

RIGHT COST FOR SUSTAINABLE CONSTRUCTION

ENGR. M. MAZHAR UL ISLAM

RIGHT COST FOR SUSTAINABLE CONSTRUCTION

By

Engr. M. Mazhar-ul-Islam

1. Defining Construction and Sustainable Construction

1.1 Definitions

Construction is defined as the art, trade, or work of building a structure, such as a building, framework or model. It is the way in which something is built or put together by using materials, manpower, plant and machinery. Under WTO classifications, construction is included under the services sector.

1.2 History of Construction

According to WTO, “construction is one of the oldest of all industries, retaining its role as a core economic activity from the early days of human civilization to this day. It not only provides the infrastructure for all other industries, but also constitutes one of the largest single sectors in the economy on its own. With its close link to public works and hence the implementation of fiscal policy, it has always been considered as a strategically important industry for creating employment and sustaining growth. For the developing economies, the construction sector carries particular importance because of its link to the development of basic infrastructure, training of local personnel, transfers of technologies, and improved access to information channels.”

1.3 Share of Construction in GDPs of Developed & Developing Economies

WTO further ascertains that “In most industrialized economies, the share of construction in total GDP is in the range of around 5 to 7 per cent. It is slightly lower in the United States (3.8 per cent) and Mexico (3.7), and higher in Japan (10.3). For Korea, the share in GDP is 13.9 per cent. Although disaggregated data are not always available for developing economies, the share of construction in GDP does not differ very much from the industrialized countries in such countries as India (5.7 per cent), Philippines (5.6), Malaysia (4.5), Thailand (7.0), Singapore (7.1) and Pakistan (2.5). The sector is also important as a major employer. The share of the sector in total employment is somewhat higher than in terms of value-added, but the range is still between 5 to 7 per cent for most OECD countries, except for Germany (8.7 per cent), Japan (10.5) and Mexico (9.7). In the United States alone, 7.5 million people are employed by the construction industry whereas the figure is around 9 million in European Union.”

1.4 Defining Sustainable Construction

Sustainable construction is the development that fulfills the needs of the present generation without compromising the future generation’s ability to meet their own demands or needs. This ultimately leads to better utilization and conservation of resources on the planet. Sustainable Construction aims to apply this principle to the construction industry by providing ways of building that use less virgin material and less energy, cause less pollution and less waste but still provide the benefits that construction projects have brought us throughout history. Sustainable Construction should not be seen as something that is exclusive to expensive projects, as it has the potential to be applied to any development. If even small aspects of a development are switched to more sustainable materials or design this should be seen as a step forward.

2. Construction: Overview and Situation Analysis

2.1 Regulations and Standardization of Country Specific Documents

The construction sector is subject to many different aspects of domestic regulation. They include controls on land use, building regulations and technical requirements, building permits and inspection, registration of proprietors, contractors and professionals, regulation of fees and remunerations, environmental regulations, etc. Such measures are applied not only at the national level, but also very frequently at the sub-federal or local government level. Standards may be fixed by the governments or by standard-setting bodies or private-sector associations. In Pakistan, work has been going on for standardization of “country specific” documents to regulate and streamline hiring of engineering consultancy services and procurement of works in line with advice by Pakistan Engineering Council (PEC). PEC, being the statutory regulatory body, has been vested with authority by the Parliament of Pakistan through PEC Act amended in 2011, to undertake standardization of cost and contract matters.

2.2 Construction Contracts

A contract is defined as set of conditions at a price. In Pakistan, construction contracts are generally delayed beyond the scheduled completion period and costs of the projects are overrun, coupled with inadequate quality construction. This is primarily due to award of contracts at a cost which is not right, unreasonable and not based on prevailing market rates. There are many factors for executing such contracts in an environment of inefficient management and unrealistic completion schedule. However, the primary reason is that there is no such data for all construction inputs which can be considered as reference data for preparation of realistic Budget Estimate, Engineering Estimate; Cost Validation, Preparation of Bids and Contract Administration. In preparing Engineer's Estimates, due to availability of lack of credible reference data, a lot of anomalies are found which result in inaccurate and unreasonable estimates. Moreover, there is a habit of awarding contracts based on departmental schedule of rate/cost data which in most cases, cover very few items, outdated, do not reflect market based rates and above all is not neutral to the contracting parties.

