

An Empirical Assessment of Decision Making in the Public Procurement Lifecycle

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Abstract

Public procurement is generally an important sector of the economy and, in most countries, is controlled by the introduction of regulatory and policy mechanisms, National law in most countries regulates public procurement more or less closely in an attempt to prevent fraud, waste. The economic progress in the region, to be sustained, depends upon continuing improvements in public governance. One important hallmark of a high standard of public governance is a well-developed and efficient system of government procurement, which provides value for money. Though initially considered a clerical activity, public procurement has become one of the most important functions of the government for the following reasons. First, as the size and activities of the governments have increased in the last fifty years, the procurement outlays have also burgeoned, making them a substantial part of the annual budgets. The Bank is preparing the Sindh Public Sector reforms project. The project focuses on public financial management, procurement, and property tax. Various institutional reviews have identified that there is no data to substantiate the procurement performance of the various implementing agencies. While SPPRA is in the process of setting up the performance benchmarks and developing a monitoring and evaluation system, but currently there is no such data available. The findings are expected to aid in determining the root causes of underperformance of the procurement practices in Sindh, Pakistan.

Keywords

Public Procurement, SPPRA, Procurement Timeline, Probabilistic Analysis

1. Introduction

In recent years most of the countries of Asia have experienced noticeable economic growth, although its extent and impact on living standards have varied across the region, serious weaknesses have persisted in the area of public procurement. These include fragmented procurement procedures; the lack of professional procurement expertise etc. (Jones, 2007).

Public procurement is generally an important sector of the economy and, in most countries, is controlled by the introduction of regulatory and policy mechanisms, National law in most countries regulates public procurement more or less closely in an attempt to prevent fraud, waste, etc. (Kastanioti et.al, 2013). Laws, rules, and regulations are that are existent require overall overhauling to bring them at par with the current needs and challenges, besides the capacity of public procurement practitioners is weak (CPDI, 2011). The national budget for Public procurement expenditure is about 45-65% (Khan, 2020). The economic progress in the region, to be sustained, depends upon continuing improvements in public governance. One important hallmark of a high standard of public governance is a well-developed and efficient system of government procurement, which provides value for money. A legal procurement system that ensures transparency creates an enabling environment for competition (Benchmarking Public Procurement, 2017). Yet over the years, serious weaknesses have persisted in procurement practices in the countries in the region (Jones, 2007). According to International Governance Solutions (2014), poor procurement policies can impact developmental pace which ultimately impacts on foreign investments (International Governance Solutions, 2014).

2. Scope

The scope of the study is to identify the procurement practices existing in specific departments of the Government of Sindh (GoS), namely Irrigation, Agriculture, Works & Services, and Education. There are generally three categories of inputs that governments acquire for their smooth functioning through one of these departments. The inputs include civil works e.g. bridges, buildings, highways, etc., goods-typically equipment, material and supplies, commodities, textbooks, medical supplies, and services which cover expert advice and training, technical assistance as well as such things as building maintenance, janitorial services, security services, and computer programming, etc. Also, to prepare a set of recommendations that can help to improve the procurement practices in identified departments. The study is conducted through intense surveys and interviewing exercises through face-to-face meetings.

3. Objectives

Keeping in view the theme for the current paper writing contest organized by the prestigious Institution of Engineers Pakistan (IEP), this study is intended to find its due place within the overarching theme of, ‘quantification of losses due to delayed decision making in public sector projects. The study takes an analytical look at the impact of decision-making w.r.t procurement lifecycle of various procurements at selected GoS departments. The study undertakes a probabilistic approach to simulate the impact of delayed decisions on the completion of representative steps of public procurement methodology as prescribed by Sindh Public Procurement Regulatory Authority (SPPRA). Specifically, the proposed study is undertaken with the following objectives.

- i. To study procurement outlays of the last three years of selected departments including break down of procurements by goods, works and consultancies, and mode of bidding (ICBs, NCBs, etc).
- ii. To analyze procurement cycle time of the sample projects w.r.t SPPRA procurement methodology.

4. Methodology

The project methodology is depicted in Figure 1.

