

EXPLORATORY STUDY OF 'COSTING COLLABORATIVELY' IN THE UK CONSTRUCTION INDUSTRY

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ABSTRACT

This research study looks at how stakeholders collaborate over costing in the UK construction industry. The purpose is to define the concept of 'costing collaboratively' (CC), to widen understanding of collaboration. Post economic recession, more collaborative practices have been regarded as strategies for transforming construction challenges. However, studies have shown that these practices are fading in the UK, because of fragmentation, adversarialism and, clients preference for lowest tender, whilst cost consultants struggles to be involved in collaborative working especially, during costing activities. The primary research used a multiple case study approach, which aggregated data from interviews and documentary analysis (financial business case; costing & estimating manuals etc.). Overall, 23 interviews were captured with cost consultants, lean practitioners, main contractors among others within the building and infrastructure sectors in the UK. The results showed attributes, like target costing, optioneering and all-inclusive value engineering, as relevant constituents of CC. Accordingly, these were used to defined CC as an approach that engaged stakeholders (upstream and downstream) around wider scheme budgets creating a sense of ownership, driving positive behaviours to achieve desired cost outcomes. However, the results also show that although CC is progressing within the multidisciplinary settings, the approach is still driven by price, and a limited understanding continue to affect the wider practice of collaboration in the UK construction industry.

KEYWORDS

Collaboration, target costing, construction, costing collaboratively, target value design.

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INTRODUCTION

Post-economic recession, the construction 2025 report called for partnership at all levels among stakeholders in the UK industry to reduce costs by 33%, and time by 50%. This was followed by the Farmer Report (2016) that called for modernization and the adoption of manufacturing advances such as lean construction, BIM, and integrated procurement strategies for improvement (Farmer, 2016; HM Government 2018). It seems as if though galvanizing these concepts to achieve the necessary improvement would require extensive collaborative working (CW) in the industry. However, despite these calls, CW in the mainstream construction remain sporadic (Aziz & Hafez, 2013). The Farmer Report (2016), added that the UK construction industry has now adopted a ‘survivalist’ mentality wherein commercial practices are reinforced by traditional procurement protocols, thus resisting change. This is even though it has been suggested that CW should transcend beyond the hierarchical arrangements to align commercial functions (costing, design etc.) with the production process (Sarhan *et al.*, 2017; Namadi *et al.*, 2018). Consequently, as it stands, the current status quo hinders clients and cost consultants from collaborating with suppliers during early costing phase on the basis that this will limit competition (ICE, 2018). The issue is that, this creates more transactional characteristics, given that commercial practices are carried out in ‘confidence’ (Nicolini *et al.*, 2000). Herein, costing and design activities are repeatedly viewed as separate functions, rather than integrated and part of production as advocated in the target value design (TVD) model.

This view continue to linger despite scholars arguing that collaboration especially during early costing phase can shift the customary approach (Laryea, 2010; Jung *et al.*, 2012; Ballard & Pennanen, 2013; Love *et al.*, 2017; Shalpegin *et al.*, 2018). Nonetheless, professional cost consultants, particularly in the UK continue to work in isolation. This in part has taken precedence from the way the costing & design approach unfolds, i.e., based on the RIBA plan of work, which is discrete, sequential and favours competitive tendering. But also that ‘institutional’ factors and cultural behaviours are engrained within the business delivery model, thus influencing project delivery (Namadi *et al.*, 2018; Sarhan, 2018). Consequently, stakeholders invariably work in isolation, which in turn affects the dynamism of collaboration (Zimina *et al.*, 2012). Therefore, this paper intends to look at ‘costing collaboratively’, in an attempt to provide a wider understanding on CW in the UK construction industry. The study will define CC; describe its perception and development in practice. The paper starts by describing the research context, followed by the theoretical background, and thirdly, presents and discuss the case study findings.

