to the procurement staff to access their procurement ability and mitigate any discrepancies in their practices. Lastly, Training plan X5.10 requires the official training schedule in the department duly followed and minimum seventy two hours of yearly training programs must be conducted in the organisation.

X6.1 to X6.15
Tools (X6)

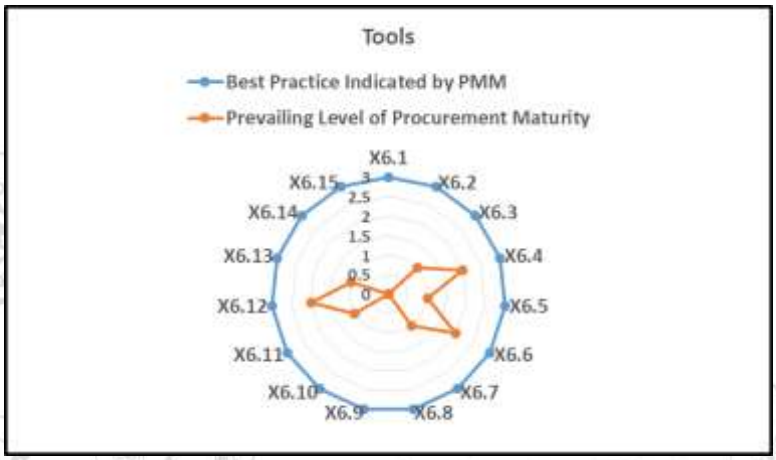

Figure VIII: Spider Web Plot based on Independent Variable Tools

According to the Figure VIII, total 3 indicators have the 1 point difference namely Contract Templates, External Website, and RFx Templates while 5 indicators have the gap of 2 points from the expected procurement maturity level of 3 namely Contract Management System, eRFX, Internal Website, Reverse Auctions and Third-Party Research.

Other 7 indicators out of 15 have 3 point difference. These are Contract Approval Workflow Automation, Contract Labor Sourcing System, P-Cards, Procure-to-Pay Process, Requisition / Purchase Order System, Vendor Profile System / Vendor Portal and Vendor Relationship Management System. Either the system related to these indicators are not used entirely or there is no business structure to support the use of these related indicator systems.

For indicator X6.4, Contract Templates, the model indicates the need of reasonable and pre-qualified template utilization for the effective procurement system. For X6.6, external website, an efficient system uses a portal or online mechanism for exchanges of information between bidders and procuring agency. X6.12, RFx templates means that the pre-qualified and approved templates are used by the procurement department for the preparation of bidding documents and staff is well familiar with them.

For the indicators having 2 level variation, the first indicator X6.3 contract management system elucidate that the overall process of procurement is managed by an automated technology by external party. All the affairs of vendors and procuring agency are executed electronically through the technological means. Next, X6.5 eRFx emphasize that the external electronic system is used for the bidding documents exchanges.

X6.7, internal website underscores the need of the electronic means to transfer information between staff, stakeholders and other department employees. Reverse Auctions, X6.11 stresses upon the requirement of online reverse auctioning medium to sale public goods. For X 6.13, third party research, the model specifies the need of access to research resources to the procurement officials for any goods or services that needs data and information gathering before the initiation of procurement process.

The indicators having 3 level of deviation are those sub-variables that needs a system which is not currently practiced in Pakistan. For this purpose, the respondents have scored 0 or cross that shows that the organizations are deprived of any technological structure to support the installation of the automated system. The indicator X6.1, Contract Approval Workflow Automation entails that the contracts are monitored and executed using an automated tool. For X6.2 Contract Labor Sourcing System, the model suggests an automated operation for selection and acquirement of contractors must be utilized for better competitiveness. The next indicator X6.8 Procurement Cards ascertain the use of cards for procuring of goods and services and the holder gets a monetary advantage if the purchases exceeds a specific amount. X6.9, Procure to Pay Process underlines that an effective procurement process utilizes automated processes of purchasing and payment. Next, For X6.10 PO system, model suggests that efficient buying processes are performed through the use of automation in generating purchase requests. For Vendor Portal X6.14, the best practices provide vendors and suppliers a portal to input their documents and information for submission to the purchasing party. Lastly, X6.15 Vendor relationship management delineate the use of technological automated tools to get the information of vendors such as service levels in an effective manner by external resources.