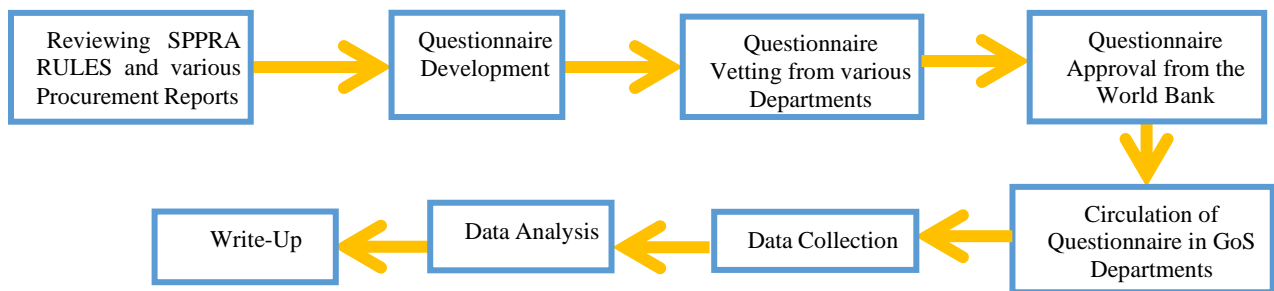


Fig 1. Study Methodology

4.1 Questionnaire Development, Pilot Survey, and Approval

A review of SPPRA Rules is done first. This is followed by a review of international studies conducted on procurement, such as those by the World Bank and ADB. Then a questionnaire is developed keeping in view the local procurement strategies. This questionnaire is then vetted by various departments/ agencies. This included experts from Sind Coal Authority, KMC, W&S Department, and SPPRA. A copy is also sent to World Bank for review and approval.

4.2 Questionnaire Disbursement in various Departments

After the approval of the questionnaire, the same is circulated in the target departments with the help of focal persons nominated by the department (Additional Secretary - Technical).

4.3 Data Collection

The data collection methodology is such that by the consent of the respective department, an adequate sample size would be selected based on the data collected by the research assistants on the questionnaire.

4.4 Data Analysis

After the data collection, data analysis will be done. The analysis would include statistical analysis as well as expert comments and conclusions.

5. Data Analysis

The data analysis is presented in the following sections and sub-sections.

5.1 Composition of Goods, Works & Services Procurements in the Selected Departments

The composition of Goods, Works, and Services is calculated based on sample projects as the data is not recorded, and archived centrally by neither of the departments, as a result, the values have highly relied on the provided sample projects and any biasness can only be attributable to non-availability of data.

After the descriptive analysis of the data, it has been learned that during the period 2010-14:

- Education Department procured Works (25%), Services (34%), and Goods (41%).
- Works & Services Department procured Works (100%).
- Irrigation Department procured Works (100%).
- Agriculture Department procured Works (33%) and Goods (67%).

Table 1, summarizes the numbers of procured contracts for works, goods and services by the identified departments for this study. It can be observed that the largest procurements of works have been carried out by the education department, it may be because of the reason that the present government regime has extensively focused on upbringing the level of education in the province, this strategic move is well endorsed by international funding agencies like the Bank, and that is why such numbers are observable.

Table 1. Summary of Goods, Works & Services Procurements in the Selected Departments

Department	Total	Works	Goods	Services
Education	92	23	38	31
Works & Services	10	10	0	0
Agriculture	12	4	8	0
Irrigation	12	12	0	0

5.2 Composition of Procurement Mechanism Adopted by the Selected Departments

The composition of ICB, NCB, and Shopping is calculated based on sample projects as the data is not recorded, and archived centrally by neither of the departments, as a result, the values have highly relied on the provided sample projects and any biasness can only be attributable to non-availability of data.

After the descriptive analysis of the data, it has been cultured that during the period 2010-14:

- *Education Department procured contracts through ICB (01%), NCB (48%), shopping (26%) and Consultancy (19%)*
- *Works & Services Department procured 100% contracts through NCB*
- *Irrigation Department procured 100% of contracts through NCB*
- *Agriculture Department procured 100% of contracts through NCB*

Table 2 consolidates the procurement mechanism for the four departments, predominantly it is seen that all of the departments under study opt for National Competitive Bidding (NCB) as their preferred mode of procurement mechanism except for the exception of very few instances. As in our sampling, only one procurement mechanism was for International Competitive Mechanism (ICB).

This observation leads to several understandings, chiefly is that the scope of work that these departments wish to execute is fully addressable and executable by our local industry, the performance specifications enlisted are fully deliverable by our local contractors, vendor, and consultancies. This in turn elaborates the adequate capacity of the local industry. Furthermore, it is usually believed that public agencies and departments are the largest employer/engager of local industry and this belief is endorsed by this finding, i.e. majorly polar procurement for NCBs.

