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# Analysis of Collaborative Procurement of Green Building Projects in China

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### ABSTRACT

The low carbon transformation of the building sector has become trendy, driven by the objective of minimising carbon emissions and safeguarding the environment. Consequently, China has established a goal for the ecological transformation of the building sector. To effectively execute a green construction project while safeguarding the environment, it is imperative that all stakeholders collaborate from the outset. Green construction initiatives need an increased volume of information and technology. This prompts us to provide the following research enquiries: What is collaborative procurement? In what ways may a customer collaborate with a green building project's designer and contractor to get a favourable result? How might collaborative procurement tactics enhance communication and cooperation among a customer, designer, and contractor? This research concludes that collaborative procurement practices are more appropriate for green construction projects, facilitating cooperation among clients, contractors, and designers to attain social and economic advantages and ensure effective project execution. The research employs qualitative analysis and interviews with ten personnel engaged in green construction initiatives to get these results.

## 1. Introduction

An increasing number of nations are concerned about climate change and rising carbon emissions; thus, they are prioritising sustainable development, energy efficiency, and emission reduction. Up to 30% of China's carbon emissions originate from the building sector [1]. The building sector may achieve maximum potential due to the robust society that develops with a rising nation such as China, hence improving the living standards of its populace. Consequently, in a society with significantly improved social welfare, it seems more feasible to satisfy individuals' living requirements, integrate more comfort, health, intelligence, and other architectural aspects into their consciousness, and create a more sustainable living environment [2]. Consequently, construction firms must progressively integrate low-carbon and sustainable building concepts into their project

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design, shifting focus from short-term profitability to long-term stakeholder value. The construction of sustainable buildings has gained popularity in this context [3].

The aims of green building are to reduce energy consumption and enhance energy conservation [4]. Environmental protection, sustainable development, and the provision of a healthy and attractive environment are achievable results [4]. Developing a green building project differs from doing a conventional construction project. Green building projects, characterised by their technical and organisational complexity, need extensive knowledge to guide decisions about sustainable design and solutions, hence requiring contributions from several professional fields. Chmeit *et al.*, [5] urge that designers and seasoned builders participate from the project's inception to ensure a building's connection with its environment, offering solutions for energy-efficient heating, natural ventilation, and sustainable materials.

Consequently, green building initiatives need meticulous collaboration among all stakeholders. Construction projects cannot proceed without procurement, and a robust procurement strategy fosters collaboration by facilitating the selection of dependable suppliers and contractors. Currently, the majority of construction projects use one of two procurement models—the traditional model or the design-build model—that neglect to include collaboration. According to Ndekugri and Turner [6], conventional procurement processes included the designer presenting the idea and then soliciting bids from construction contractors. The proposed procurement models indicate a wholly price-driven competition resulting from the provided construction project strategy, perhaps causing unavoidable friction between the contractor and the designer. Consequently, engaging the customer appropriately in the project presents difficulties. It is intolerable for green construction initiatives to be influenced by price competitiveness. However, the subject must conform to society standards, advocate for environmental conservation, and use sustainable resources [4]. Moreover, advanced technologies and specialised expertise are essential for sustainable construction [4]. To ensure that all facets of green construction projects align with stakeholders' shared goals, it is essential to engage specialists. Thus, analysing collaborative procurement for green construction projects has shown advantageous for the project's operational efficiency and for optimising objectives associated with sustainable development and resource conservation.

This study intends to investigate how stakeholders in green construction projects might collaborate via innovative procurement methods, addressing the limitations of standard procurement models. To effectively implement green buildings, which need the attainment of social value alongside economic advantages and the incorporation of diverse expertise across all project stages, it is crucial to comprehend the collaborative dynamics among the numerous stakeholders involved. Nonetheless, neither research nor policy has established which procurement strategy is optimal for green construction initiatives. To generalise the most efficient strategies for managing green building projects throughout implementation, it is essential to comprehend the special advantages of cooperation. The following are the research questions constituting this study:

- i. What is the precise definition of collaborative purchasing?
- ii. In what manner does the client collaborate with the designer and contractor to ensure the effective execution of green building projects?
- iii. In what ways may collaborative procurement methods improve the synergy among the client, the designer, and the contractor?

### *1.1 What is Procurement Model*

In construction engineering project management, a contrast is made between the limited and wide meanings of "procurement" [7]. Procurement, in its specific definition, pertains to the acquisition of products and services; yet, in a broader context, it comprises the whole of the building

project. The customer must choose a certain transaction type for procuring construction materials and services [8]. The manner in which a client purchases in the construction market is referred to as the transaction technique, and the selection of this method ultimately influences the procurement outcome [7]. Erik Eriksson and Laan [8] assert that the procurement model serves as a framework for organising all duties associated with a construction project's life cycle, including surveying, designing, constructing, managing, consulting, running, and maintaining. Moreover, the construction project procurement model delineates and allocates the responsibilities, entitlements, and risks associated with a project, in addition to the structure of the contracts [8]. The management of construction contracts may be influenced by alterations in procurement models, since various procurement models for construction projects include distinct contract forms and contractual arrangements [9].

