

Recognizing stakeholders in construction projects as co-creators of value in sustainable urban development: a Hong Kong perspective

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Abstract

Sustainability goals and environmental performance of construction and infrastructure development projects are often determined by construction clients or consultants (in design specifications), or set out by the government (in the form of regulations, codes and ordinances). Contractors and subsequent layers of sub-contractors and suppliers rarely have opportunities or mechanisms to provide feedback to the consultants and clients. This results in: i) the hindrance of learning from lessons captured by these other project stakeholders (acquired through their experiences from other projects they worked on) to be relayed back to the client or consultant; and ii) the lack of support systems and mechanisms for these companies (particularly for the smaller or more specialized sub-contractors/suppliers) to collaborate with the consultant, client and/or main contractor to nourish innovation and create greater value together. Based on a study conducted in Hong Kong through a series of semi-structured interviews (with construction clients, relevant government department representatives, consultants, contractors, sub-contractors and suppliers), review of project documentation related to sustainability objectives and environmental features, as well as a detailed case study conducted with a major construction client, this paper explores the existing landscape of the relationships and support mechanisms (related to sustainability/environmental aspects) between the various project stakeholders mentioned above, and identify industry best practices. A roadmap of recommended strategies is then presented for embracing this diversified range of stakeholders to become co-creators of value in sustainable urban development.

Keywords: construction stakeholders, sustainable development, urban development, co-creation, stakeholder relationships.



1 Introduction

Pressure and expectations from the government, end-users and the general public to improve environmental performance and push for sustainable development in the construction of built infrastructure projects are continuously increasing. As a result, the construction industry has become more focused on issues such as sustainability, delivering greater end-user satisfaction and lifecycle considerations [1–4]. However, many of the initiatives, innovation for making improvements and efforts to uplift industry benchmarks mainly come from clients and consultants of construction projects (such as requirements to comply with environments standards like ISO 14001 or obtain green building certifications like LEED or BREEAM, etc.), or through government regulations and legislation.

Feedback from the downstream construction stakeholders (i.e. contractors, subsequent layers of sub-contractors and suppliers) are usually minimal as their roles are to primarily build and provide materials in accordance with the design specifications and regulations. This leaves contractors, their sub-contractors and suppliers merely following orders and doing only what is specified in the tenders and design specifications. Meanwhile, potential for pushing industry benchmarks and standards even higher through capturing their expertise and experience from previous jobs, and their knowledge of other new technologies, materials or industry trends remains largely untapped.

This paper aims to explore the current landscape of the relationships and support mechanisms (regarding sustainability and environmental practices) between various project stakeholders, and explore the potential and relevance of co-creation in the construction industry. Based on a study conducted in Hong Kong, semi-structured interviews with nine construction industry experts were completed, along with the review of three sets of project documentation related to organizational objectives and requirements on sustainability and environmental aspects obtained from a housing client and major contractor. Ultimately, industry best practices will be highlighted and recommendations will be given on how industry norms can be uplifted through recognizing a diversified range of stakeholders as co-creators of value in sustainable urban development.

2 Co-creation and its relevance to the construction industry

Co-creation is a relatively new discipline, only taking place in recent years in industries like aerospace, consumer electronics, automobiles and sports apparel [5]. Prahalad and Ramaswamy [6] pointed out that co-creation is not simply focusing design efforts on customers, believing that customers are always right, or considering customers to be product managers. Instead, co-creation promotes joint problem solving and active, continuous dialogue between the different parties involved. By turning clients and end-users into active partners, co-creation can help re-shape the way companies think, interact and innovate [5, 7].



With two main forms of co-creation (i.e. supplier co-creation and customer co-creation), the idea is having an organization that develops a certain product to involve their suppliers or customers in the design process in order to generate more innovative ideas and greater value. Examples of co-creation include an aircraft manufacturer working with its suppliers to make improvements on the safety and performance of its aircrafts, or an automaker inviting a group of long-time loyal customers to provide initial feedback and design input on a new vehicle model under development [5].