RESEARCH METHOD

This research adopted an exploratory qualitative approach using a multiple case study technique. This provides an opportunity to investigate real-life perspective (Pratt 2009; Yin 2009), also, it covers the ‘what and how’ questions and the influence of the social context in practices within human dimensions (Maxwell 2005). The primary research gathered data from interviews, open-ended questions, which provide insights from the views of participants and allowed the author to understand the concept of CC. An ascribed definition

was produced, which was further examined in the cases using semi-structured interviews and the analysis of costing & estimating manuals; financial business plans and supply chain policy documents from the cases studied, to improve the quality of findings and conclusion (Yin, 2009). The study adopts a purposive sampling method in selecting the cases. Bryman (2012) maintain that this allow researchers to choose case(s) that can answer particular question(s). For example, some criteria for the case study selection were: (a) the companies must have adopted target costing or an integrated approach during the early costing phase (b) collaborative values that cut across project teams and supply-chain groups and (c) domiciled in the UK. Thus, 23 participants participated in the interviews that lasted for 60 minutes comprising of: client, directors (commercial, alliance & procurement), designers, contractors, cost consultants, estimators, lean practitioners, and suppliers. The author focused on early costing interactions from three cases to understand the development of CC. Table 1 illustrates the characteristics of the cases studied.

Table. 1 Characteristics of the case study projects

Project Attributes	Case study 1	Case study 2	Case study 3
Nature of projects	Infrastructural	Infrastructural	Infrastructural
Location of projects	UK	UK	UK
Nature of works	Design & construction of water recycling treatment plants	Construction of water recycling treatment plants and sewage works	Upgrade of highway to smart motorway btw J19 & 16
Types of clients	Public	Public	Public
Mode of partners selection	Alliance, framework	JV, framework	JV, framework
Proposed duration	60 months	60 months	24 months
Procurement arrangement	Centralised procurement system	D & B	D & B
Contract sum	£1.2 billion	£200 million	£120 million
Phase examined	Costing	Costing	Costing

THEORETICAL BACKGROUND

COLLABORATIVE WORKING IN THE UK CONSTRUCTION INDUSTRY

Collaborative working (CW) is a typical term used in the construction industry to denote a mutual and beneficial working relationship among stakeholders to deliver a project to the required standard (Mattessich et al, 2001; Xue *et al.*, 2010). Although, in construction CW is often interchanged with partnering, Bresnen & Marshall (2000) argued that partnering entails commitment by organisations to co-operate and achieve common business objectives. This means that partnering is an element of CW. CW is still gaining prominence in the construction industry. It has been increasingly adopted over the last decade to underpin relationships between project participants, transparency and cooperation, instead of operating based on contractual formulations (Dagenais, 2007). It has also been argued that it brings several benefits to projects, especially when stakeholders are engaged early (Alderman and Ivory, 2007). Despite these, organisations in construction continue to use their traditional approach. Which is why Wilkinson (2005) cautioned that true collaboration

cannot be easily accomplished in construction because of hierarchical arrangements and construction industry culture.

Similarly, Akintoye and Main (2007) argued that CW in construction is being overshadowed by cultural attitudes and behaviours, where contractors enter CW with the hope of financial gains. This practice is preventing the industry from realising the benefits of CW, and shows that contractors only enter such relationships if it is a viable proposition for them and not because of what their competitors are doing. In the same way, Baiden *et al.*, (2006) added that construction projects continue to witness overruns in time and cost, which are due to lack of CW. Challender *et al.*, (2014) posits that perceptions have shifted after the austerity times, and individuals are now responding with a quest for job security, which in turn encourage the risk-averse practices that is affecting the idea of long-term relationships in construction.

It appears that CW seems to exist in principle rather than in practice. Most clients and stakeholders have acknowledged its benefits, but the propensity to inculcate it properly is still missing. This is partly because the model put in place to deliver and facilitate construction encourage ‘adversarialism’ through hierarchical relationships (Bennett, 2000; Pasquire *et al*, 2015). According to Erikson and Laan (2007), construction clients now place more emphasis on price and authority and very little on trust, a position that is also taken by the contractors to keep their subcontractors at arm’s length. This establish a form of governance within the system that focus on price and control, despite, the suggestions that CW would help teams develop beyond the transactional perspective of ‘buying behaviours’. It seems that for genuine CW to exist, trust and cooperation must thrive among stakeholders (Latham, 1994), to enable organisations restructure and manage their interrelated activities, thus improving communications and shared understanding (Challender *et al*, 2015). Accordingly, CW during conceptual processes (costing/design etc.) remain significant, but this rarely exist in practice. For instance, the study of Zimina *et al.*, (2012) observed that cost advisers and the contractors do not collaborate in this sense, especially when developing project cost. In fact, the costing model adopted in the UK pushes cost consultants to work in isolation from designers and vice versa. This not only results in developing unrealistic estimates, but compounds waste into production processes and encourage opportunistic behaviours (Pasquire *et al*, 2015). Without a genuine culture of collaboration, consistency and accuracy in costing processes will not be effective.