### *1.2 Advantages and Disadvantages of Main Procurement Models*

The predominant methods for procuring materials and labour for construction projects nowadays include design-bid-build (DBB), design-build (DB), management contracting (MC), construction management (CM), and collaborative procurement.

The primary advantage of the traditional paradigm is its straightforward implementation. Oyegoke et al. (2009) assert that subcontract coordination falls within the contractor's purview, since the designer is accountable for the design while the contractor is responsible for its execution. Traditional procurement procedures provide "cost certainty," facilitating pricing [10]. The conventional approach, however, has its limitations. Disputes are prevalent and may result in project delays due to the distinct separation of design and construction stages [11]. Simultaneously, when stakeholders such as designers and contractors are aware of the project's precise cost, they prioritise cost reduction above the project's social implications.

The conventional model involves the customer selecting a designer to develop the project's plans, followed by a contractor to execute the construction. In the design-and-build process, a general contractor is engaged to perform both functions [11]. In this approach, the contractor assumes complete responsibility for the project from inception to completion, fulfilling all customer specifications at each stage [11]. Engaging the same contractor for both the design and construction stages might decrease the overall project duration [12]. A disadvantage is that the customer has little influence in the design process, potentially resulting in disappointing project outputs [12].

In the management contracting approach, a general contractor supervises the project's subcontractors without establishing direct contracts with them. One advantage of management contracting is the general contractor's ability to choose subcontractors with whom they have previous experience, so reducing the risks associated with unfamiliarity [13]. The customer has more influence in the design process, facilitating the integration of their comments. A significant negative is the insufficient communication between the design and construction stages, resulting in misunderstandings and inadequate information that may lead to interdepartmental disputes. A further disadvantage is that the customer must participate from inception to completion, which introduces time and cost uncertainties [7]. In the project management approach, the owner assigns responsibility to several subcontractors. This technique has benefits, including the owner's significant engagement in the project [14], but also entails downsides, such as heightened risk for the owner and a cumbersome management process owing to several subcontractors [11]. Two or more organisations may collaborate in a procurement model that aligns buying power, revenue goals, and efficiency, so ensuring successful project execution and achievement of ultimate objectives [15]. Collaborative efforts enable individuals to consolidate their resources more efficiently, so conserving both financial and temporal expenditures [16]. Furthermore, a more congenial collaborative atmosphere may yield greater added value when all participants achieve a common objective

through alignment [16]. The heightened criterion represents a disadvantage in personnel and departmental contract management [17]. The involvement of several organisations in collaborative procurement renders these contracts complex and challenging to handle.

### *1.3 Collaborative Procurement Practices*

The engagement of all stakeholders is essential for the effective execution of green construction projects, as it facilitates the incorporation of their shared objectives into every facet of the project. Projects are effectively completed via collaborative procurement. Stakeholders collaborate within this procurement method to get products and services; they may use each other's strengths, such as resource and information sharing, to minimise costs, enhance efficiency, and benefit society [18]. To ensure the successful execution of green building projects and to optimise benefits derived from resource conservation and sustainable development, it is advantageous to examine and analyse stakeholders within the context of collaborative procurement.

Successful green building projects need mutual reliance and collaboration among team members. Procurement models are systems that delineate the contractual and functional connections among project stakeholders [19]. To ensure the successful execution of the green building project and achieve its goals, the procurement strategy must promote collaboration, reduce antagonism, and foster a harmonious work environment. The primary objective of green building construction, from a low-carbon and ecologically sustainable viewpoint, is to maximise advantages derived from diminished emissions and energy use via resource management. Collaboration and information sharing among the owner, designer, builder, and operator are essential for this [20]. Currently, the majority of procedures used for acquiring buildings do not recognise the need of teamwork. For instance, under the conventional procurement technique, after the design is finalised, a contractor is chosen via competitive bidding to execute the construction [15]. This procurement process relies on bidding, leading to inevitable discrepancies between designers and contractors [11]. The customer struggles to engage appropriately in the project [11]. Besides being costly, green construction projects need advanced technology and specialised experience, while emphasising social responsibility, environmental considerations, and the use of sustainable resources. Acquiring knowledge on the advantages of collaborative procurement may enhance specific methodologies for collaborative initiatives.