Adoption of co-creation in the construction industry remains largely unexplored. This may be due to construction projects (e.g. buildings, bridges, tunnels, etc.) not as widely viewed as ‘products’ in the same way as cars, mobile phones or running shoes that customers can touch, feel and interact with on a daily basis. Nevertheless, this does not and should not mean that co-creation cannot be applied in the construction industry since the completed construction projects are indeed physical products and the end-users of these projects (in addition to construction clients) are essentially customers. Rather, the mindset of construction stakeholders, end-users and the public needs to be altered so as to view the physical structures as consumer products so they can look towards creating value collectively for the customers and users of these structures.

Construction projects involve a complex supply chain, often involving multiple layers of sub-contractors and suppliers. Therefore, co-creation can be highly relevant for the construction industry. This paper will primarily focus on supplier co-creation since the investigation was on the relationships and typical working arrangements between clients and consultants, and their contractors, sub-contractors and suppliers. Customer co-creation in the context of construction on the other hand, is more related to the involvement of clients, end-users and the general public (for public projects) in the design process, and is more closely linked with client/end-user/public consultation and engagement.

3 Research activities conducted

A total of nine construction industry experts from Hong Kong were interviewed (covering client, consultant, main contractor, sub-contractor and suppliers). Profiles of the interviewees are shown in Table 1.

The selection criteria were that the interviewees had to be professional experts from the construction industry, with significant experience working with various stakeholders (i.e. clients working closely with consultants; consultants with contractors; and contractors with sub-contractors/suppliers).

The interviewees were asked about:

- The current trends in the construction industry (e.g. green practices, technologies, etc.), and whether industry players (in particular contractors, sub-contractors and suppliers) are adequately equipped to meet these trends;
- Standards, qualifications most commonly adopted or required in the industry, and whether industry players are adequately equipped to meet these requirements;



- Support systems or mechanisms from clients, consultants and large contractors to help smaller organizations (i.e. sub-contractors and suppliers) to build up their knowledge and expertise to meet sustainability goals in construction projects;
- Strategies and measures needed to uplift capacity of entire industry to achieve sustainability goals and requirements in construction projects.

Table 1: Profiles of experts interviewed.

Interviewee	Position	Type of Organization
1	Senior Technical Manager	Client
2	Senior Architect	Client
3	Architect	Client
4	Senior Manager	Main contractor
5	Managing Director	Main contractor
6	R&D Manager	Main contractor
7	Project Manager	Sub-contractor/supplier
8	Director	Sub-contractor/supplier
9	Director	Sub-contractor/supplier

Access to three sets of documentation related to sustainability/environmental aspects were granted with the permission from representatives of two major construction clients and a large contractor. The three sets of documentation were: i) the Development Programme of a housing development project; ii) a Guideline on Estate Facilities (Common Facilities and External Works); and iii) Criteria on Sub-contractor Selection and Evaluation.

Review of the first two sets of documentation were intended to investigate the requirements from a client, the typical sustainability and environmental elements that need to be included, and the clients' expectations of consultants and contractors. Review of the third set of documents was to look into the sub-contractor selection and evaluation processes of a leading main contractor in the industry, as well as to find out what kind of support mechanisms are available to small and medium sized firms.

4 Findings from review of documentation

The Technical Guide to Estate Facilities is a comprehensive document from a major housing development client in Hong Kong intended to provide guidance on the design of housing estate facilities in a standardized manner. Aspects



covered in this set of documents range from maintenance/service rooms, transportation access and walkways, to greening, water features and waste management/recycling facilities. The focus of this paper is on the sustainable and environmental aspects. To this end, the relevant elements include water facilities, tree planting, refuse collection and recycling. For each of these elements, there are: i) Mandatory Requirements (which consultants and contractors must abide by); and ii) Recommended Guidelines (where consultants and contractors would be encouraged to follow).

Using waste management as an example, 'Mandatory Requirements' include the need to provide adequate daily storage of refuse for the total number of residential units; mechanical ventilation system with exhaust deodorizer, standard sizes of refuse bins to fit the refuse chutes, and pre-defined ramp gradient for refuse carts. 'Recommended Guidelines' include additional measures such as observations of prevailing wind and microclimate so as to minimize odour and noise nuisance to residents; and exploring opportunities for greening on vertical and horizontal surfaces (e.g. planting on walls and rooftops).

Clients are still primarily focused on low cost provided that consultants and contractors are able to meet mandatory requirements of a project. There are examples of selected large clients leading the way to promote interaction by inviting consultants and contractors to return to share lessons learned, and how to do certain designs and build something better. However, such practices are mostly lacking in the rest of the industry.

