Early Contractor's Involvement
A Paradigm Shift in Procurement Approach

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ABSTRACT

Early Contractor Involvement or "ECI" has been advocated as a procurement process that harnesses and elevates the construction productivity. Singapore government has been pushing the Construction Industry (now better known as the Built Environment Industry) to move towards higher productivity – through technology adoption, procurement and knowledge workforce.

Adopting ECI as part of the procurement enables Contractor to be engaged during design stage (i.e. concept or schematic design) provides opportunities to seek contractor's expertise in areas of buildability, constructability, construction scheduling, site and project planning, risk management, adoption of new construction technology and construction methodology. This enables the contractor's construction input and consideration to be considered into the design development upfront hence eliminate any waste and optimizing a better outcome. This procurement framework enables some form of partnering approach amongst the parties while maintaining the competitive tendering environment.

ECI may be adopted for both public and private projects; and it can also be adopted in different procurement approach – Lump Sum or Design & Build approach.

While there are certainly benefits reap from the ECI procurement approach, there are also challenges and potential pitfalls that need to be managed.

This paper will discuss on the ECI Process, implementation timeline, some of the challenges and the need to have a paradigm shift in our procurement approach when adopting ECI.

Keywords: *Procurement, Productivity, Challenges.*

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1. INTRODUCTION

The Singapore Construction sector has been perceived as low productivity sector due to its heavy reliance on foreign construction workforce and low-technology adoption.

Since the launch of Singapore Construction Productivity Roadmap in 2010, the Construction industry (now better known as Built Environment Industry) has been making concerted efforts to steer towards the vision of built environment sector that is highly integrated and technologically advanced, supported by a skilled and competent workforce (BCA, 2013).

The industry has been encouraged to switch to technology and to re-engineer its processes. The Singapore government has also launched an S$250 million Construction Productivity and Capability Fund (CPCF) in 2010 as part of the Construction Productivity Roadmap (BCA, 2015a). Since the launching, there has been enhancement of the Construction Productivity and Capability Fund (CPCF) in 2014 (BCA,2015b).

2. BACKGROUND

To push for adoption of labour efficient designs and construction methods along the entire value chain, BCA has introduced mandatory requirements for buildability and constructability for projects. Upstream in the planning and design process, as part of the buildability framework, the industry has to develop designs that are more buildable, more labour-efficient and easier to build. Downstream, contractors have to use more advanced technology and construction methods that improve labour efficiency as part of the constructability framework.

To effect transformation to the industry, there is a need to go further upstream at procurement stage to achieve a higher degree of integration amongst the stakeholders. Adopting Early Contractor Involvement (ECI) procurement model is one of the ways to achieve this integration at the early stage of the development project. The ECI model enables the utilisation of contractor's experience, expertise and understanding of the construction process and brings it upfront into the design process, where labour efficient designs and construction methods including new technologies can be considered.

Unlike traditional procurement routes, through ECI, contractors' participation is sought during the earlier stages of design (i.e. concept design or schematic design stages) to seek contractor's expertise in areas such as buildability, constructability, construction scheduling and planning, value engineering solutions and latest construction technologies.

The ECI approach paves way for greater degree of collaboration and integration within the project teams and spurs them to achieve optimal solutions as early as possible. The interaction between the contractors and designers at the design stage promotes scope for innovation and also "partnering" in tendering environment.

This paper covers our experience on the adoption and implementation of ECI on various projects.

3. EVOLUTION OF ECI

From the private project experience perspective, with the raising land cost (and financing cost) in recent years, developers are keen to secure better certainty of construction time (where possible, early start of the project), tighter construction cost so as to optimise the capital cost for land bids and more buildable solution to enhance the construction duration.

In the earlier approach, ECI was adopted to have early engagement with contractors especially during the pre-tendering stage, to agree on construction cost on lump sum basis or unit cost per GFA basis (i.e. pre-bid price) for developer's participation in land bid. Other early objectives include enabling early start of the development project once the developer secures the land since the contractor would be familiar with the project and have considered buildable solutions in their pre-bid price. All these are important considerations for developer due to rising land cost.

From a quick reflection of the earlier ECI approach, it has not fully harness onto the benefits of ECI, as it was mainly an early engagement (mainly between developer and contractor, with some involvement of the quantity surveyor and consultant), but not a full ECI process.

