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Framework for successful implementation of E procurement in Indian Construction Industry

Theme Project Management Leadership in a rapidly changing world

Keywords E procurement, Construction Industry, Project Lifecycle, Digitization, DMAIC

Abstract

In the era of globalization when the world has shrunk to a more accessible structure and with the advent of Information Communication and Technology (ICT), the involvement of E- procurement in Construction Industry is indeed of strategic importance. It helps in increasing competition, transparency, market access, operational improvement, swift responses and likewise.

In other sectors as retail merchandise, banking, automobile etc. the E procurement is gaining popularity but it is still in a very nascent stage in Indian Construction industry. There are several challenges to the adoption of E procurement in construction sites such as internet unavailability at remote site, unawareness in the management, lack of trained staff, costly in implementation, no contractual obligation, paucity of time etc. E Procurement can be implemented both in Pre award and Post Construction stages. The pre award stage comprises of E notification, E-submission, E-comparison, E-evaluation and E awarding and the post construction may include E - ordering, E invoicing, E-payment, E tracking. This can be performed through innumerable means like Emails (Microsoft share point, drop box), EIP systems, Online Collaboration, Cloud systems, Portals Web sites and others.

Thus the main challenge is that the projects dynamics are very heterogeneous in nature and so is the project organization structure along with prevailing cybercrime. Thus the main aim of the study will be to define a Frame work for successful implementation of E-procurement at various stages of project life cycle in Construction Industry

Intent

This paper contributes to the theoretical framework for successful implementation of E procurement in construction Industry from previous literatures, magazines, reports and books and is studied in detail to gain imminent knowledge.

Introduction

According to a study by Global construction perspectives and Oxford Economics, India will become the world's third largest market in construction by 2050 . In this era of globalization when the world has shrunk to a more accessible adobe and with the advent of ICT, the involvement of E procurement in Construction Industry is indeed of strategic importance. It is observed that though in sectors such as retail merchandise, banking, a utomobile etc. E procurement is gaining popularity but still it is in a very nascent stage in Indian Construction industry. Online E Procurement tools have been around since the late 1990's, and as such, have evolved significantly to provide a robust set of tools used frequently by Fortune

500 companies as part of their procurement tool kit (Executive). E Procurement covers a wide range of web-based methods and tools (for obtaining

prices, awarding and managing contracts, etc.) spanning every stage of the purchase of goods or services (Anumba C.J., 2002, 2003). E- Procurement can therefore be described as using ECommerce for procurement: "A business tool and enabler, involving the use of electronic technologies to automate and streamline the procurement processes of an organization, improving efficiencies and transparency, and thereby reducing the costs of those processes within and between businesses "(NSW Government 2002). The Indian construction industry has been condemned for poor initial uptake of E procurement and ICT generated support systems. It should assume a greater importance with a plethora of construction projects on the horizon. Though it is still rampant in large construction firms who have the ability to invest and maximize the E procurement advantage, Vis a v very little or no deployment in Small and Medium Enterprises (SMEs) which is 95 % of the Indian construction sector. In the construction sector SMEs contribute significantly for the development of the economy. The use of ICT in this sector is low even though it has got the greatest potential to increase productivity and efficiency (Tisha Merium Cherian, August 2016). If the trifling demands are consolidated for SMEs then certainly greater profit margin can be achieved. Thus the aim should be to facilitate the already existing E procurement system in large organization and boost the inception in small organization. Overall, the findings show that SMEs are gaining profits through the use of ICT that empower them to systematize repetitive works. Typical examples of these are tools for administrative tasks, documents and communications at inter-organizational level, exchange of inters- organizational documents and business information. The paper elucidates through two case studies on L&T EPMS and Bhoomi, implementation of successful E procurement in India. Table 1 show the ranking of E procurement usage by different developed countries and India is too far in the list:

Country	Ranking
United States	1
Japan	2
Sweden	3
Australia	4
United Kingdom	5
Ireland	6

Table 1: Ranking of e-Procurement Usage by Country Source: (Westcott, 2002)

Challenges and Benefits to E Procurement in Construction Sector

There are several technical and non-technical challenges to the adoption of E procurement in construction sites.