The Development Programme for a housing development project provides the description and scope of the project, as well as outlining the architectural and landscape design, and structural and geotechnical considerations. While this document covers a wide range of aspects, the ones related to sustainability and environmental considerations are discussed here. Regarding greening opportunities of the project, a target of 20% green coverage of the gross site area was set (50% of which at-graded), with exercise area for children and the elderly. With reference to micro-climate, environmental studies were conducted to assess the wind speed and directions, sun shadowing and outdoor comfort levels during different seasons. The tree planting plan was designed to maximize shading in the common areas based on the environmental assessment. There were also requirements on the minimum percentage of day time natural lighting (sunlight penetration) in the flats and air flow rates for natural ventilation in common areas. Furthermore, the project underwent green labeling assessment and obtained a silver rating from BEAM Plus (green building assessment scheme in Hong Kong) and a 2-Star Label from the China Green Building Label.

From the two documents described above, it is evident that targets and objectives related to sustainability and environmental performance are mostly pre-determined by the clients and consultants. Contractors, sub-contractors and suppliers mostly follow the guidelines and build according to the specifications. Kumaraswamy *et al.* [9] noted that communication mechanisms are lacking between project management and asset management teams for the majority of the industry, and that feedback mechanisms are largely absent from those who perform operations and maintenance works back to those who are responsible for



design and construction. This leaves a lot of missed opportunities for the project stakeholders to innovate together to create even greater value collectively.

The third set of documents is from a major contractor and comprised of evaluation forms for the sub-contractor with a checklist of items, and a summary table of scores of all the sub-contractors in a given project. There are three classes of sub-contractors: large (Class 1); medium (Class 2); and small (Class 3). Class 1 sub-contractors are typically large-scaled, well-structured organizations. Class 2 sub-contractors are smaller scaled organizations with fewer resources. Class 3 sub-contractors are usually those that provide labour only. The items on the checklist are comprehensive, with Class 1 sub-contractors facing the most requirements, while certain items would not be applicable to Class 2 and Class 3 sub-contractors. This evaluation process is conducted once every three months. Grading is based on three aspects: i) quality; ii) safety; and iii) environment. For the purpose of this paper, the criteria regarding the environment will be emphasized. The items covered in the environment section of the evaluation process are shown below.

- Environmental Document Submission;
- Compliance with Company System;
- Violation of Environmental Protection Regulations;
- Participation in Environmental Audits (% Compliance);
- Environmental Infringements Recorded by Government Officers;
- Response to Corrective Actions/Measures;
- Physical Environmental Performance (Noise, Air, Water Control, Roden and Mosquito Control);
- Non-Friendly Environmental Acts;
- Environmental Incidents;
- Environmental Scoreboards.

After reviewing the documents, it was observed that the evaluation process take form of a checklist. While a review is conducted with the sub-contractor on three-month intervals, the process mainly aims to check for the sub-contractors' performance in accordance with the main contractor's internal guidelines and standards; violations of environmental regulations outlined by the government; infringements spotted by government inspectors; and compliance with environmental schemes and audits (e.g. ISO 14001, LEED, BEAM Plus, etc.). However, points for aspects such as generating innovative ideas or initiatives; improvement measures; sharing of previous lessons learned; or communication with/input back to the main contractor were absent from the evaluation process. The implication is that the feedback and experiences from these sub-contractors are not as valued and that the main contractor is not fully extracting the full potential of the sub-contractors in terms of value and knowledge creation. However, given the nature of construction projects (tight budget and time constraints), these initiatives must be encouraged and percolate down from further upstream (i.e. from the client).



5 Findings from interviews with experts

5.1 General findings and current practices in Hong Kong

In Interviewee 1's organization, there is no specific list of suppliers but there is a short list of contractors. Due to the size of his organization, suppliers of new products and technologies often approach the organization, where they may be invited to give a presentation on their product/technology. The information gathered is usually documented in the organization's knowledge management system where other relevant colleagues will be able to gain access to the information.

With regards to environmental training of workers, Interviewee 5 stressed that there is still much more to do. Compared with the initiatives of training on safety, the environmental side is 5-10 years behind.