ECI was also adopted during pre-qualification or tendering stage, where involvement of contractor was drawn in to provide input on critical cost drivers and understanding on their concerns on project specific issues and challenges. Over time, this engagement evolved and the contractors were requested to respond to specific issues further to advance design and project information issued as "Advanced Information Package (AIP)" during the pre-qualification or pre-tender stage. (LS, 2012).

However, with increased emphasis on buildability, constructability, environmental sustainability, safety and productivity for the built environment industry, the adoption of ECI has become more complex as there is great opportunity to better integration between the project team and contractors in the early stage of the project so as to achieve better project outcome in term of cost, time and quality as well as productivity.

4. WHAT IS ECI?

ECI is a project delivery method whereby contractors are engaged during the early stages of design (i.e. concept design or schematic design stages) to effectively tap their construction expertise and input especially on areas of buildability, constructability, construction scheduling, programme and planning, approaches to manage project specific challenges, value engineering solutions and adoption of latest construction technologies or methodologies.

The engagement and interaction between the developer, consultants and contractors during the ECI process would enable the project team (especially the designers) to have essential constructability and construction planning feedback which enable these to be considered as their design evolves (i.e. design is more buildable and constructible). This includes other key considerations such as contract phasing and sequencing which are more realistic, having taking into account of contractor's planning and programming.

The value drivers of ECI process includes :-

(a) Shorter tendering period
(b) Construction planning and methodologies
(c) Buildability and constructability
(d) Value Engineering solutions
(e) Better understanding of the Contractor's team capability
(f) Promote partnering concepts in a tendering environment

5. ECI FRAMEWORK

As part of ECI framework, selected contractors will be invited to participate in the ECI process where all stakeholders involved including the contractors will be investing substantial amount of time and effort, hence it is important to select the most suitable who meets the requirements for the tender to participate.

Prior to the ECI process, it was recommended that a pre-qualification (Pre-Q) exercise be conducted to select the most suitable contractors to tender for the project. Pre-Q evaluation criteria to help shortlist and select the most suitable contractors shall also be developed and agreed upfront. These Pre-Q deliverables required from the invited contractors are :-

(a) Company Profile
(b) Financial Strength
(c) Resource Capability and HQ Support
(d) Track Records of similar nature and value of projects
(e) Current commitments and capacity
(f) Quality Assurance
(g) Environmental, Health & Safety (EH&S) System

It is worth noting that the objectives of the Pre-Q exercise to gauge the contractors' standing in terms of their financial capability, resources including their HQ support (especially for overseas contractors), current work commitment and capacity for new projects, relevant experience in similar project type and value.

Apart from the Pre-Q criteria which focus on overall company profile, contractors may be required to provide their appreciation of the project challenges from the project brief provided and proposed project organisation including proposed key staff (which include their CVs and proven track records). The key outcome expected of the Pre-Q exercise is to shortlist suitable contractors to be invited for the tender, in this case the tender commences with an ECI process.

ECI process is an intense exercise where it requires substantial resource and time commitment from the contractors and all involved. To avoid unnecessary wastage in contractors' resources and avoid increased cost of tendering, it is therefore suggested that 4 to 6 suitable contractors be shortlisted from the Pre-Q exercise for the tender. It is also prudent to ensure that there is senior management involvement from the respective contractors' organisation (including the involvement of their CEO or senior representative) as well as similar commitment from the developer's organisation, which is a demonstration of commitment from both parties.

The deliverables for ECI process which aims at going more in depth of the project specifics through a series of intense engagement between the project team (developer and consultants) and contractors, includes :-

(a) Identification and proposed approaches to overcome critical project constraints and risks
(b) Construction programme, planning and scheduling
(c) Project completion and handing over and operation interface workplan
(d) Project organisation structure – all key project staff (including CVs and experience)
(e) Construction methodology and technology (e.g. deep basement construction)
(f) Design system study (e.g. structural system – Cast In Situ, Pre-cast, steel structure)
(g) Environmental, Health & Safety Management System
(h) Value Engineering solution
(i) Application of BIM

6. ECI PROCESS

The ECI Process is a structured process that stretched approximately 3 months period and this includes formulating of preliminary tender, technical documents and design drawings into Advanced Information Package (AIP) to be issued to the contractors in tranches. These preliminary technical documents and drawings are largely output from the different design stage (i.e. concept design, schematic design) that are issued to contractors to enable them to study and provide feedback on buildability and constructability input. These feedback are then taken into consideration as design evolves into the next stage.