OVERVIEW OF COSTING IN CONSTRUCTION

It has been established that costing is an integral process for managing construction projects. For example, Michalak (2001) reported that it contributes to business and project objectives, which ensure that accurate and efficient information is available to support informed decision-making. This implies that managing project cost depends largely on the cost forecasting information and its recommendations in facilitating any action in practice. The cost management process is spread across the project lifecycle, encompassing pre-contract, cost management, contractor’s estimation and post contract cost management. Eldash (2012) added that, despite it being separated into phases, it is still crucial to have continuous dialogue among stakeholders during the exercise, preferably working in tandem to achieve best options that would enhance project value. This is why Marchesan and Formoso (2004)

asserts that the goal is to provide accurate estimates that would stimulate interactive dialogue feeding into the production process. However, previous studies confirm that the current costing approach has not truly achieved these purposes (Johnson & Kaplan, 1987; Howell & Ballard, 1996; Koskela & Ballard, 2000). For instance, Howell and Ballard (1996) and Koskela (2000) reported that traditional cost management has placed much emphasis in managing contracts ahead of the overall production. This means that various professionals entrusted with costing functions work in isolation, prioritise their individual activities and thus, optimise pieces of the project (Marchesan and Formoso, 2004). Certainly, cost management in construction needs to be tailored towards improving its transparency and timeliness in terms of the information procedures, as this would help to identify and eliminate wastes in production process through strategies that support collaboration (Hanid, 2014).

CURRENT STATE OF COSTING AND COLLABORATION IN CONSTRUCTION

Costing practices have often been criticized in literature. Johnson & Kaplan (1987) identified that the information tends to be too late, aggregated and distorted to be relevant for production planning and control. This implies that the information provided are past-oriented and too aggregated to be useful in developing and controlling cost decisions. Other issues that have plagued costing process include disruptions, design liability, lack of collaboration, isolated decision-making, and limited understanding of cost management techniques (Ashworth, 2010; Hastak, 1998; Kern & Formoso, 2004; Dallas, 2006; Hanid et al., 2011). Kirkham (2007) pointed out that the classical 'cost planning' technique, which is a key process in costing, still follows the conventional process outlined by the RIBA plan of work. This approach favours competitive tendering with expensive iterative cycles of 'design-estimate-redesign'. Arguably, this is where practice focuses more on costing detailed design rather than establishing a detailed estimate. Akintoye & Fitzgerald (2000) reported that this approach lacks proper communication and feedback systems, as most times it leads to ferocious competition, lack of trust and data sharing that ultimately results in increased project cost (Eastman et al., 2011).

Accordingly, scholars continue to emphasise the need for CW, especially at conceptual stages. For example, Shalpegin et al, (2018) revealed that such approach is needed to capture suppliers at conceptual stages in order to reduce commercial friction. This was also seen in (Ballard & Pennanen, 2013), reporting that the approach fortifies the accuracy of conceptual estimating. Likewise, Jung et al, (2012) show that the strategy has the propensity to shift the customary approach in costing, adding that this kind of economic approach is expected to give more in-depth understanding of CW. On the other hand, lean thinking provide various management-based practices that pursue perfection in construction, thus inspiring CW. Among others these include concepts like integrated project delivery (IPD), which promote better commercial alignment and incentivizes stakeholders in construction (Matthews and Howell, 2005); and TVD, introduced in 2004, which steers design and construction processes to maximize the owner's value within the project constraints (Ballard and Reiser, 2004; Ballard, 2012). These enriched concepts support CW where project teams plan, manage and deliver customer value in a setting where risks and rewards are shared. It is also claimed that TVD transforms costing

approaches with more predictability and transparency, thus reducing waste at conceptual stages (Rubrich, 2012). In doing so, it allow dense collaboration amongst stakeholders where clients have extensive cost interactions, which makes the final product more competitive (Do et al, 2015).

CASE STUDY FINDINGS AND ANALYSIS

In this section, empirical findings were gathered to define and describe CC in the UK construction industry. The concept was further explored in the cases to understand its progress in practice.