As abridged in Table 3, the predominant use of Single-stage two envelope procedure has been found, it is usually a wise decision to allow the purchaser to evaluate the technical proposals without reference to the price, and

bids of bidders who do not conform to the specified requirements can be rejected as deficient bids without the enticement of low-cost delivery. Following approval of the technical evaluation and at a date and time advised by the purchaser, the price proposals are opened in public. Using a single-stage tendering, the contractor's offer of risk transfer in the financial proposal may have little value if its assessment of costs, working method is incorrect. Also, changes introduced by the client or design team will undermine the certainty achieved in the financial proposal. Whereas two-stage tendering helps the contractor to understand the design. The use of provisional items as a substitute for a complete design can give the contractor/vendor a "second-stage" pricing opportunity. But unfortunately, this practice is found to be "absent" in the data gathered for analysis except for a few exceptions of instances from Education and Works & Services.

Table 2. Summary of Procurement Mechanism

Department	Total	ICB	NCB	Shopping	Consultancy
Education	98	1	47	25	19
Works & Services	10	0	10	0	0
Agriculture	12	0	12	0	0
Irrigation	12	0	12	0	0

As expressed in Table 3, after the analysis of the data it can be asserted that during the period 2010-14.

Table 3. Summary of Procurement Method Employed

Department	Total	Single-stage one envelope	Single-stage Two envelope	Two-stage bidding	Two-stage Two envelope
Education	197	21	175	0	1
Works & Services	5	2	0	3	0
Agriculture	3	0	3	0	0
Irrigation	12	12	0	0	0

- Education department procured (89%) contracts through single stage-two envelope procedure and (11%) Contracts through single stage-one envelope method.
- Works & Services department procured (60%) contracts through two-stage bidding method and 40 % through single stage-one envelope method.
- Irrigation department procured (100%) contracts through single stage-one envelope.
- Agriculture department procured (100%) contracts through the single stage-two envelope method.

5.3 Average Bid Response

Getting an ample response to the proposed project is considered vital to the competitive bidding procedure to commence. If a sound bid response rate is experienced for a respective project, it can be asserted that the local industry is extremely interested in acquiring the project, and in turn, the procurement agency will have strong open competition to get the best value procurement for their proposed project. The vice versa would be the case if a low bid response rate is experienced which may result in average value procurement.

At first, the bid responses of each of the sample project was calculated using the following equation, thereby allowing the project team to formulate a single indicator i.e average bid response.

$$\text{Bid Response (\%)} = \frac{\text{Number of Bids received for a particular Project}}{\text{Bid Document sold for the Project}} \quad \text{Eq (1)}$$

The average bid response is calculated by taking an average of the bid response rate on each project as follows.

$$\text{Average Bid Response} = \frac{\sum_{i=1}^n \text{Individual Bid Response (\%)}}{n} \quad \text{Eq (2)}$$

As portrayed in Figure 2; Works & Services and Irrigation Department were found to be enjoying on average full

response to their proposed projects while Education & Agriculture were found on the slightly lower side.

5.4 Planning Process

To evaluate the extent of planning adopted in procurements at the departmental level a set of five questions were asked:

The first question pertains to the effort involved to conduct complex procurements resulting in realistic project definition, achievable completion schedules, and accurate cost estimates.

5.4.1 *“Is overall planning for complex goods works and other contracts done in sufficient detail to produce realistic project definition, achievable completion schedules, and accurate cost estimates?”*

The departments responded affirmatively, few highlighted tender documents as a source of sufficient detail for specification and completion schedules as well as PC-1 for estimates of costs, others simply confirmed the process of planning within.

The second question inquired about the extent of technical and financial planning causing accurate cost estimation resulting in appropriate release of funds.