2.3 Lack of Credible and Authentic Reference Cost Data

Experts have been raising concerns over the present source of price indices referred in the bidding documents in Pakistan. The current price indices are not realistic, primarily because very limited items are covered in these indices, which are also not updated regularly. Moreover, presently available Government produced data is only for few construction items which are not prepared by the relevant professionals, cost engineers, analysts and quantity surveyors having practical insight in analyzing the construction cost inputs. This lack of availability of accurate and credible reference cost data results in unrealistic costs in bidding as well as award of contracts by respective governments. Contractors, in order to get the contracts, make bids based on costs which are neither right nor market based. This results in bidding and/or awarding costs which are sometimes higher than the right cost or sometimes way too low. If the estimated price is low then the contractor suffers losses and is unable to complete works and if cost estimates are unrealistic and on higher side then it causes loss to National exchequer. In both cases, the sustainable construction is seriously hampered and the people of Pakistan suffer the losses and their quality of life deteriorates.

2.4 Importance of Market Based and Online Construction Cost Data

Hence, in the present globalized environment, online availability of Cost Data, from a credible and authentic source, for all types of construction inputs based on prevailing Market Rates, updated at least on monthly basis, is vital to bring efficiency, productivity and transparency in determining the right cost of the Contracts. Such cost data not only minimizes cost overruns,

malpractices and corruption in the construction sector but also brings a positive change in the quality of lives of people. This goal can be achieved by establishing research based National level institutes to act as a single source of authentic construction cost data and to deal with matters related to engineering contracts.

3. Pakistan Initiative

3.1 Introduction & Background

Pakistan Engineering Council (PEC) has taken another initiative to boost the construction sector of Pakistan by preparing and making available on the website (<http://www.picc.org.pk>) cost of all construction inputs which are being updated, for the time being, on monthly basis. In various workshops organized by PEC in the last couple of years all over the country, the participants raised their concerns regarding present source of price indices referred in the bidding documents. The current price indices are not realistic, primarily because very limited items are covered in these indices, which are also not updated regularly. Moreover, presently available Government produced data is only for few construction items which are not prepared by the relevant professionals, cost engineers, analysts and quantity surveyors having practical insight in analyzing the construction cost inputs.

Over one trillion Rupees are spent in Pakistan every year by public and private sectors for construction activities towards National development. While executing these projects, it is often witnessed that in most of the cases the projects are delayed and cost are overrun leading to loss of billions of Rupees to National exchequer. To overcome these difficulties, it was realized by stakeholders since long the need of a single source authentic costs data for all type of construction inputs to prepare realistic budget and estimates and for effective tendering and contract administration. As cost and contracts are related subjects, PEC has already developed a set of standard bidding/contract documents, notified by Planning Commission of Pakistan as the Country specific procurement documents. PEC was requested by the Ministry of Housing and Works and Public Procurement and Regulatory Authority (PPRA) to prepare a unified Schedule of Rates (SoR). After extensive consultations with relevant stakeholders such as, government departments, contractors, consultants and project executing authorities etc, Pakistan Institute of Cost and Contracts (PICC) has been established, as a subsidiary of PEC and a non-profit research based institution, to provide services on construction cost and contract related matters. PICC provides a single source of authentic construction cost data to prepare realistic project estimates and for effective tendering as well as contract administration. The use of such cost data, prepared by PICC as a neutral entity, by all private/public sectors will ensure; realistic and transparent project cost estimates; timely project completion; quality construction; good governance and minimize the financial loss to the National exchequer during implementation stage.

PICC has recruited cost engineers; quantity surveyors; IT professionals; finance; HR; and administrative staff in its head office in Lahore and deputed market surveyors in all provincial capitals, Federal Capital, AJK and Gilgit-Baltistan for the collection and verification of market rates. PICC Cost Data has been tremendously appreciated at both national and international levels. Asian Development Bank (ADB) has extended a TA Grant of \$149,500 to PICC under Procurement Partnership Initiative (PPI).