PERCEPTIONS OF ‘COSTING COLLABORATIVELY’

The overview of collaboration in the literature has set the context for CC to be explored. Therefore, the researcher started by probing the constituents of CC. The participant’s responses were: *‘transparency during costing’*, *‘collective value engineering’*, *‘reliable cost planning approach’* as seen in table 2. Similarly, other respondents cited attributes like, *‘pain/gain sharing’*, *‘cost visibility’* which is reference to open book estimating, while others mentioned *‘optioneering’* in search of efficient & reliable cost outcomes, hence through collaboration. These statements described CC as an approach with potentials to achieve a ‘win-win’ situation by the project team - thus, in need of mutual understanding and a sense of ownership among participants. Some of these attributes are found in CW, which mean it is socially driven. This is to keep in line with Fischer *et al.*, (2017) definition of collaboration as a *‘community of people working together to achieve common goal - through a deep level trust, clear understanding of project values and feeling the sense of ownership’*. This definition acknowledged the social interaction of community to mean project performers i.e., designers, constructors, trade vendors and the client all working toward a common goal.

Further attributes associated with CC derived from the participants were categorised into themes namely: ‘optioneering’, all-inclusive value engineering and target costing. The respondents referred CC to ‘target costing’ meaning collective substantiation of information that leads to the development of target price. Others suggested that CC is a progressive approach in construction. For example, a respondent with manufacturing backgrounds described it as *‘an approach that steers design to achieve a desired cost solution within the boundary of what has been contracted’* [lean practitioner, CS1]. This view indicate that the approach embrace trust, shared understanding, and dialogic conversations around scheme budgets or any assumptions to develop cost solutions, hence, through CW. Similarly, all-inclusive value engineering, in this case means reciprocal dialogues on what is required, knowing where cost, time and quality stands, thereby developing trustful relationships with the project team. This underlines how teams need to collectively forecast and track cost variables, to develop eloquent cost solutions in project.

Table 2: Description of CC and attributes gathered from interviews

Themes	Attributes 1	Attributes 2
Target Costing	Open dialogue Cost certainty Open book estimating	Transparency in costing & design process Cost negotiations
Integrated Value Engineering	Well-informed discussions during costing; Shared understanding	Value creation Cost visibility
Optioneering Process	All-inclusive validation study Risk/reward sharing	Open conversations Reliable cost planning & estimation

CC was also considered to have commonalities with optioneering process. This means that it requires a collective value engineering and target costing traits to realise client's condition of requirements. A respondent with contracting background described this as '*a process that encompass extensive discussions and investigation where multiple cost and design options are distil into single solution, thus feeding into risk and value sessions*' [Main contractor, CS2]. Indeed, achieving single solution in this process is important; as this would allow stakeholders to collaborate over costing and design iterations, especially in multidisciplinary environment where stakeholders are presumed to have in-depth collaboration on costing and value matters.

Therefore, CC as gathered from these descriptions could simply means an approach that engaged stakeholders (upstream and downstream) around wider scheme budgets creating a sense of ownership, driving positive behaviours to achieve desired cost outcomes. This definition acknowledged the social interactions to mean project performers i.e., designers, constructors, quantity surveyors (Qs), supply chain and the client all working together towards a common goal with shared accountability.

COSTING COLLABORATIVELY - AS PRACTICED

After defining the concept of CC, it is equally important to understand how it is progressing in practice. Thus, the study embrace some TVD principles such as *target costing, set-based design, choosing by advantage* and *relational form of contracting* as a guiding lens to understand how CC is developing in practice.

CASE STUDY 1, 2 & 3 COSTING APPROACH

Figure 1, illustrate the process of target costing, supply chain (SC) approach and the extent of collaboration during early costing phases in multidisciplinary settings. As studied, the process normally begins with collation of historical price data from various project schemes, which are extrapolated into the client database. This revealed a highline TC that informs a new financial business plan (FBP). The FBP is continuously refreshed with historical data, where cost consultants (from client the camps) establish the TC at the end of DM5 (see figure 1). As the project approach conclusion, the final costs are then compared with that of the clients TC, an average cost is selected and the project teams are tasked to value-engineer. As such, the process is centrally coordinated by the client's team, albeit, with little interaction and input from the project and SC teams.