The expertise of Interviewee 6's organization is in pre-cast technology. Due to the size and scale of their operation, they have an in-house design team. When a client approaches them for a project, they are able to make suggestions back to the client on which parts can make use of their pre-cast technology.

When asked about which parties are in the best position to drive sustainability initiatives, Interviewees 7 and 9 suggested the government and clients, while Interviewee 8 pointed to the government and major contractors.

5.2 Stakeholders' knowledge and understanding of sustainability goals

According to Interviewee 1, knowledge and understanding of sustainability issues and environmental awareness for large clients, consultants and contractors are already mature. The sub-contractors however, are not yet fully clear on these issues but he does not view this as a big problem since the sub-contractors are brought in to perform specific tasks so it is not necessary for them to understand the overall picture for the project. He added that some basic concepts such as site safety, good housekeeping, and noise/pollution mitigation are relayed to the sub-contractors during briefing sessions. As for the small and medium enterprises (SMEs) of suppliers (e.g. for lighting, cabinets, etc.), they too may not be clear about the sustainability goals of a given project.

Interviewee 1 also noted that while some contractors and sub-contractors have the know-how to meet those objectives (e.g. for obtaining green building certification), others do not and will require support from sustainability consultants, which are not in abundant supply in Hong Kong. His organization (a major construction client) participate in the green building certification auditing process with the sustainability consultant, an iterative process involving checking of milestones achieved, conducting period workshops with the entire project team and contractors. It is during this process where applications of new products and technologies may also be discussed.

Interviewees 1 and 4 agreed that the first and second tiers of sub-contractors typically have a good understanding of a project's sustainability goals (e.g. green

features, use of materials, noise and pollution mitigation measures, etc.). However, there is a shortfall from the third tier onwards.

5.3 Following specifications/requirements from clients and compliance with environmental standards and certification processes

In line with the observations from the analysis of project documents, Interviewee 1 noted that the specifications and requirements to meet sustainability goals and environmental performance are already written in the Request for Proposals (RFPs). Interviewee 6 (from a large contractor) echoed those views stating that the sustainability practices of his organization are mainly based on the clients' requirements and initiatives, and what they do is ultimately tied to market needs.

At the organization of Interviewees 2 and 3, there are templates for project briefs and facilities guidelines to maintain consistency and provide standardized specifications. This particular organization (a major housing development client) has a design and construction arm, as well as an operations and maintenance arm. Staff on both sides is aware of the budget and common goals of a given project, and cater to the same group of users, which makes the sharing of knowledge and experience between the two sides easier. Links between the two sides are particularly strong in this organization due to the vast range of meetings and platforms for staff from different departments to share their knowledge and experiences. At the professional level, internal workshops are held periodically.

Interviewees 7, 8 and 9 (who were from suppliers) also confirmed that their main targets regarding sustainability are to meet the specifications and requirements of clients (ISO 9001, ISO 14001, FSC, HK BEAM, LEED, Green Mark, etc.). Due to the numerous and diverse range of standards and assessments schemes in the industry, with different clients requiring compliance with different sets of standards and schemes, these suppliers are simply trying to keep up.

Regarding compliance with environmental standards, such as ISO 14001, Interviewee 4 did not view that as a major obstacle. He explained that if needed, they can always hire a third-party consultant to help them.

5.4 Support, incentives and motivation to pursue better environmental practices/performances

When it comes to green labeling schemes and incentives/motivation for achieving better environmental performance, Interviewees 1 and 5 pointed out that the major incentive for new buildings in Hong Kong is the Gross Floor Area (GFA) concession where developers employing green features (e.g. green roofs, use of renewable energy, installing chargers in car parking lots, etc.) would be eligible to apply for the concession. However, there are no such incentives for existing buildings. This makes it more difficult to drive progress in environmental performance for Renovations, Maintenance, Alterations and



Additions (RMAA) works, resulting in lower chances of obtaining green building certifications.

Several of the interviewees felt that pursuit of environmental performance is driven by economic factors (e.g. starting with budget allowance to develop environmental features). However, when challenged by the interviewer about the possibility of a re-thinking of mindset where demand for higher environmental performance can drive economic factors (e.g. use of double-glazed glass as a better insulator, thus reducing energy costs, or building roof gardens to increase green space leading to eligibility to apply for government incentives and also increasing end-user demand for green space), these interviewees agreed that this new way of thinking is also possible to drive the industry forward.