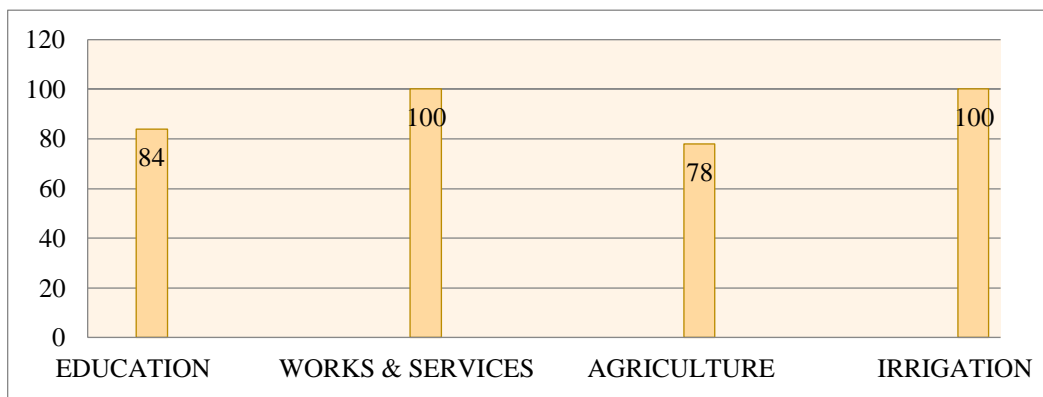


Fig 2. Average Bid Response

5.4.2 *“Is the early technical and financial planning well-coordinated so that projects are fully funded when work needs to begin, based on accurate cost estimates?”*

In response to this question, the departments were of the view that as a policy to allocate funds on ADP schemes estimation is done and usually well-coordinated with the technical aspects moreover tenders for ADP schemes are released on the availability of funds. However, the departments show their grievance on the delayed as well as the partial release of quarter-wise funds from the Finance Department.

The third question required category wise response on the completion of the schedule met for Goods, Works & Services Contracts.

Most of the departments confirmed that the schedules for Goods Procurements are usually met however Works & Consultancies are usually delayed.

The fourth question probed the major cause(s) of slippage – A set of five choices were offered: (i) Budget Release Time Lines (ii) Unrealistic and overly optimistic time frame (iii) Delays in contract award (iv) Weak project management and decision making (v) Inadequate contractor capacity to meet the contracted scheduled completion date.

All the departments opted for the Budget Release Time Lines as a major cause of slippage.

The fifth Question explored the aspect of market surveys to update the price database for realistic cost estimation.

5.4.3 *“Does your Department regularly conduct market surveys to update their knowledge of prevailing prices for goods and works?”*

One department confirmed the exercise of market surveys regularly, however, most of the departments negated due to inadequate manpower to conduct such surveys.

5.5 Analysis of Project Procurement Timeline

In this section analysis of various milestones in the Project Procurement Cycle (For example date of advertisement, number of bidders buying bid docs, number of bidders submitting bids, date of bid opening, date of award, etc.) is presented.

The following discussion presents the analysis of the procurement timeline for the short-term assignment on Review of Procurement Practices and Timelines in Specified Departments in Sindh. The analysis is performed in three phases. The brief description outlining the purpose of each phase along with the interpretation of tabulations is as follows:

This analysis has been performed to establish a rational Time Indicator for Procurement Cycle Time that is representative for all types of projects (Goods/Works/Services) and is derived on common grounds from the W&S Department, Education Department, Irrigation Department, and Agriculture Department.

As per SPPRA guidelines, the following are the major milestones in the procurement timeline along with the type of analysis selected: deterministic versus probabilistic. For processes with low variation, the deterministic approach is suitable, whereas, for processes that contain large variation and uncertainties, the probabilistic approach is more justifiable. Owing to the varying nature of processes in each of the milestones of the procurement timeline, the timelines for a particular milestone are coming out with a high degree of variation thus necessitating probabilistic treatment to have an assessment of the variation.

Table 4. Milestone v/s Selected Analysis

S. No.	Milestone	Selected Analysis
1	NIT to Closing of Bids	Probabilistic
2	Closing of Bids to Opening of Bids	Probabilistic
3	Technical Evaluation & Financial valuation (BER)	Probabilistic
4	BER to Contract Signing	Probabilistic

As per SPPRA guidelines, Table 5 shows the major milestones in procurement timelines along with the type of analysis consideration: deterministic versus probabilistic. Table 5 also summarizes the procurement steps in the cycle and their connection with the study milestones. Cross-reference is also made to the pertinent SPPRA clause along with the type of analysis (probabilistic VS deterministic) performed for a respective milestone. For processes with low variation, the deterministic approach is suitable, whereas, for processes that contain large variation and uncertainties, the probabilistic approach is more justifiable. Owing to the varying nature of processes in each of the milestones of the procurement timeline, the timelines for a particular milestone are coming out with a high degree of variation thus necessitating probabilistic treatment to have an assessment of the variation.