Most of the cases adopts top-down approach for CC, which does not overtly on-board commercial actors SC early, because the project teams are involved indirectly. This was lamented by some of the respondents stating that:

‘TC are set by the client organisation independent of the project team. They use data from the ‘cost capture system’ (CCS) once the previous scheme costs are established; the final costs are transferred to the CCS which drives the client database. Our input is indirect and, we’ve only started involving the tier-2 in the last few months’.

Despite using the top-down approach, the project teams complains about underlying issues associated with commercial and SC groups, which thus, brings some tension in practice. Some of the participants interviewed lament on:

‘Insufficient provision of details to the project team ‘continued struggle with the SC on pain/gain share structure’, and the incessant waste embedded in the scheme costs of which the new TC is based upon’ [Design manager CS2; Consultant CS3].

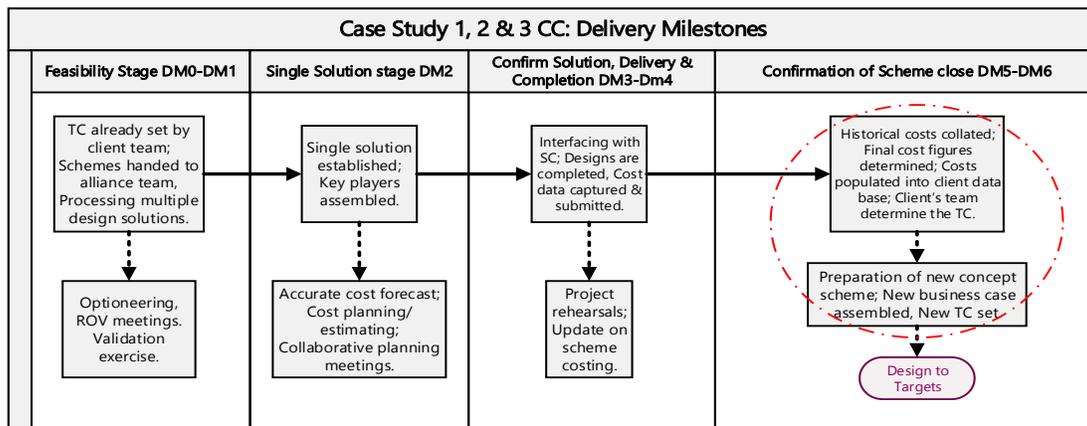


Figure 1: Example of ‘Costing Collaboratively in Multidisciplinary Setting

Although, the top-down approach showed notable principles similar to those in TVD and glimpses of CW such as having integrated teams, standard process for TC development; and the owner appears to be heavily involved with the project team. However, other key principles that would intensify CC are missing. For instance, the TC is often costs set in isolation from the project team; there is no cross-functional team dialogue with the client to underline desirability and viability issues. It was also found that at times the TC sent to the project team is non-negotiable particularly in case study 2 (CS2), which become the final amount to spend. This means that collectively, stakeholders including SC often miss the opportunity for dialogic conversions at feasibility to enhance costing activities. Similarly, CC and SC approach in case study 3 (CS3) appears to be disconnected. This is because the process keep alternating, where sometimes SC are engaged on framework, and other times on competitive basis. The commercial director stated that:

‘For some time now, our SC are engaged in a traditional competitive basis of which we realised the enormous transactional relationship and lots of adversaries that is costing both parties where the client end-up paying’. He further affirms that they are deploying a new strategy now suggesting that: *‘We adopt the ECI running our optioneering with the SC at a lower rate, so we engage contractors to help us with the scheme design and negotiate with the SC at that stage’.*

This shows a different type of CC approach, where ECI process allows the team to address buildability and constructability in designs. However, they still emphasise on cost negotiation with the SC groups. This encourage negative behavioural characteristics, as the team are still having difficult relationships with their tier-2 in costing activities. Furthermore, he stated that:

‘So what we’re doing differently now is getting the SC early and setting the price target with them, and we ultimately end up agreeing the right price in a collaborative way’.

Interestingly, this show that CC would indeed motivate reasonable price determination that is fair to the parties involved, returning value to the owner and stakeholders. However, this needs to start from a position of transparency and sustainability to eliminate any transactional characteristics, so that stakeholders involved would not need to chase claims or unnecessary disputes in the process.