Collaborative procurement is a novel strategy used to alleviate specific project risks in initiatives such as the Crossrail and London Olympic projects. Clients and contractors in this sector mitigate risk in infrastructure projects by using established technological methodologies and management practices [21]. The relentless quest for the lowest price and strict compliance with defined technological plans, although mitigating risk, have hindered inventive advancement. In the last decade, the United Kingdom government has prioritised innovation and cooperation in project delivery. To optimise a project, collaborate with the client, designers, contractors, and other stakeholders to make choices, use innovative technologies to enhance creativity, and disseminate pertinent information.

### *1.4 The Management of Green Building Projects*

To advance green building practices in the construction industry, it is essential to create a non-competitive project atmosphere that encourages collaboration across diverse teams. This will ensure that cooperation is prioritised from the project's inception [22]. According to Milner [23], cooperation transpires when many parties with comparable levels of responsibility and authority unite to achieve a common objective. All team members must collaborate and foster a positive atmosphere at the beginning of a new project [21]. Many contemporary construction projects, however, conform to

antiquated practices and standards that prioritise immediate solutions over sustainable long-term strategies [24].

The importance of information interoperability across stakeholders and the emphasis on sustainable, low-carbon principles make collaboration the optimal approach for green building initiatives. Moreover, builders may provide critical insights on the viability of sustainable building elements when designers and builders work in conjunction [25]. Preventing costly, last-minute design alterations and rework is achievable via the contractor's expertise and experience. Collaboration enhances assurance that the final result aligns with the idea, which is particularly crucial in green building construction, where several criteria must be satisfied for certification. The first stage in initiating a green construction project is to assemble a team of experienced specialists and key stakeholders. This is due to their proficiency in the criteria and requirements for green certification, as well as their comprehensive understanding of the concept of green building.

## **2. Methodology**

### **2.1 Research Design**

Qualitative research is inherently subjective due to its reliance on humanist methodologies, including constructivism, interpretivism, and phenomenology. Social phenomena exist independently, apart from the causal principles that regulate natural phenomena. Conversely, quantitative research relies on positivist methods and provides factual assessments. According to the philosophy of empiricism, which underpins positivism, social processes are seen as objective facts that exist irrespective of individual subjective volition [26]. A logically coherent cause-and-effect link must exist inside each subject and between subjects for the assessment process to occur. Discovering, recognising, and validating quantitative connections are the foundational elements of quantitative assessment. A procurement model is one method to arrange a project from inception to completion [17]. The structure and dynamics of the collaborative procurement model are the main focusses of study concerning its issues in respect to green construction projects. Consequently, qualitative research is more appropriate than quantitative research for addressing the research themes outlined in this study. Qualitative research is a method for collecting information in educational studies that does not depend on numerical data. Rather, it employs non-quantitative methodologies like as content analysis, interviews, observations, and literature reviews. Conversely, quantitative studies typically yield results as extensive datasets, with researchers meticulously designing their experiments to ensure valid conclusions can be drawn from the collected data. A qualitative approach is more appropriate for this study due to the following reasons: the researcher's constraints, insufficient information on pertinent data sources, the necessity to engage with relevant personnel regarding the issue of collaborative procurement. This study used a qualitative methodology, concentrating on the local context of the research issue, as shown by the previously highlighted contrasts. Comprehending the importance of the study subject's behaviours and perspectives, and formulating hypotheses based on this understanding. Focus on the researcher-participant dynamic, in which the researcher acquires understanding of the study's topic via contact with the subject of examination. This study should emphasise the use of verbal language to articulate the phenomena under investigation instead of depending on intricate statistical methods such as path analysis and regression analysis to present their findings.

This study collects its data via interviews. Selecting an interview has two advantages: interviews provide more reliable information. For the interview approach to be effective, both the interviewer and the interviewee must communicate clearly. Following the researcher's efforts to encourage the subject to disclose their ideas, the interviewee becomes more at ease and reveals their genuine emotions. Although all interviews follow a uniform format—a series of questions and corresponding

answers—interviewers often feel pressure to reply promptly and instinctively. Moreover, interviewers may respond candidly due to the interview's flexibility about schedule, topics, and the sequence of questions posed. Interviews provide more precise and direct information. Engaging in direct or indirect engagement with respondents, whether in-person meetings, telephone discussions, or online platforms, affords the researcher more control over the trajectory and profundity of the interviews. Consequently, based on the respondent's particular answers during the interview, the researcher may modify or alter the interview framework.