3.2 PICC Cost Data

Effective tendering and contract administration of construction projects depend upon transparent and realistic budget/estimates based on viable and authentic costs data for all type of construction inputs.

PICC has undertaken to fulfill the requirements of market based National cost data to effectively handle the project cost to optimum level. PICC Cost Data includes Schedule of Rates (SoR) for basic and composite items; Technical Specifications; Standard Methods of Measurements; Model Bill of Quantities & Guidelines; Per Unit and Material Testing Rates; Transportation Charges; Cost Behavior Patterns; Providers Database; and Reports.

As on May 06, 2012, the PICC website has about 3,673 basic input rates for materials, manpower and machinery; and about 2,256 composite item rates for concrete, brick masonry, stone masonry, steel reinforcement, framework, plastering, pile works, earth works and road works etc. Overall, rates of about 831,937 Cost Data items are being monthly updated which are being increased progressively. Each and every individual input has been classified under various sections and allocated a unique code for its identification, in line with the Construction Specification Institute (CSI) Master Format 2004. Such cost data have been displayed for all the city districts of Pakistan including AJK and Gilgit-Baltistan and being updated on 7th of every month.

The PICC Cost Data will transform and have significant technological impact on a large number of areas of construction sector. It will facilitate Cost Plus project execution and will also be beneficial for Government Departments; Funding Agencies; Project Executing Authorities; Consulting and Contracting Firms and others relevant to construction industry by saving time and money spent in preparation of cost data by manual procedures which are incomplete, outdated and lack authenticity. PICC Cost Data will also revolutionize Construction Cost Information and Reporting.

3.3 Schedule of Rates (SoR)

Schedule of Rates (SoR) for basic and Composite items are being developed progressively. The basic input rates for all the Districts of Pakistan including AJK and for Gilgit-Baltistan are determined and hosted on the website. The Composite Item Rates for various sections; such as Concrete, Masonry, Finishing, Road works, Electrical Works, Earth Works etc. are developed and hosted on website for all the districts of Pakistan including AJK and Gilgit-Baltistan.

These rates are based on the data collected and verified by the PICC Quantity/Market Surveyors; and checked and analyzed by the Cost Engineers and Quantity Surveyors for final determination of the rates.

These cost data are available on website for the current month as well as for two preceding months. However, the old data are available under the head "Archives" available only to subscribers.

3.4 General Assumptions related to Input Rates

Following are the general considerations regarding input rates:

- The rates of basic construction inputs are hosted on the web site for all the city districts of Pakistan including AJK. The input rates for Gilgit-Baltistan are also available.
- The material rates are inclusive of transportation and other applicable taxes/charges but excluding contractor's profit and overheads.
- The rates of plants and equipments are inclusive of fuel consumption.
- Each basic construction input has been identified by a unique code and placed under the relevant classified section.
- To account for the diversity in quality, some of the materials are categorized into various classes such as class A, B and C whereas class A signifies the highest quality. However some manufacturers of plumbing products have categorized their products into various classes based on the quality in the reverse order.

3.5 Composite Item Rates

Various execution activities are classified into different sections and each section has further classified in to itemized groups for precise and accurate estimation. Composite item rates for various classified sections are progressively prepared and uploaded on the website for all the districts of Pakistan including AJK and Gilgit-Baltistan and updated on monthly basis.

Rate analysis for composite items is prepared by a team of Cost Engineers and Quantity Surveyors by determining various parameters. The cost data is analyzed with reasonable care for preparation of project estimates, budgeting bids, rationalization of cost and contracts administration.

Rate analysis and composite item rates for concrete, steel reinforcement, masonry works, formworks, cement-sand plastering, earthworks and road works have been developed and uploaded on the website for all the districts of Pakistan including AJK and Gilgit-Baltistan. PICC is progressively completing composite rates for building and road works on priority basis.