DISCUSSION

Exploring the concepts of collaboration and costing brought some new insights and attributes that defines CC. Most of the respondents felt that collaboration offers significant benefits in practice. Although, not fully applying its attributes especially as seen in the cases examined means maximum benefit would not be realised. This also relates to the concept of CC and how it is perceived. The exploration showed partial understanding and application in practice (see figure 1 and table 3). Whilst establishing CW seems essential in practice, the study discovered that the current costing approach does not overtly integrate commercial actors and SC groups even within the multidisciplinary settings. For instance, a main contractor interviewed on CS03 stated that *‘we don’t involve our strategic suppliers (tier-2) when we’re building these costs; we design and give them to quote’*. This can equally be interpreted as cost negotiation, a position that dominate the current practice and a challenge to CC. Besides, negotiating over cost, which is supposedly referred to as CC completely lacks trust, open dialogue, shared understanding and the wider sense of togetherness, instead it encourage the habit of ‘mining for profit’ from the contracting parties (Pasquire *et al*, 2015). Invariably, CC as practiced in (CS3) seems to show one-way streak for clients to negotiate or request for information when it suits them but thoroughly lack transparency and interaction. Unsurprisingly, these views are inspired by ‘institutional’ factors (Sarhan, 2018), which seems to compound the issue of fragmentation, cultural resistance and the poor approach in costing practices.

Table 3: Summary of TVD Principles examined across the three Case Studies

TC/TVD principles examined	CS1	CS2	CS3
Setting TC based on design, value, with cross-functional team.	Occurs partially	Occurs partially	Occurs partially
Co-located facility.	Utilised	Utilised	Utilised
Use of relational contracting.	Sporadic	Sporadic	Sporadic
Application of BIM, Set-based design & Choosing by advantage methods.	Partially Utilised	Not utilised	Not utilised

As examined, the TVD principles required to support CC are either missing or partially applied in the current approach from the cases studied (see table 3). The most apparent is the lack of dialogic conversation when developing the client's costs and the infrequent integration of cross-functional teams to explore costing and design alternatives. For instance, an interviewee stated that ‘ *we build our projects cost mostly reliant on the market prices and sometimes becomes the amount to spend on the overall scheme* ’ [Commercial Director, CS02]. According to Simonson (2016), the essence of these dialogic conversations for target price is to determine the degree of certainty on the overall costs for owners to make sure sufficient funds are available to finish the project, and assist in making informed cost-benefit analysis before construction commence. Apparently, these dialogues do not often take place or even widely understood, thus, the chances of attaining cost certainty at conceptual stage would remain slender, given that the default approach is to refer to the contingency savings. Indeed, CC needs a strategy that best aligns the interest of all involved, including commercial actors & SC groups to inspire productivity, innovation, and value addition beyond the least cost approach. (Zimina *et al.*, 2012).

CONCLUSIONS

The study explored costing approach, with a purpose of defining CC concept to widen the understanding of collaboration in the UK construction industry. In doing so, the study identified some constituents that defines CC. These include *target costing*, *all-inclusive value engineering* and *optioneering process*. Therefore, in this study CC is considered as an approach that engaged stakeholders (upstream and downstream) around wider scheme budgets creating a sense of ownership, driving positive behaviors to achieve desired cost outcomes. The concept was further explored to understand its progress in practice. The findings shows that ideal CC is required to improve on the current approach. This is because, the depth for all-inclusive and collaborative dialogues with relevant parties during costing phase is weak/lacking, thus, risks & rewards sharing strategy are not properly understood, especially among the tier-2 groups. Although, it appears to be progressing where the findings revealed customer focus, design centred and somewhat involved cross-functional teams, yet, the approach is still driven by price.

Consequently, the concept could benefit or even becomes better if principles within TVD such as set-based design, choosing by advantage, and relational contracting (eg. IPD) are all embraced when defining TC. More importantly, this would be better if the wider teams are involved early (including traditional cost consultants and tier-2) to compensate the lack of trade-specific and constructability input to inform the limited options that aren't available during costing development. Indeed, establishing this would further strengthen CW, as testament to the definition of CC, upstream & downstream players need to have a sense of ownership and starts from a position of transparency and sustainability to eliminate any transactional characteristics in practice. Although, this study focused on upfront costing (eg., through design), therefore, further research is required to take it beyond expected costs at the end of design to the end of construction using the ascribed definition of CC, as potentially this would shed more light in understanding how to set the right environment that would mitigate commercial challenges to strengthen CW.

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