ECI Process which includes issuance of AIP tranches are dovetailed behind the output from the design stages are illustrated below :-

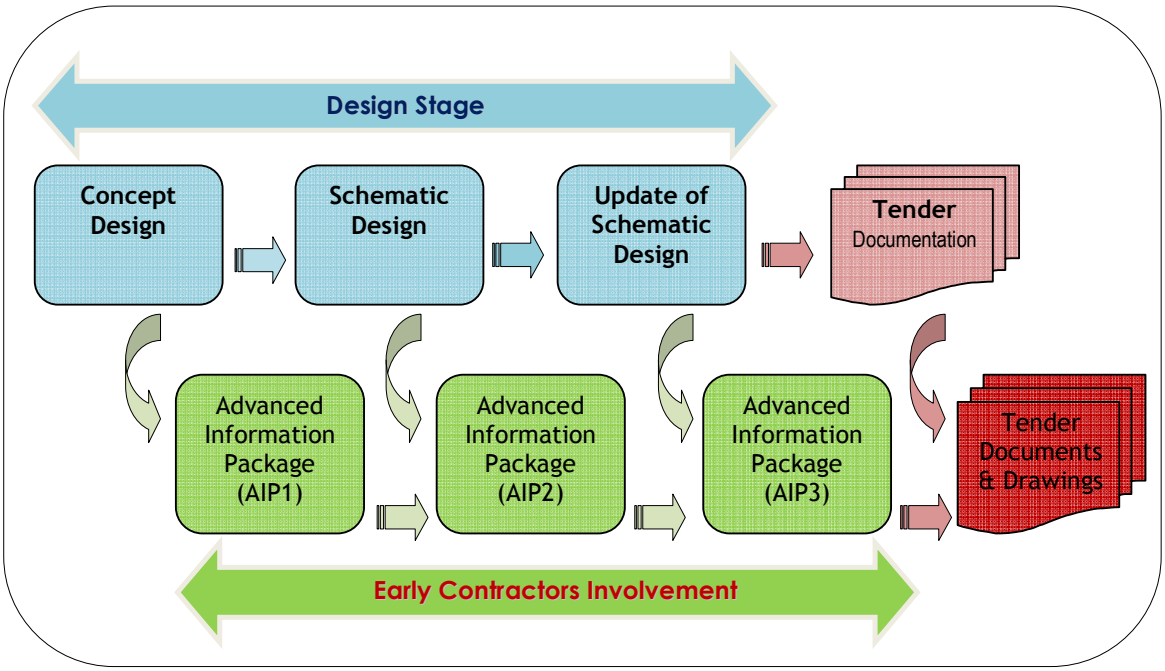

Figure 1 : An Overview of ECI with Design Stage

Apart of the ECI process, for each AIP stage, it begins with a briefing / presentation to contractor by the consultants, which enables the consultants to share with contractors the current project and development information, issues and status of design development. This is commonly carried out prior to the issuance of the AIP documents / package. The collection of the AIP documents / package is followed after the briefing. Prior to the submission of the AIP by the contractors, they were also allowed to submit clarifications after they have studied the AIP documents / package, and the consultants will attempt to respond to these clarifications. Following the submission, the developer and consultant team will review the AIP submission and a one-on-one presentation by respective contractors to the developer and consultant team will be arranged.