X7.1 to X7.6
Value (X7)

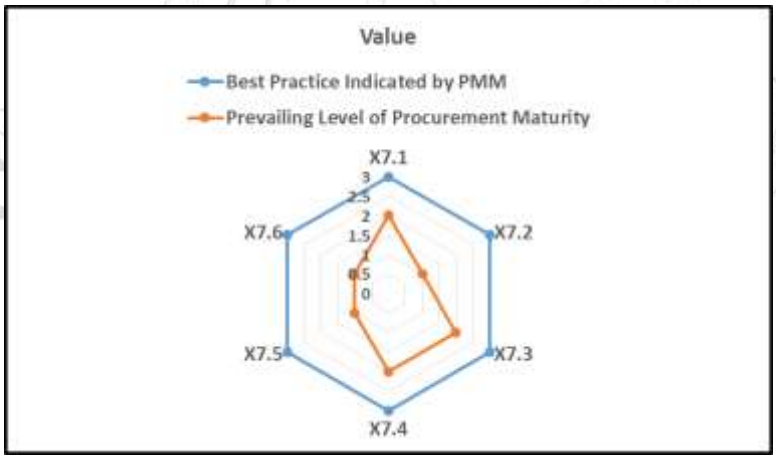

Figure IX: Spider Web Plot based on Independent Variable Value

According to the Figure IX, total 3 indicators have the 1 point difference namely Contract Disputes, Contract Template Ratio and Contract Turn-Around Time while 3 indicators have the gap of 2 points from the expected procurement maturity level of 3. These indicators are Contract Risk Level, Cost Avoidance/ Cost Savings and RFx Turn-Around Time.

For indicator having difference of 1 score, X7.1 Contract Disputes, Hinchey in 2012 described that the strategic procurement practices make a positive impact on the resolution of disputes in timely manner (Hinchey, 2012). For contract template ratio, X7.3, the best practice needs the use of contract templates in the contract formulation and management activities. For X7.4 Contract Turn Around Time, the expected performance of the organization requires that the maximum contracts completes the negotiation process and enters into the execution stage in 30 days.

The first indicator having 1 level deviation is X7.2 Contract Risk level. According to Siedel and Haapio, the best practice stresses that risk mitigation strategies and risk pooling must be practiced in order to divide the risks among the parties having potential to control the damage effects (Siedel et al., 2013). This will help in preventing conflict of interest and disagreements between parties involved in procurement process. Next, X7.5, Cost Avoidance highlight that the organizations must document the cost reduction objectives and the procurement department must adhere to the cost reduction plans Guth (2010). For X7.6 RFx Turn Around Time, the model reflects the need of completion of the 80% of procurement projects in 60 days while 95% in 90 days.

X8.1 to X8.6
Vendors (X8)

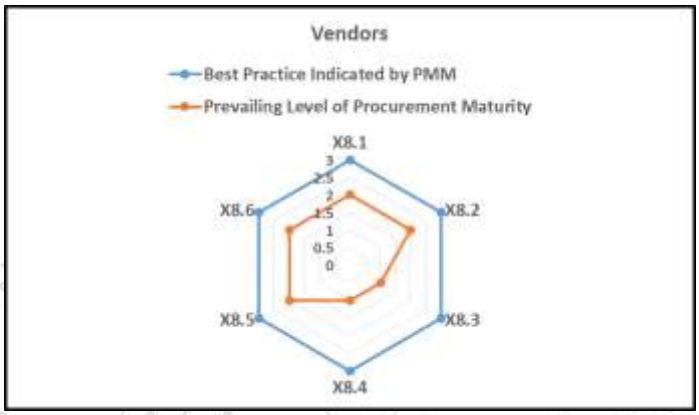

Figure X: Spider Web Plot based on Independent Variable Vendors

According to the Figure X, total 4 indicators have the 1 point difference namely Approved Vendor List, Measurements and Metrics, Vendor Rationalization and Vendor Recognition while 2 indicators have the gap of 2 points from the expected procurement maturity level of 3. These indicators are Vendor Categorization and Vendor Qualification.