Interviewee 4 spoke of two relevant government incentive schemes in Hong Kong, namely the Considerate Contractor Site Award and the Construction Safety Award where contractors are rewarded for good practices like mitigating noise and air pollution at construction sites, having a clean record on site safety, and not receiving penalties or complaints from the Environmental Protection Department (EPD). He also mentioned about a reward scheme from a leading construction client in Hong Kong where the client performs periodic site inspections and the main contractor is eligible for bonus rewards upon satisfactory inspections.

On the topic of support systems for sub-contractors, Interviewee 4 highlighted an example where if smaller sub-contractors do not have the capability to handle and dispose of used machine oil or treat waste water, the main contractor can provide assistance.

5.5 Lack of feedback to suppliers for product improvement

An example given by Interviewee 3 was the use of pre-made grass tiles. This particular product, while fast and easy to install and provides an attractive look, was found to be very difficult to upkeep by maintenance staff. This view was relayed by the maintenance teams back to the design teams, and it have become widely known at the organization that this product should be avoided in the design and planning of future projects. While experiences like this are efficiently and effectively transferred between different teams within the organization, feedback to the suppliers are lacking. Rather than completely abandoning the use of certain products like the pre-made green tiles, it would be more ideal for the client organization to work with the supplier to improve the products (e.g. re-designing the grass tiles to make it easier to maintain). Working in closer collaboration with suppliers can help create greater value (e.g. developing a grass tile that can be more easily maintained in the long run, while retaining the benefits such as providing a quick and easy way of creating green space in a building). Only with adequate, constructive feedback from clients and end-users can improvements be made on the product that truly caters to their needs. However, the tendency is that clients will opt out of using a product and search for an alternative, rather than to work together with suppliers to make improvements to a product.



6 Conclusions and recommendations

The interviews conducted with nine construction industry experts and the review of three sets of documents revealed the current practices and challenges of different stakeholder groups on sustainability issues. The findings confirmed that sustainability goals and environmental performance are primarily achieved through pre-determined specifications and requirements to comply with environmental standards or to obtain green building certifications as outlined by the clients. Contractors, sub-contractors and suppliers are simply working towards meeting the clients' requirements but have very limited opportunities to provide feedback and make use of their experiences and lessons learned from previous projects. Moreover, collaborative efforts and feedback/comments from clients on how certain products can be improved are lacking. The findings also showed that communication and input from suppliers to clients are insufficient. It is important to help organizations realize that their competitive advantages can only be sustained in the long-term through effective use of knowledge [8].

The focus of suppliers is primarily on financial incentives and streamlining administrative procedures for application processes for obtaining certifications. None of the interviewees from the suppliers mentioned about playing a bigger role in working with the government, clients, and/or main contractors to improve their products. This suggests that the suppliers do not view themselves as significant stakeholders and they do not fully see the potential of co-creation with clients. Their perception of "support" is mainly in the form of financial incentives. However, based on the experiences shared by Interviewees 2 and 3 on the pre-made grass tiles, overlooking the potential of supplier co-creation can result in lost business opportunities. Experiences and lessons learned from maintenance teams based on their close interactions with end-users and the public make them an important stakeholder when it comes to creating value and satisfying end-user needs [9].

This paper proposes the adoption of co-creation for the construction industry to create greater value for end-users of construction projects. In response to the findings uncovered during this study, a number of recommendations are derived as shown below:

- Promotion of co-creation in the construction industry through industry coordination bodies (e.g. Construction Industry Council in Hong Kong), highlight the benefits of co-creation in other industries and how co-creation can be applied in the construction industry;
- Hosting of periodic tradeshow and workshops to bring together construction clients, consultants, contractors, sub-contractors and suppliers where they are able to discuss existing challenges and possible solutions;
- Encourage clients and large contractors to allocate or recommend sustainability consultants to help support sub-contractors and suppliers

(particularly SMEs who would otherwise not have access to these resources) in reaching sustainability goals of a project;

- Encourage clients and large contractors to provide quality feedback to sub-contractors and suppliers on what worked well and what didn't.

Only in a concerted effort where clients, consultants and leading contractors recognizes sub-contractors and suppliers as co-creators of value in development projects can the entire industry improve and continue to raise industry norms in a healthy and sustainable manner.

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