3.6 Technical Specifications

Technical specifications have been developed in line with the Construction Specification Institute (CSI) Master Format 2004. Various construction activities are classified into different sections. Specifications format for all the classified sections remains same to make these specification uniform and user friendly. Specifications are prepared, for the time being, for Section 03 Concrete, Section 04 Masonry, Section 22 Water supply and sanitation and Section 36 Pile works which are hosted on the website. However, Specifications for other sections are currently under development and shall progressively be hosted on the website on development.

3.7 Provider's Database

A comprehensive provider's database of manufacturers, suppliers and vendors based in various geographical locations has been prepared. This database assists PICC market surveyors for collection and verification of current market rates for materials, manpower and plant and equipments.

3.8 Per Unit Rates and Material Testing Rates

In addition to other cost data, per unit rates for various facilities and rates for quality control tests are also provided on PICC website. Information hosted on PICC website for per unit rates is obtained from different National organizations involved in the construction industry. Such cost data has been displayed on website for the users to prepare preliminary cost estimates. However PICC will analyze and evaluate these per unit rates utilizing its own construction cost data in due course of time. PICC has also displayed on its website the rates for performing quality control tests for materials and end products.

3.9 Cost Data Reports

PICC is developing a comprehensive reporting system for users to access any type of cost data. In this regard, three reports which include Provider Database; Major Building and Infrastructure Items; Major Domestic Electrical Works Items; Major Power Sector Items; Month wise Input Rates; City wise Input Rates; and Month, City wise Input Rates are currently available on the website. In near future, more reports will be developed.

3.10 Archived Cost Data

The cost data displayed on PICC website is of current month and the 2 preceding months. Cost Data older than 3 months is marked as archived and only available offline. To access Archived Cost Data, a request has to be made through a form available on PICC website. At the moment,

PICC is providing Archived Cost Data free of charge. However, an appropriate fee may be charged in future.

3.11 Transportation charges

A comprehensive mechanism has been developed for determining transportation charges in four types of terrains i.e. plain asphalt road, unmetalled (katcha) road, hilly terrain and hard hilly terrain. The transportation charges are applied on Ex-works rates to verify the already determined material rates within the cities.

3.12 Cost Behavior Patterns

PICC is also providing on its website the Cost Behavior Patterns for major construction materials for a period of preceding 12 months. This will enable the estimators to assess monthly variation in prices of major materials during past 12 months.

3.13 Model Bill of Quantities & Guidelines

Model BOQ and Guidelines for preparation of Bill of Quantities have been developed by PICC, finalized and uploaded on its website. The objective of this document is to standardize the procedures according to which the Bill of Quantities shall be prepared, quantities to be expressed, BOQ to be priced and measured. The document also defines how the works shall be itemized and described in Bill of Quantities with sufficient details to enable the Bidders/Tenderers to price the BOQ adequately.

3.14 Standard Method of Measurements

PICC has also developed the document for Standard Method of Measurements (SMM) and uploaded on its website. The objective of SMM is to standardize the procedures according to which the quantities expressed in the Bill of Quantities shall be measured for payment to the contractor. Presently, this document includes method of measurements for various types of general and preliminary items, concrete, steel reinforcement, masonry works, plastering, water supply and sanitation, pile works and road works etc., whereas method of measurements for other construction works are under development.

3.15 Utility of PICC Cost Data

The PICC Cost Data will be widely used for:

- Preparation of budget cost estimates
- Preparation of engineer's estimates
- Cost validation of PC-1 and third party cost validation
- Reference data for resolution of contractual disputes
- Reference data for price adjustment
- Reference data for bidders to prepare the bids

3.16 Benefits of PICC Cost Data

Use of single source construction cost data by all private/public sectors for budgeting construction projects will result in following benefits:

- Quick verification for accuracy of project cost
- Transparency in the estimates
- Minimize malpractices and corruption

- Quality construction
- Timely completion of projects
- Effective contract administration
- Minimize cost overrun and financial loss to the National Exchequer during the currency of contracts
- Facilitate Cost Plus project execution

3.17 Environmental Impact and Benefits of PICC Cost Data

- Following the Technical Specifications provided on PICC website and undertaking environmental impact assessment for each construction project; the use of PICC Cost Data will result in minimum negative impact on environment and there will be less number of environmental problems caused due to construction activities.
- PICC Cost Data will ensure that all items are properly and adequately utilized which will result in, for example, fewer trees chopped down; less noise and air pollution from Plant and Machinery; low water pollution etc.
- Consumption of raw materials by the construction industries results in depletion of natural resources, increasing the environmental impacts and CO₂ emissions all over the surroundings. With the use of PICC Cost Data, only required and adequate raw materials will be used and therefore, construction activities will be environment friendly with minimum negative impact.
- The use of PICC Cost Data will enhance safety in construction.