For X8.1, Approved Vendor List, the PMM stresses upon the need of documented list of suppliers and vendors through which maximum purchasing are conducted. For X8.2, Measurement and Metrics, the model suggests the evaluation of performance of vendors based on pre-determined performance indicators by the organization. For X8.5, Vendor Rationalization, the researcher Croom et al. suggests that the internet technology will help in minimizing the cost associated with the research of vendors and maximizes the competition among the suppliers, thus the purchaser could have increased control on the number of suppliers (Croom et al., 2007). For X8.6, Vendor Recognition, the model entails that best procurement practice involve the criteria of selecting the vendors both quantitatively and qualitatively and given due recognition.

The 2 level difference sub-indicator Vendor Categorization X8.3 suggests that the effective method for categorizing vendors is based on the official approach, pre-approved by the management and for X8.5 Vendor Qualification entails that the best method of qualifying vendor is by the use of technological automated tools.

The research study only considers the single case of procurement maturity analysis of the public infrastructural sector in Karachi, Sindh. Moreover, the strategies were developed on the basis of secondary data in form of recommendations. Also, the research objective only considered the measurement and analysis of variation between the current practice and ideal conditions as identified in the procurement maturity model. The technological variables such as Procurement 4.0, Internet of things, robotics, advanced

e-procurement and other similar components were not undertaken in the research as they are not fully introduced in Pakistan. Responses against only basic and first level e-procurement such as software, portal management, electronic mail were assessed in the research.

The limitations of the study give the direction of future research. It is recommended to conduct the further research study for not only in Karachi but overall Sindh, provincially, and internationally considering large samples of data collection.

The variables on which the procurement performance is dependent are not static but expanding with time. More and more research work is being conducted to divide the variables into subtasks for precisely examining the performance levels. Thus the variables in the model under consideration are customers, organization, policy, process, staff, tools, value and vendors. But, the researcher recommends to involve in investigation of other aspects that are linked with the procurement performance.

Next, for the improvement of the procurement performance, recommended strategies can be further formulated on basis of technical perspectives and systems, mathematical calculations and analysis on basis of recent technological advancements.

Correlation between the Independent Sub-variables and Procurement Performance

The correlation between the independent and dependent variables were evaluated by Pearson Product-Moment Correlation Test. The SPSS software was used for this purpose. The data collected was found to be valid and extent of relationship dependency was accessed between the indicators and the dependent variables (efficiency and effectiveness). The correlation value (r) was estimated and was considered accurate, valid and significant if the value of $r > 0.6$. The table below shows the value of each indicator correlation on Y dependent variable.

Table VI: Correlation of Independent and Dependent Variables

S.NO (X)	Indicator	Correlations of X	
		Procurement Efficiency	Procurement Effectiveness
X1.1	Engagement	.425**	.305**
X1.2	Procurement Instructions	.240*	.393**
X1.3	Relationship Management	.687**	.295**
X1.4	Satisfaction	.370**	.282*
X1.5	Status Reporting	.855**	.537**
X2.1	Best Practices	.316**	.559**
X2.2	Business Plan	.558**	.501**
X2.3	Executive Support	.547**	.518**
X2.4	Mission Statement	.741**	.393**
X2.5	Strategic Plan	.807**	.578**
X2.6	Structure	.688**	.389**
X2.7	Vision Statement	.822**	.427**
X3.1	Approval Authority Levels	.560**	.448**
X3.2	Business Continuity Plan	.389**	.320**
X3.3	Delegation of Spend	.366**	.536**
X3.4	Procurement Authority	.566**	.481**
X3.5	Procurement Policy	.595**	.563**
X3.6	Procurement Standards	.458**	.475**
X3.7	Record Retention	.627**	.442**
X4.1	Audit	.576**	.386**