5.6 Description for Indicators used in Probabilistic Analysis

Since the data is non-normal, the probabilistic analysis requires normalization of data before analysis. Table 6 summarizes the indicators used in the probabilistic analysis.

5.6.1 NIT to Closing of Bids

Table 7 summarizes the probabilistic analysis of the milestone “NIT to Closing of Bids”.

Supplementing the probabilistic analysis in Table 7, there had been 12 instances when the milestone under consideration took as much as 48, 38, 36, 34 days to complete.

5.6.2 Closing of Bids to Opening of Bids

Table 8 summarizes the probabilistic analysis of the milestone “Closing of Bids to Opening of Bids”.

Table 5. Basis for Development of Time Indicator for Procurement Cycle Time

Procurement Steps	Days	Remarks	Study Milestones
NIT to Closing of Bids	Probabilistic	SPPRA Clause 18.2	Days b/w NIT till Closing of Bids

Closing of Bids to Opening of Bids	Treatment	SPPRA Clause 41.3	Days b/w Closing & Opening of Bids +
Technical Evaluation & Financial Evaluation (BER)		For NCB (Bid Validity) SPPRA Clause 38.1	Days b/w Bid Opening to Evaluation
BER to Contract Signing		SPPRA Clause 45	Days b/w Evaluation & Contract Signing

Table 6. Description for Indicators used in Probabilistic Analysis

Log ₁₀ (Mean)	Log ₁₀ (SD)	Milestone days (x)	Log ₁₀ (x)	Probability (%)
Base 10 log of the mean days to achieve the milestone	Base 10 log of the standard deviation of the days to achieve the milestone	The test value for a specific confidence level	Base 10 log of (Milestone days)	The confidence level to achieve the specific milestone days

Table 7. NIT to Closing of Bids

Log ₁₀ (Mean)	Log ₁₀ (SD)	Milestone days (x)	Log ₁₀ (x)	Probability (%)
1.23182	0.310314	5	0.69897	4.2978
		10	1	22.7517
		15	1.176091	42.8738
		20	1.30103	58.8244
		25	1.39794	70.3788
		30	1.477121	78.538
		35	1.544068	84.2848
		40	1.60206	88.3587
		45	1.653213	91.2761
		50	1.69897	93.389
		55	1.740363	94.9372
		60	1.778151	96.0845
		65	1.812913	96.9438
		70	1.845098	97.594
		75	1.875061	98.0908
		80	1.90309	98.4737
85	1.929419	98.7713		
90	1.954243	99.0045		

Supplementing the probabilistic analysis of Table 8, there had been 07 instances when the milestone under consideration took as much as 180, 143, 79, 58, 57 days to complete.

5.6.3 Technical Evaluation & Financial Evaluation (BER)

Table 9 summarizes the probabilistic analysis of the milestone “Technical Evaluation & Financial Evaluation (BER)”.

Table 8. Closing of Bids to Opening of Bids

Log ₁₀ (Mean)	Log ₁₀ (SD)	Milestone days (x)	Log ₁₀ (x)	Probability (%)
0.398724	0.629708	1	0	26.3305
		2	0.30103	43.8355
		3	0.477121	54.9539
		4	0.60206	62.6616

5	0.69897	68.3248
7	0.845098	76.0794
10	1	83.0173
15	1.176091	89.1489
17	1.230449	90.6718
28	1.447158	95.2039
35	1.544068	96.5533
40	1.60206	97.1994
50	1.69897	98.0531

Table 9. Technical Evaluation & Financial Evaluation (BER)

Log₁₀ (Mean)	Log₁₀ (SD)	Milestone days (x)	Log₁₀ (x)	Probability (%)
		1	0	3.0629
		3	0.477121	15.9726
		4	0.60206	22.17844
		5	0.69897	27.8184
		7	0.845098	37.45081
		10	1	48.5832
1.019345	0.544631	11	1.041393	51.6145
		15	1.176091	61.3250
		21	1.322219	71.0931
		31	1.491362	80.6939
		53	1.724276	90.2223
		83	1.919078	95.0733
		90	1.954243	95.6971
		138	2.139879	98.0177

Supplementing the above probabilistic analysis, there had been 06 instances when the milestone under consideration took as much as 288, 240, 211, 175, 164 days to complete. The same is visible by the x (BER days) corresponding to 95% and more probability.

5.6.4 BER to Contract Signing

Table 10 summarizes the probabilistic analysis of the milestone “BER to Contract Signing”.