The following illustrate the typical process of each AIP stage during the ECI process which focus on "Share" and "engage" approach between all parties involved :-

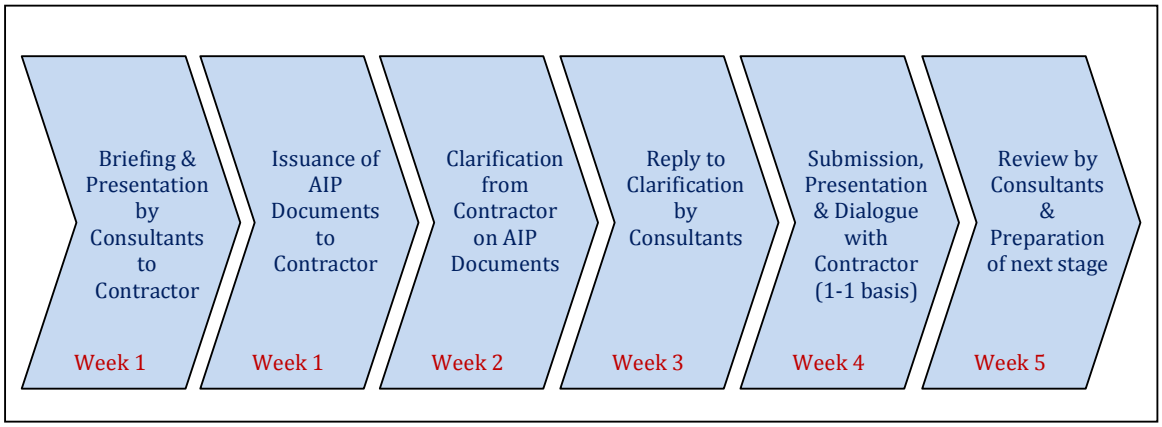

Figure 2 : Typical Process of AIP Stage during ECI Process

The presentations are key as it contains essential information for the other party to take note and work on. For the case of briefing and update by consultants, it could cover various disciplines (i.e. authority and planning issues including records of pre-consult meeting with authorities, architectural, civil & structural, mechanical & electrical services, cost & contracts, specialist consultants – e.g acoustic, ESD, traffic, security, other specialist system). As for the AIP documents, while it may be preliminary design and technical information which may include drawings, schematic, parameters and assumptions, there should be as comprehensive as possible, so that contractors can fully understand the project requirements and specific issues. It shall be noted that the more information the contractors have, it provides them with a better opportunity to better understand and consider them in their submission, hence optimising the benefits of ECI process.

As each of the AIP stage will take between 4 to 6 weeks, depending on the overall period allocated for the ECI process, there may be 2 to 3 tranches of AIP documents to be issued and correspondingly, the above mentioned process will be repeated for 2 to 3 rounds based on different sets of preliminary design, technical and tender documents and drawings to be issued. With better resolution on the technical, constructability and construction planning input from the AIP submission and exchanges, subsequent AIP package (which are technical output as design develops) should provide more details in design and technical requirements.

At the end of the 2 to 3 AIP stages (i.e. the ECI process) including contractor's submissions and presentations, all the construction, design, planning and technical input will be incorporated into the tender documents and drawings to be issued to contractors as a complete set of "Tender Documents". At this juncture, the project would have advanced from ECI stage into tender stage.

As the contractors would have intimately involved in the entire ECI process and have a thorough understanding of the project specific requirements, they would be able to effectively respond to the tender submission, without the fear of unknown risk which will impact onto the tender price unnecessarily. Moreover, having engaged from the onset of the tender process (since ECI stage), contractors will not require so much tender time or rather the tender time given will be better optimised as contractors would be able to focus on their key project drivers which include contractor's proposals or value engineering solution. Hence, there is potential benefit of shortening the tender period.

7. BENEFITS OF ECI

Apart from enabling a closer integration between the project stakeholders, the following are some of the benefits of ECI :-

(a) Achieve more favourable results from leveraging on contractor's expert areas, as compared to conventional procurement routes;
(b) Harness the latest knowledge and technologies from the contractors;
(c) Initial greater commitment and sense of ownership from the contractors;
(d) Create better awareness and understanding of the project risks from the onset;
(e) Provide better forecast of project outcomes;
(f) Lean construction cost as contractors have lower risk to buffer in their tender price;
(g) Joint problem solving (between project team and contractors) – addressing unknowns and difficult environments;
(h) Reduce the risk of dispute
(i) Shorten tendering period

8. ECI FOR DIFFERENT PROCUREMENT APPROACHES

The following are the common procurement approach and ECI can be adopted for both approaches :-

(a) Conventional Contract Procurement (Design-Bid-Build approach)
(b) Design & Build (Develop & Construct) Contract Procurement