Technical Challenges: First and foremost technical challenge is that internet unavailability is very poor at remote site and even if available the speed will be very slow such as Hydro projects or pipe line projects. There is different version of software available in the market which adds to the heterogeneous nature and thus transfers of correct file is a challenge. Fundamental issues for successful E commerce in construction, such as signature exchange (Pederson, 1999; Asokan et al., 2000), secure payment (Shamir et al, 1998; Bellare et al., 2000), and fair contracting models (Coscia et al., 2000; Rohm & Pernul 2000; Liu et al., 2001) needs to be addressed in broader business-to-business (B2B) projects. The access for one project in an organization might be granted to unlimited number of people thus authenticity of the sender is questionable. Virus attacks to the saved work, hacking by disreputable experts, some of the threats to the security and integrity of the E-ways.

Non-technical Challenges: Factors which prevent the immediate leadership to implement E tools at site, high initial cost of investment in IT techniques implementation. There is dearth of trained and motivated management and staff at site who give utmost importance to the iron triangle of time cost and quality rather than initiatives in E business. Lack of awareness of different stakeholder's at different levels in IT field. There is resistance among the senior experienced staff members to adopt latest E techniques. More often than not there is no contractual obligation to use E procurement techniques. It's a question of Jurisdiction of Law of which state or country to be applied for dispute resolution. Multiple Stakeholders involvement in a single project as the client, architect, structural engineer, government agencies, approving authorities and contractor etc. so integration of all on a common platform is a challenge

Benefits: The benefits of adoption of E procurement techniques are copious. Principally it helps in increasing competition in the market as the market access is enriched. It supplements to the leanness of the procurement cycle as it helps in reduction of administrative cost and man power employed for mundane repetitive task. The overall operational efficiency is improved as the acquisition and the Inventory cost is less due to short purchasing cycle time. In India, E-procurement improves the average road quality example Pradhan Mantri Gram Sadak Yojna (PMGSY) (Sean Lewis Faupel, July 2014). The environmental sustainability because of less paper production is promoted through prevalent use of e tools. It fosters overall cost reduction and enhances user satisfaction. It increases communication modes and thus responsiveness of the stakeholders. In a recent survey of senior people in the infrastructure space by Deloitte India, 60 per cent of respondents believed that procurement fraud, bribery and corruption are the biggest fraud risks in the infrastructure sector (Vendor Alert, 2013) and introduction of E procurement will definitely bring this to a major halt as transparency and accountability will be likely.

Cartel formation which is a major weekness of construction industry will be curtailed. Glocal boundaries will be ubiquitous with the usage of E procurement as the territorial constraints reduce to a great extent.

Methodology

E procurement tools in project life cycle phases

E Procurement can be implemented both in Pre award and Post award Construction stages. A project life cycle can be divided into five categories viz Initiation, Planning Execution, Monitoring and Control and Closure (PMBOK 5th edition). As the lifecycle phases can be functional to all the construction projects irrespective of the dynamics similarly these E procurement techniques can be implemented to all projects with necessary technological sustenance.

Various E procurement techniques can be further distributed in the process groups as shown in figure 1.