X4.2	Competitive Bidding Plan	.578**	.165
X4.3	Cost Reduction Plans	.728**	.388**
X4.4	Forecast	.843**	.549**
X4.5	Negotiation Planning	.693**	.316**
X4.6	Purchase Order Generation	.597**	.347**
X4.7	Spend Profile	.474**	.419**
X5.1	Certification	.220*	.239*
X5.2	Commodity Training	.176	.050
X5.3	Customer Engagement	.488**	.542**
X5.4	Employee Engagement	.658**	.463**
X5.5	General Training	.423**	.338**
X5.6	Job Qualifications	.775**	.426**
X5.7	Performance Management	.486**	.543**
X5.8	Performance Objectives	.746**	.563**
X5.9	Procurement Training	.633**	.482**
X5.10	Training Plan	.702**	.621**
X6.1	Contract Approval Workflow Automation	.459**	.193
X6.2	Contract Labor Sourcing System	.498**	.143
X6.3	Contract Management System	.456**	.129
X6.4	Contract Templates	.353**	.368**
X6.5	eRFX	.681**	.358**
X6.6	External Website	.756**	.334**
X6.7	Internal Website	.409**	.064
X6.8	P-Cards	.583**	.299
X6.9	Procure-to-Pay Process	.594**	.444**
X6.10	Requisition / Purchase Order System	.497**	.365*
X6.11	Reverse Auctions	.547**	.529**
X6.12	RFx Templates	.502**	.361**
X6.13	Third-Party Research	.527**	.460**
X6.14	Vendor Profile System / Vendor Portal	.595**	.290**
X6.15	Vendor Relationship Management System	.613**	.430**
X7.1	Contract Dispute	.225*	.374**
X7.2	Contract Risk Level	.696**	.438**
X7.3	Contract Template Ratio	.294**	.380**
X7.4	Contract Turn-around time	.165	.359**
X7.5	Cost Avoidance/Cost Savings	.758**	.511**
X7.6	RFx Turn-around Time	.608**	.311**
X8.1	Approved Vendor List	.577**	.442**
X8.2	Measurements and Metrics	.575**	.403**
X8.3	Vendor Categorization	.626**	.461**
X8.4	Vendor Qualification	.728**	.486**
X8.5	Vendor Rationalization	.545**	.395**
X8.6	Vendor Recognition	.595**	.539**

** Correlation is significant at 0.01 level (2-tailed).
* Correlation is significant at 0.05 level (2-tailed).

The next step was to identify the variables with high and medium correlation based on the values generated after test. A high significant relation between the variables indicate strong correlation r>0.6 and the significant relation implies medium correlation.
The high and medium correlation indicators are specified in the table below:

Table VII: High and Medium Correlation Indicators

High Correlation Sub-variables with Procurement Performance		Medium Correlation Sub-variables with Procurement Performance	
X1.5	Status Reporting	X6.13	Third-Party Research
X4.4	Forecast	X1.3	Relationship Management
X2.5	Strategic Plan	X8.2	Measurements and Metrics
X5.10	Training Plan	X4.1	Audit
X5.8	Performance Objectives	X4.6	Purchase Order Generation
X7.5	Cost Avoidance/Cost Savings	X8.5	Vendor Rationalization
X2.7	Vision Statement	X3.6	Procurement Standards
X8.4	Vendor Qualification	X7.6	RFx Turn-around Time
X5.6	Job Qualifications	X3.3	Delegation of Spend
X3.5	Procurement Policy	X4.7	Spend Profile
X2.4	Mission Statement	X6.14	Vendor Profile System / Vendor Portal
X7.2	Contract Risk Level	X2.1	Best Practices
X8.6	Vendor Recognition	X6.12	RFx Templates
X5.4	Employee Engagement	X5.5	General Training
X4.3	Cost Reduction Plans	X6.4	Contract Templates
X5.9	Procurement Training	X3.2	Business Continuity Plan
X6.6	External Website	X7.3	Contract Template Ratio
X8.3	Vendor Categorization		
X2.6	Structure		
X6.11	Reverse Auctions		
X3.7	Record Retention		
X2.3	Executive Support		
X2.2	Business Plan		
X3.4	Procurement Authority		
X6.15	Vendor Relationship Management System		
X6.5	Erfx		
X6.9	Procure-to-Pay Process		
X5.3	Customer Engagement		
X5.7	Performance Management		
X8.1	Approved Vendor List		
X4.5	Negotiation Planning		
X3.1	Approval Authority Levels		