8.1. CONVENTIONAL CONTRACT PROCUREMENT

Design is primarily lead by the design consultants engaged by the developer and the tender documents are generally with sufficient developed design details for contractor to tender. The ECI process will normally leverage contractor to study and propose the following as part of their quality proposal for the tender submission, by enabling contractors to have access of information :-

(a) Alternate design of key elements – structural system, basement construction
(b) Alternate proposals on materials
(c) Alternate programme

The following is a typical ECI programme for Conventional Contractor Procurement approach :-

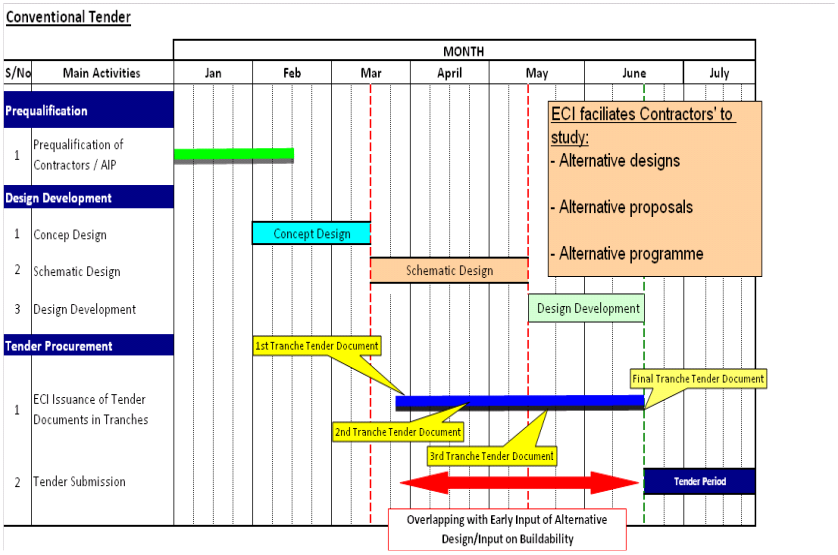

Figure 3 : Typical ECI Programme (Conventional Contract Procurement)

8.2. DESIGN & BUILD (DEVELOP & CONSTRUCT) CONTRACT PROCUREMENT

In a Design & Build (Develop & Construct) procurement approach, the design team will develop design intent drawings (schematic design and developed design for architectural), design brief and performance requirements. The ECI process can be tapped on as design evolves and develops, where AIP documents are issued in tranches to the contractors to enable them to have early access of these information to enable the contractors to study and propose the following quality submission (amongst other ECI deliverables which were discussed earlier) :-

(a) Contractor can commence designs for their Contractor's Proposal
(b) Construction methodology
(c) Construction planning, programming, scheduling and sequencing

The following is a typical ECI programme for Conventional Contractor Procurement approach :-

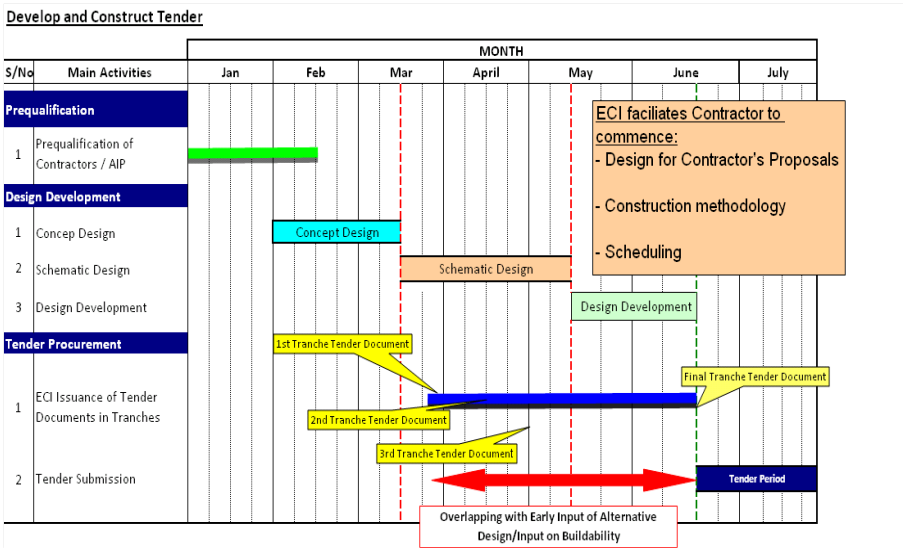

Figure 4 : Typical ECI Programme (Design & Build (Develop & Construct) Procurement)