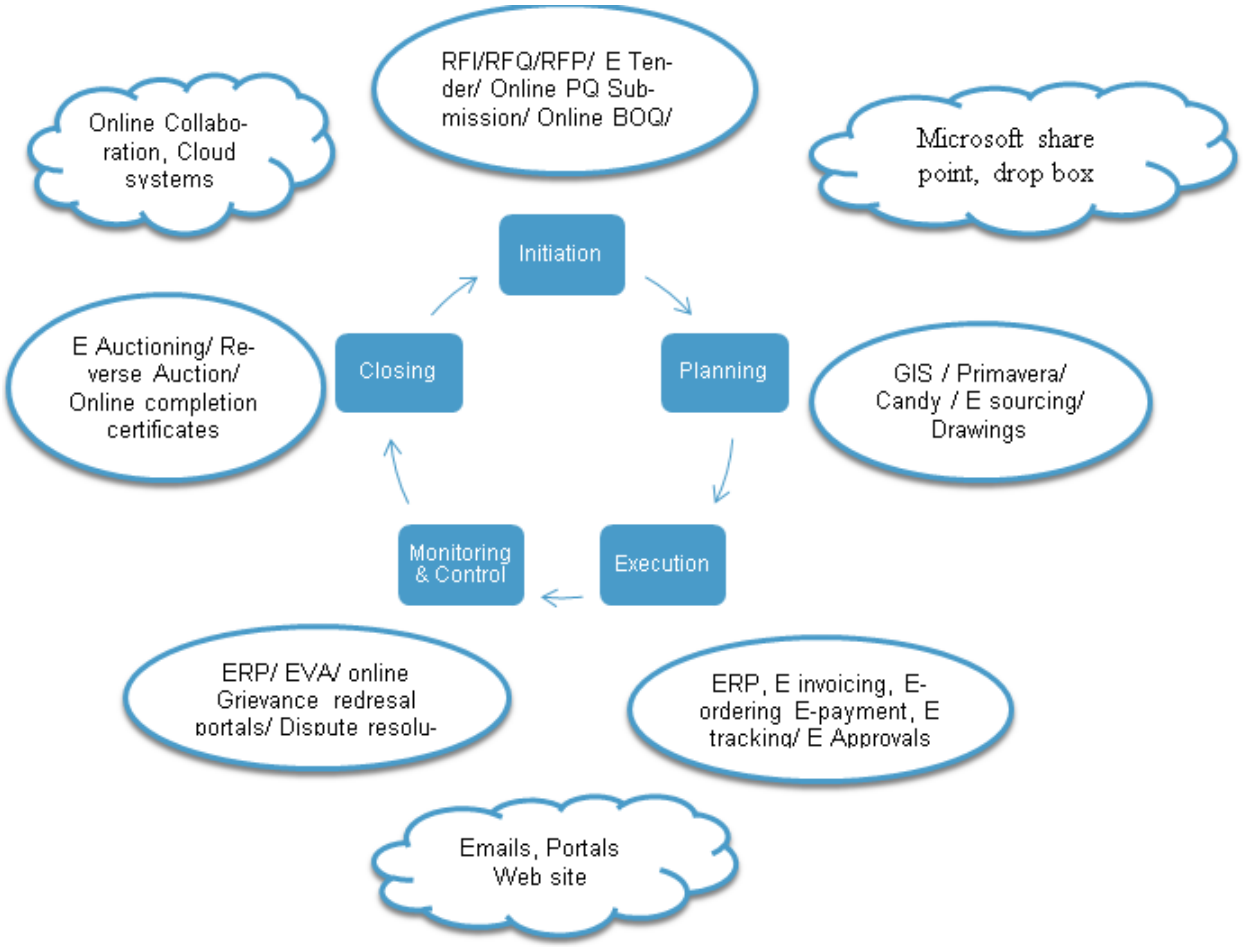

Fig 1: Distribution of E Procurement techniques In Construction Life Cycle

A point noteworthy here is as the process groups are seldom either discrete or one-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project, subproject, or project phase. (PMBok 5th edition) so are these E procurement tools at any phase. There is coherence, integration and overlap among all the e tools stages of procurement cycle.

To illustrate this development of a project in sequential order can be discussed. Any project kick starts when the client floats tender. This can be accomplished through tools as Request for qualification/ interest and proposal on online portals as www.tenderwizard.com or www.etender.com . Additionally the obligatory documents such as Pre-qualification documents, drawings and BOQ can be submitted on the same portal. This will save the respondent's time, will be easy to compare and evaluate by client. Ample paper will be saved which is otherwise unnecessarily lost in the printing and signing of tender / contract document, which can yet again be performed by authenticated digital signature.

After the award of the contract agreement the contractor can plan the entire project details via tools as Primavera (planning), Cots (Costing), Candy (Estimation/ Costing/ Planning), STAD, BIM, and Equest etc. which aids in automation of the planning process.

The Execution, Monitoring and Control is administered through tools as Enterprise Resource portal and online collaboration which helps in selections of vendors, invoicing tracking and online tracking, online payment etc. at a single stretch , much faster pace and hindrance free path.

One of the successful case study is that of L&T which is demonstrated by the below Fig 2

Case Study 1: L&T EPMS

L&t's Enterprise Project Management System (EPMS) framework has been designed to centralize and standardize information collection and management associated with capital project management of both mega and site projects. Contract management, planning and scheduling, procurement management, construction management, project costing and finance are key business areas that the EPMS framework focuses on. (L&T Infotech, 2017). Herein the associated sites are scheduled, scrutinized and accomplished through EPMS portal with concerned internal and external stakeholders.