3.18 Social Impacts and Benefits of PICC Cost Data

- PICC Cost Data will help eliminate corruption and ensure transparency in the project estimates, quality construction, timely completion, effective contract administration and minimize the financial loss to the National exchequer during the currency of contracts. The PICC initiative of developing construction cost database, having legal force of its compliance throughout Pakistan, will be updated on continuous basis and maintained in its website accessible to all in Pakistan and across the Globe. Such cost data will be of preventive measures against fraud, manipulation and corruption.
- Information sharing and public awareness on construction sector issues.
- PICC Cost Data will also facilitate the Accountability at all levels in construction sector and help ensuring transparency.

3.19 Capacity Building

PICC has been actively conducting various capacity building activities including trainings, workshops, seminars, conferences and other research related activities. PICC has conducted a number of training workshops for its market surveyors to help them perform their duties in more productive and efficient manner. PICC has also been holding conferences, seminars and other awareness activities related to PICC cost data. In this regard, a National Conference on Construction Cost was held on August 10, 2010 in Pakistan Institute of Cost and Contracts (PICC) head office at Lahore. The conference was attended by relevant stakeholders. The CEO of PICC has also conducted several workshops on PEC Contracts documents all over the Pakistan for capacity building of the personnel of Executing Agencies, Government Organizations and Consulting/Contracting Firms etc.

3.20 Future Plans

PICC's anticipated future plan includes, but not limited to, the following:

i. Professional Services Offered

PICC will expand its services in near future to include services like preparation of budget cost estimates, engineer's estimates, tender documentation, cost validation of PC-1 and third party cost validation etc.

ii. PICC Cost Data as Reference Data

PICC cost data will be used as reference data for price adjustment and for bidders to prepare their bids.

iii. Assist PEC Act and By-Laws Committee

PICC will assist PEC Act and By-Laws Committee in updating various standard forms of procurement documents.

iv. Research & Development

PICC will conduct more research and development works to improve its products and services. The research may also be in areas of standardization, developing new products like BOQ Estimator, Construction Cost Index and others.

v. Capacity Building

In Pakistan, generally the field of quantity surveying and cost management is relatively unheard. Therefore PICC, in addition to above tasks, has also taken this responsibility upon itself to cultivate the same in the construction sector. Bearing in mind the dearth of trained professionals in this field, PICC intends to undertake a comprehensive capacity building program comprising of participation in National/International trainings and seminars, conduct capacity building workshops and training sessions, create opportunities for higher education in the relevant fields and establish modernized library etc.

vi. E-Procurement

Keeping in view the current international practices, PICC has also undertaken the work to establish the mechanism for Electronic Procurement of works which will reduce the time and resources required for procurement process. Generally, this involves development of standard procedures for e-Procurement by utilizing information technology aimed at bringing simplified procedures, bringing in transparency, making need based good quality and timely information available to public and providing all services in cost effective and efficient manner through an online web portal. PICC would also develop a strategy document for e-Procurement which would identify the goals of e-Procurement policy and detailed outline of the strategy to be adopted.

4. Conclusion

In order to achieve sustainable construction and awarding contracts at right cost, avoid cost overruns, malpractices and corruption, PICC Cost Data should be used as reference data in all kinds of construction activities in Pakistan. This enable a project to be completed on scheduled time in desired quality. PICC Cost Data has been developed using information technology and contains all types of construction inputs based on market rates. It is accessible to everyone across the globe via PICC website web (www.picc.org.pk) for their use, feedback and suggestions.