Relationship between the Procurement Maturity with Procurement Efficiency and Effectiveness (Performance)

According to the literature study and theoretical framework, the research hypothesis directs that the maturity of procurement and performance related to procurement are closely linked with each other. As per the research work of Batenburg et al. (2008) , the maturity and performance of the procurement procedure are interdependent, Schiele in 2007 stated that the innovation in the field of procurement results in acquiring better performance and thus maturity level increases. And according to Andreasen (2012), the

performance related to procurement activities can only be estimated by evaluating maturity of the procurement processes.

The Pearson Correlation Test was applied to all the indicators and the results provided the research 32 indicators with high correlation and significance with procurement performance. The research work of aforementioned researchers Batenburg et al. (2008), Andreasen (2012) and Schiele (2007) stands true and is proved that the significance and correlation between procurement maturity and procurement performance is higher.

The research work also aims to upgrade the conditions of practices under critical indicators with the help of strategy development. The higher degree of procurement performance can be achieved by the improvement of those areas of procurement maturity (indicators) that have variations and gaps from the ideal and approved conditions.

Strategy Formulation (Recommendations) for Improvement of Procurement Maturity Level through PMM Best Practices

The study on the determined correlation values of the indicators provided results that in order to achieve higher degree of performance in procurement unit, altogether all 63 indicators requires improvement at different scale to be able to get close with the PMM ideal practices. Difference of one point from best practice as defined by PMM was identified in 31 indicators, followed by 2 degree gap in 25 indicators and 0 scoring, 3 points gap in 7 indicators.

The research work will provide strategies for altogether most significant five (5) indicators. Strategies will be developed for 5 indicators having strong significance and 1 point of difference. The five indicators having strong Pearson Product-Moment Correlation values and most closely linked with the procurement performance are X1.5 Status Reporting, X2.6 Structure, X3.5 Procurement Policy, X6.6 External Website and X8.6 Vendor Recognition.

The improvement in the process related to these indicators will have a higher degree of impact on the overall procurement performance as these sub-indicators have higher degree of correlation with the dependent variable.

Status Reporting

The current practice by the procurement professionals indicate that there is 1 point gap of the condition of X1.5 Status Reporting with the best state as defined by model under research. This means that the reporting is scheduled but the data in the reports are old and incomplete. Hence, the reporting becomes ineffectual for the customers. The model under study states that the updated and complete procurement reporting must be provided to the customer for determination of contract status.

Salcedo in 2017 suggested that the improved customer experience is the function of improved provision of information to the customer about the procurement cycle. The pathway to achieve better results following key points must be considered during status reporting:

- Reporting of Lead Time

When customers are well aware of the realistic time frames and lead times of the delivery, they can easily schedule their tasks as per the provided delivery time projections. Hence, better customer experience is achieved with timely completion of the contracts.

- Reporting of Purchase Requisition

Customers feel more engaged when they are informed about the status of purchase request cycle such as creation of request for quotation, beginning of procurement, supplier selection, award of contract etc. The medium used for the intimation must be an electronic mail system so that updated and timely status can be provided.

- Reporting of Purchase Orders

The issuance of purchase order to the potential bidder an automated system such as software for electronic reporting or simply an electronic mail system must be utilized to deliver all significant details about the purchase such as price, discounts, quantity as well as estimated delivery time.

The improved performance of status reporting requires that the procurement department comply with the rules and regulations of the timely, updated and complete reporting ensuring better customer experience as per the pre-determined schedule of delivery.