9. CURRENT CHALLENGES & WAYS FORWARD

It is apparent that the ECI process reaps various benefits as it provides better integration amongst the project stakeholders at the early stage of the development project, enabling the harnessing of contractor's experience to be brought upfront into the design process – contractors being part of the process will be able to introduce construction methodology and new technologies as well as programming and planning consideration, making their subsequent tender submissions more comprehensive and competitive, and minimise their concerns unknown project risk.

The interaction between the contractors and designers at the design stage also promotes "Partnering" in tendering environment, while maintaining a healthy and competitive tender environment. It enhances great productivity as it enables better understanding on programming and constructability issues (by the consultants and designers) and facilitate in-depth understanding on the design consideration and project specific issues (by the contractors) in early stage.

Unlike traditional tender approaches, ECI process demands time and resources commitments from all stakeholders (developer, consultant team and contractors involved) and to most extent, it will also include senior representatives involved from all parties.

Hence, it will require a paradigm shift for all involved – there is a need for a mindset and culture change for all parties involved. To drive for successful adoption of ECI, the parties need to adopt an open communication mindset where it focused on sharing and engagement, as opposed to traditional tender environment. ECI requires While sharing and engagement are key, it shall be noted that the process is still managed through a structured approach.

In view of the intense resources involved, while the industry has yet to define the lower applicable project range for adoption of ECI, ECI would be more suitable for more sizeable projects in particular complex projects. Depending on the project value and complexity, the ECI process should be adapted to contain the tender cost. Small projects of say below $50m may not be suitable, as it will be a costly exercise and it may not attract interest from the contractors.

It is worth noting that ECI will not suitable for routine maintenance projects as value add could be insignificant. ECI will not be suitable for projects where the Employer's requirements and/or project brief is unclear.

While ECI has been adopted in various private projects for some years now, the framework can be implemented for public sector projects as well, as long as the process observes the public sector procurement guidelines. We have also noted that public projects have also started to adopt ECI. Notable projects which have embarked on the full ECI process include Terminal 4 Changi Airport.

With the intensive resources and time commitment by the contractors participating in ECI process, and to encourage participation, it may be fair for the developer (both private or public sector) to consider some form of honorarium to compensate those contractors and their team who are unsuccessful. This will be more a nominal amount to recognise their effort and to help the firms to cover their tendering cost which may include engaging of external consultants to assist in the ECI / tender process. This approach is also to avoid tender cost from raising unnecessary, as the contractors would price into their tender on such cost, if it is not reimbursed elsewhere.

10. CONCLUSION

With the Singapore government push through the Singapore Construction Productivity Roadmap which aims at improving the productivity for the Built Environment industry – with the vision of a highly integrated and technologically advanced construction sector led by progressive firms and supported by a skilled and competent workforce in 2020. BCA will also be unveiling the second Singapore Construction Productivity Roadmap in 2015 as announced in Oct 2014, which aims at further transformation of the sector and promotes greater integration across construction value chain. There is a critical need for paradigm shift by the industry to do things differently.

It has to be multi prone approaches where planning and design (upstream) should consider on more buildable, more labour-efficient and easier to build, whereas contractors (downstream) shall use more advanced technology and construction methods which help improve labour efficiency.

And the adoption of ECI approach enables the higher integration of stakeholders – bringing the constructability input including technologies and methodology (through contractor's participation in ECI process) upstream.

The ECI approach is not new. It has been practiced widely in countries such as Australia, USA, UK and USA.

With the success stories on adoption of ECI in various private projects of different development types especially mixed development and also public sector projects such as BCA Academy Redevelopment (BCA, 2013a) as well as sizeable project such as Changi Airport Terminal 4, and the benefits been reaped, the industry will be more encouraged to explore the potential of ECI more seriously and in greater depth, and ECI can be better embraced. As quantity surveyors, we are in the best position to take the lead and drive the ECI procurement approach.

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