Table 10. BER to Contract Signing

Log₁₀ (Mean)	Log₁₀ (SD)	Milestone days (x)	Log₁₀ (x)	Probability (%)
		1	0	27.8748
		2	0.30103	50.2705
		3	0.477121	63.8279
		4	0.60206	72.5788
		5	0.69897	78.5568
0.29759	0.052609	6	0.778151	82.8233
		7	0.845098	85.9742
		8	0.90309	88.3657
		9	0.954243	90.2217
		14	1.146128	95.2788
		22	1.342423	98.0273

Supplementing the above probabilistic analysis, there had been few instances when the milestone under consideration took as much as 36, 32, 34, and 37 days.

6. Conclusions

The prime conclusions of the study can be presented as:

- The reform of public procurement in the country may still be considered a work-in-progress.
- Non-existence of procurement cells in the identified departments leading to the inability to serve as a single-window for all procurements of the department.
- Absence of electronic data system for archiving and retrieval of information regarding the overall procurements, the procurement cycle time of the undertaken projects by the department.
- Shortcomings in the HR capacity concerning knowledge of procurement rules as well as implementation timelines.
- The lack of awareness to compile any data about procurement outlays, budget release timelines, and procurement timelines and seek self-improvement.
- Bureaucratic hurdles and bottlenecks.
- If all sampled projects are considered for a specific department (under the scope of this study, the top three troublesome milestones (in the order of descending frequency) in procurement timeline are “BER to Contract Signing” closely followed by “Closing of Bids” and “NIT to Closing of Bids”.
- If all individual procurement types (goods, works, services, etc) are consolidated from each of the selected departments (under the scope of this study) the top three troublesome milestones (in the order of descending frequency) in the procurement timeline are “BER to Contract Signing” closely followed by “Closing of Bids” and “NIT to Closing of Bids” and “Technical Evaluation & Financial Evaluation (BER)”. This conclusion is based on the strategy that.
- At 80% confidence level, the procurement cycle is supposed to be completed in 82 calendar days. While at 90 percent confidence level, the procurement timeline would be 124 calendar days.

7. Recommendations

The recommendations are derived as a collection of formal and informal learnings from the study, reinforced by strong statistical backing.

If the massive task of improvement has to be carried out, concerted efforts have to be made by the government, academia, and international donor agencies such as The World Bank. Addressing the challenge to ensure that the procedures laid down in the procurement reforms are translated into actual practices and are neither ignored nor side-stepped should be the key aim of all stakeholders. Therefore, a partially integrated set of improvement measures is proposed as follows:

- Concerted efforts are to be made to establish a procurement cell in the public sector departments to function as a single node for all procurements for the department.
- A national plan for training and certification of relevant personnel at all levels should be developed and implemented.
- It would be appropriate to arrange some form of formal and/or informal education and training on various aspects such as procurement management, contract management, claim management, best value procurement, etc.
- It is also necessary to specify to the prospective tenderer the criteria by which submissions are evaluated. These may include the weights to be given to price and quality in a tender proposal, preferential margins to be applied, or any other conditions that will favor or exclude certain types of the tenderer.
- Well harmonized financing should be evolved for a smooth transition between procurement milestones and the execution of projects.
- There is a need to inculcate adequate level knowledge about procurement methods and systems. To some extent, NED UET has taken a lead and has started the journey to develop a self-sustainable industry. This had been mainly achieved by launching new graduate and postgraduate programs in Construction Engineering and Construction Management respectively at NED UET.

- Informal education and training could take the form of career development programs organized by academic institutions with the support of professional organizations like the Pakistan Engineering Council and Institute of Engineers Pakistan (IEP). With the support of SPPRA, PEC, IEP, and similar organizations, seminars, training workshops, and interactive symposiums can be arranged on procurements practices and management, with a focus on international best practices to uplift the local industry.
- The procurements methods, means, and mechanisms being used by various authorities in a respective department should be harmonized.
- Competent authorities in Pakistan can take inspiration from Singapore as an example. Over the many years, it has developed one of the most comprehensive e-procurement systems known as GeBiz. Through this portal, all intended procurements are advertised, with general specification requirements, and the necessary procedural, evaluative, and other information; that prospective tenderers and applicants are required for registration. It also discloses bids received with prices offered, and the results of the selection process. Details of registration and pre-tender qualification are found on the GeBiz web-site. Tenderers submit their bids through the GeBiz portal too.

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