Structure

According to the given responses of the research, the current status of the procurement sector entails that the X2.6 Structure of the procurement department of public organizations is hybrid and the procurement unit report directly to the primary procurement supervisor.

The best practice of the model indicates that centralized procurement structure must be adopted and maximum organizational expenditures (at least 90%) spend on procurement. The researchers indicate Centralized Procurement as a major tool to achieve optimal cost advantages and quality purchases. Moreover, improved and upgraded monitoring over performance of procurement staff is also achieved through centralized procurement, Better training opportunities are provided to the procurement practitioners, better quality of standard technical and contract requirements are devised, improved knowledge exchanges, high level of transparency, accuracy and control will be achieved on public procurement and capacity enhancement to control the supplier's activities thereby monitoring performance (Dalpé, 1994; OECD, 2000; Dimitri, Dini, and Piga, 2006; Edler and Georghiou, 2007; Albano and Sparro, 2010.)

The centralized model of procurement reflects that the purchasing activities of entire company is handled by one department that is procurement unlike decentralized where all departments are responsible for their own procurement processes.

The strategy to make a centralized procurement model is as follows:

- Look Out for Common Purchases

Procurement of similar items by one unit not only give advantage of economies of scale but also helps in reducing the cost of selected suppliers. A better negotiations and better pricing can be achieved. So the procurement department is advised to evaluate the similar procurements in the entire organization by different units. If the numbers are maximum, it is advised to shift to centralized structure.

- Compliance

The procurement department must evaluate the overall requirements of the procurement process. For e.g. there is a need of at least three quotations from different suppliers before selection. The process is well

executed in centralized systems as it reduces the expenses associated with compliance of rules and regulations.

- Purchasing

Single department communicating with vendors mitigates the purchasing errors by different departments. New improvement can also be introduced in the purchasing activities such as purchase order generation. If the organization aims to reduce the increasing mis-procurement cases or problems of delays and deliveries in procurement, it must shift to centralized procurement structure.

In accordance with above factors, the procurement department is suggested to improve the centralized process by taking measures under consideration.

- Procurement Policy

As per the responses collected, the current practice of the procurement in public sector indicates that the documentation of procurement policies by the department is conducted as and when needed and the procurement department practitioners are trained and well aware of these policies. But, the internal customers (other departments) are not trained with these policies.

The best scenario as per the model indicates that the updated policies of the procurement, existing currently must be documented with meaningful information and guidance, that not only the employees of procurement department but the overall organizational staff is also well aware with them.

Schooner & Whiteman, 2000 states policies as a tool to uphold competitiveness, transparent mechanisms and maximization of value against spend. Thus, these all are the characteristics of high performance. An efficient procurement policy must include the information, rules, regulations and details related to objective of the organization specially procurement department, overall procurement process, Rfx process, contractual and financial obligations, ethical obligations, suppliers selection methods and frequently asked questions in a simple and understandable language easily comprehended by the employees of the organization.

Thus, the procurement of public sector is advised to maintain the policy standards and train there staff on these developed policy guidelines.

External Website

The existing practice in using external websites by the public sector of Karachi, Sindh reveals that there is 1 point of difference from the ideal practices defined in the model. External websites of procurement departments under study are static, same for every user, but updated.

The deviation from ideal conditions is due to the limited access or usage by vendors, and unavailability of distinct pages for different users. The best practice as identified in model entails that a dynamic website must be available to connect and exchange procurement information with eternal users (vendors). According to Octavia 2020, Vendor portals manage the pool of vendors more effectively and efficiently and each party is connected to ensure timely approvals and exchanges of bidding documents.

The external websites such as vendor portals helps in maintaining protected and centralized data records of vendors, efficient vendor tracking, enhanced participation of vendors in procurement process, updated information serves easiness in audits, and user friendly renewals of contracts information.

Thus, it is advised to develop an updated external websites, duly utilized by the vendors for routine information exchanges and for ease of registration. This will increase the procurement performance by enhancing vendor relationship with the procuring agency.