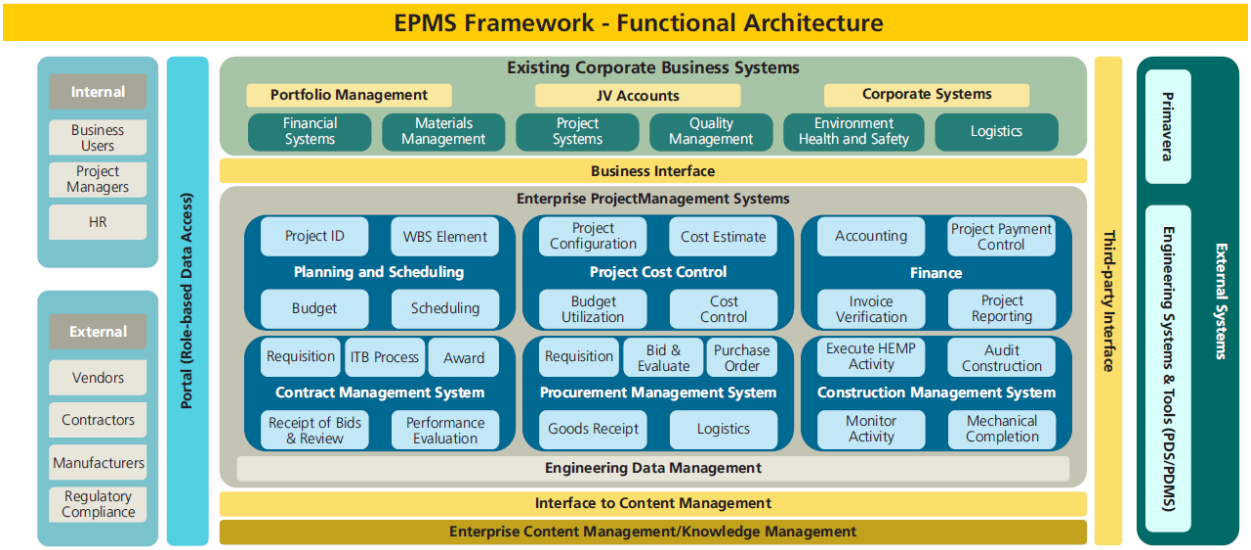

Fig 2 Source: (L&T Infotech, 2017)

During the progression of the projects all necessary approvals, registration such as land, environment etc. can be also facilitated through an online single window with the government support, which is very well illustrated by the below case study.

Case Study 2: Bhoomi

Bhoomi is a self-sustainable e-Governance project for the computerized delivery of 20 million rural land records to 6.7 million farmers through 177 Government-owned kiosks in the State of Karnataka. It was felt that rural land records are central conduits to delivering better IT-enabled services to citizens because they contain multiple data elements: ownership, tenancy, loans, nature of title, irrigation details, crops grown etc. In addition to providing the proof of title to the land, this land record is used by the farmer for a variety of purposes: from documenting crop loans and legal actions, to securing scholarships for school-children. These records were hitherto maintained manually by 9,000 village officials. Through this project, computerized kiosks are currently offering farmers two critical services - procurement of land records and requests for changes to land title. About 20 million records are now being legally maintained in the digital format. To ensure authenticity of data management, a biometric finger authentication system has been used for the first time in an e-Governance project in India. To make the project self- sustaining and expandable, Bhoomi levies user charges. Government Initiatives -In view of the benefits of E-Procurement System, it was under consideration of the Government to introduce E-Procurement System in all the Government purchases and procurements in a phased manner. effect from date 1.1.2007, E-Procurement System shall be implemented by all the Government Departments (including Heads of Departments under their administrative controls) Boards, Corporations of the State Government, Nigams and Societies under the administrative control of the State Government and which are funded by the

Government; for undertaking transactions having a value of Rs.50 lacs and above . ((NISG, 2012)
The key aspects of Health, Safety, Quality Risk assessment documents can be communicated though share point, Email, drop box etc. to all the stakeholders thus saving time, cost and adhering to quality. Below Fig 3 and Fig 4 shows advantage of online collaboration over traditional method of communication.

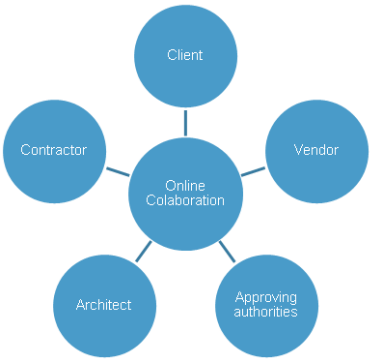

Fig 3: Online Collaboration

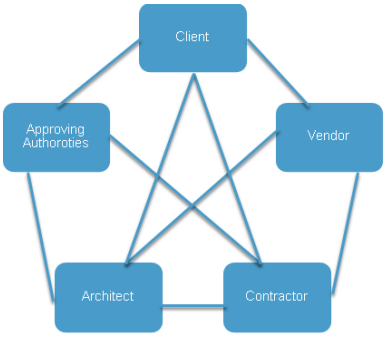

Fig 4: Traditional Communication

In the closure stage the completion certificate can be digitally signed and sent to the main contractor. E auction can be done for the residual materials. Any grievances or disputes can be communicated to the concerned departments through online portals as done in case of Public Interest Litigation or help desks in telecom or banking sectors.