Vendor Recognition

According to the research conducted, the vendor recognition indicator have a 1 point of variation which entails that it is slightly not up to the best standards specified in model. The responses elucidates that that there is no formal systematic procedure to recognize vendors and it is conducted on ad hoc basis. Whereas, the best practice according to the model specify that a routine vendor recognition program must be adopted to select vendors based on their performance.

In order to achieve vendor satisfaction, it is encouraged to recognize and praise the contribution and efforts by them based on the degree of their performance. This will help to build a long term relationship and provide better experience to them. The more delighted the vendor is, the more effective contractual and price negotiations are performed.

According to Lascelles et al. 1989, recognition is a source of encouragement as the suppliers and vendors strive for providing competitive prices to earn recognition, incentives and award (Lascelles and Dale, 1989).

A good strategy to devise a better vendor recognition program is to nominate, select and then award the potential vendors in different categories so that transparency and equity can be ensured. A selection committee comprising of members who encourage justice, equality, equity, honesty, fairness and integrity must be formed for identifying qualified vendors. The criteria of selection must include assessment based on both quantitative and qualitative performance parameters.

The criteria for evaluating the performance may include timely delivery, cost advantage, competitiveness, innovation, strategic value, customer service etc. Formal recognition platforms such as official events, press releases may be used to enhance the vendor experience and satisfaction. The procuring agency is suggested to recognize the vendors as preferred and certified to maximize the vendor participation in longer term for increasing the procurement performance.

Conclusion

The research study analysis and findings concludes that the better and improved procurement performance of the public infrastructural sector in Karachi, Sindh Pakistan can be achieved by increasing the procurement maturity level of the indicators that possess higher degree of correlation with the procurement performance and a reasonable degree of deviation with the ideal practices as described in the Procurement Maturity Model under research.

A number of recommendations are provided in the research based on the deviation and variance between the current procurement practices and expected procedures of the procurement maturity of public sector in Karachi. Also, these recommendations were developed in relevance with the higher significance values thereby representing recommendations for closely linked indicators with the performance (procurement efficiency and effectiveness). These recommendations may be presented to the government sector involved in procurement practices in Karachi to upgrade their procurement procedural standards. Altogether, five (5) indicators are assessed, evaluated and provided with realistic suggestions to take improvement actions for achieving greater level of maturity and increased values of procurement performance.

Nevertheless, in addition to above recommendations, all remaining indicators defined in procurement maturity model must be evaluated, analyzed and reviewed followed by provision of improvement

suggestions and course of action to enhance and revamp the procurement performance of public sector in Karachi, Sindh. Thus, following are the recommendations in form of strategies presented in the research study to raise the level of maturity of procurement sector in government of Karachi:

- The procurement unit must provide customers with the current and updated data and information. In order to achieve better performance, considerations must be given to lead times, delivery schedules, better customer experience and timely treatment. These actions are recommended so that customer have a delighted experience that ascertain long term linkage with them at negotiated prices.
- Centralized structure of the procurement is advised to be adopted in the organization comprising of purchases that strongly overlap in the overall organization to take advantage in terms of cost, price negotiations and standardization. These centralized processes in the procurement department increases the efficiency by improving end to end visibility on the procurement spend, improving process consistency, reducing maverick spend, mitigating external risks, enhancing speed of procurement processes and effective record management for executing procurement analysis.
- An efficient procurement policy must be formulated and practiced by not only the procurement department but all the employees of the organization must adhere to it. These policies must include the information, rules, regulations and details related to objective of the organization specially procurement department, overall procurement process, Rfx process, contractual and financial obligations, ethical obligations, suppliers selection methods and frequently asked questions in a simple and understandable language easily comprehended by the employees of the organization.
- Next, the public procurement organizations in Karachi must develop a dynamic external website in order to build a better relationship with the vendors through an automated system.
- Lastly, a systematic, fair and transparent vendor recognition system must be developed by the management of procurement departments to sustain the long term connectivity and linkage with the vendors as they feel satisfied by the recognition of their efforts ad contribution. Hence, these vendors, as a result, provide maximum participation, support and improved prices to the procuring agency in return that ultimately enhance the procurement performance.

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