DMAIC for E-procurement enactment

Six Sigma's popularity and success is catching fire throughout the service industry across the globe as no other process improvement movement before (Vijaya Sunder, 2013). DMAIC is the most commonly used roadmap which organizations use for process improvements through Six Sigma project management. (M, Jan 2016).To reach E procurement to new horizon DMAIC offers a methodology for taking existing processes to new heights and may include a measure of redesign (NISG, 2012). So it is offered with a flow process to execute DMAIC in the construction industry as well for successful E procurement enactment.

Fig 5 flow process describes it

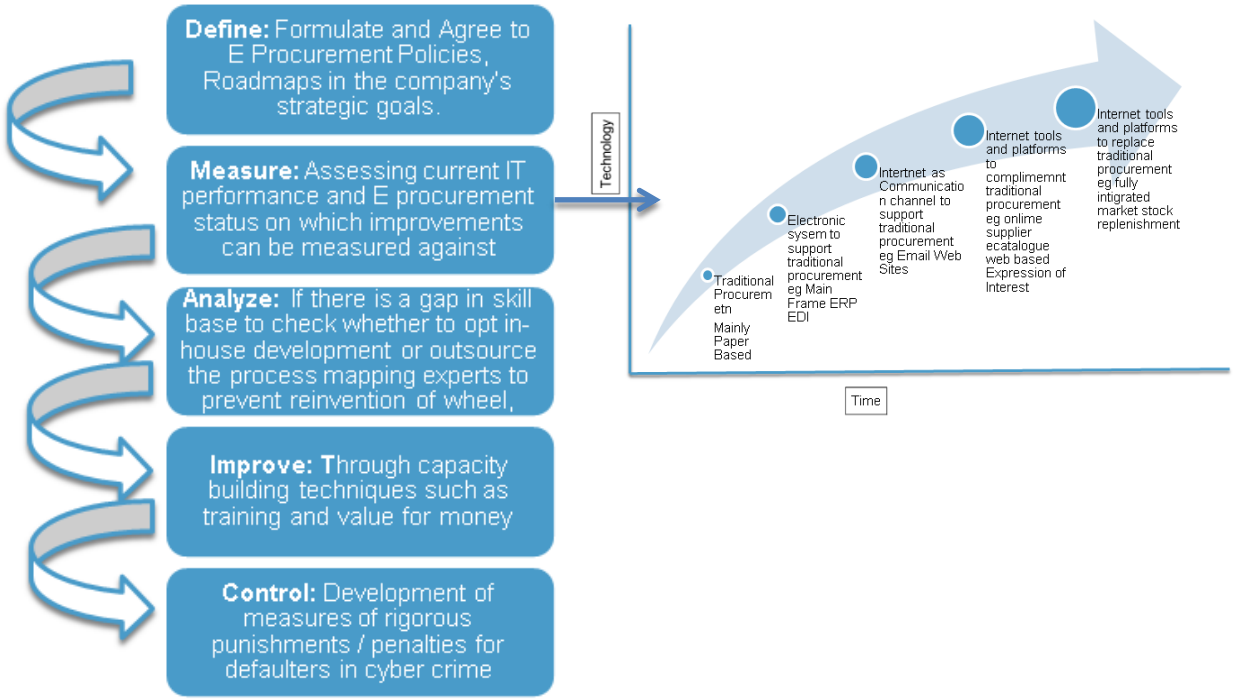

Fig 5: DMAIC for E procurement implementation

Conclusion

Glocal E procurement network is the need of the hour to inculcate price competitiveness to domestic procedures in international market as well as to provide value for money for projects as smart cities which lies on the corner stone of ICT and sustainability. Knudsen (2003) suggests E procurement can be condensed into the following six processes -"E-sourcing, E- tendering, E-informing, E-MRO (Maintenance, Repair and operating materials), ERP (Enterprise resource planning) and E-collaboration". Construction Industry key challenge lies in implementation of E procurement tools at the various stages which can be expedited through DMAIC process flow. Government (frequently key patron) with its improved tendency to conduct its business electronically certainly has an effect on various stakeholders to do business by proposing a wide range of E facilities. There is a dire need for technological uplifment, skill base development, leadership motivation and innovation inducements to bridge the gap between the current situation and the utopia state of complete digitization of construction project This study leaves an opportunity for further research and customization for construction Industry to study the benefits and limitations of the DMAIC model presented as part of the paper.

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