If the respondent fails to comprehend the questions or misinterprets their significance, the researcher may provide a clearer explanation. The interview strategy facilitated the collection of significant data and expert perspectives about the research issues. Two Chinese real estate firms, Vanke and Country Garden, supplied the interviewees with the data used in this study. The criteria used by these two enterprises to choose their staff are as follows: initially, Vanke and Country Garden are two of China's most distinguished and established construction firms. Furthermore, the government supports the development of green buildings, and these two firms have substantial expenditures in this sector. Consequently, personnel from these two firms are chosen to participate in the research.

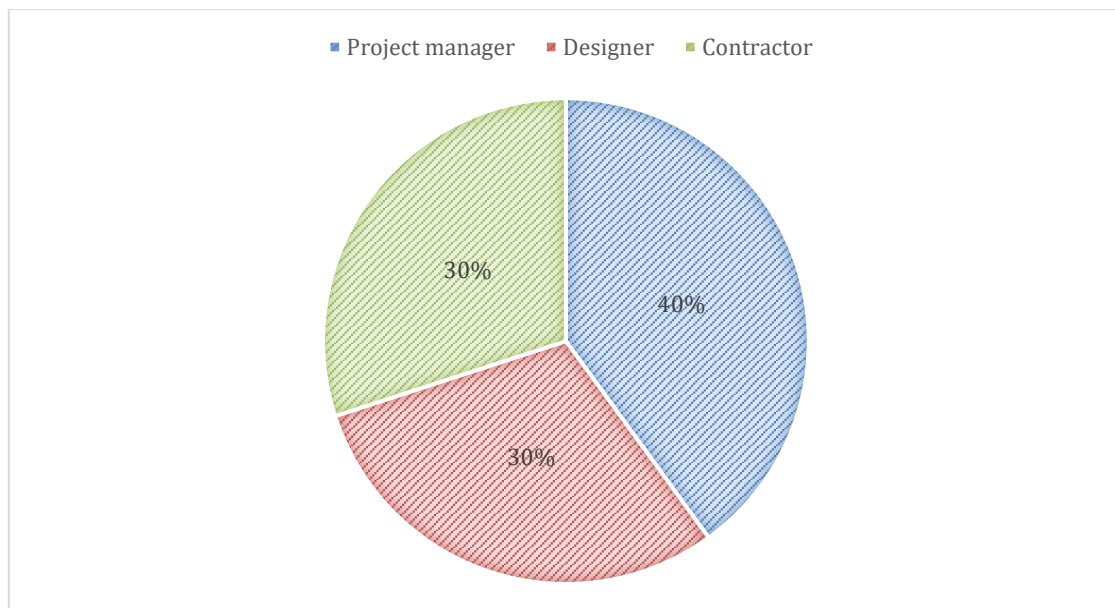
## *2.2 Research Context*

The notion of green construction arose in China later than in the industrialised West, and the energy issues related to urbanisation have been progressively escalating, as shown by the literature evaluation conducted for this study. Beijing convened the first International Green Building Conference in 2005, marking a pivotal occasion in the progressive growth of China's green development plan. By the end of 2016, China has identified about 500 million square meters of green building space and 4,500 green building projects [27]. Wang *et al.*, [28] predict that by 2020, the Chinese market would see rapid advancement in green construction, with 50% of new residential structures adhering to green building standards.

A transition to sustainable construction approaches is thus emerging as a trend in China's building sector. A superior management system that emphasises communication and collaboration among customers, designers, and contractors is crucial for facilitating the growth of green buildings. The ability to consolidate resources to reduce costs of projects while enhancing production and social value is only one of several possible advantages stemming from early cooperation among customers, designers, and contractors [18]. Zhu *et al.*, [29] identified deficiencies in China's current collaborative procurement approach and a deficiency of genuine competence in green building projects, both of which impede the advancement of green construction initiatives. To assess the existing deficiencies of green buildings regarding cooperation, it is advantageous to investigate collaborative procurement methods in China. This work may provide a benchmark for further research.

## *2.3 Data Collection Process*

The participants of the study were from different organisations in the green building project, as shown in Figure 1.



**Fig. 1.** The composition of interviewees

This study used semi-structured interviews to investigate the collaborative procurement method for green construction in China. During the 20-minute interview, subsequent questions varied or remained consistent based on the interviewee's responses after the first preference enquiries. The enclosed paper indicates that there are a total of twelve questions related to the interview. The primary themes of investigation throughout the interview are green construction project procurement procedures, the efficacy of existing procurement strategies, and the dynamics of client participation and inter-team relationships. Due to the interviewers' transparency, this study successfully recorded seven of their remarks prior to concluding. Owing to privacy issues, none of the three respondents consented to the recording of their personal opinions during the interviews. This research recorded their principal perspectives for further examination.

#### 2.4 Data Analysis Method

This research uses thematic analysis for data examination. The procedure starts with the elimination of bias and the formulation of a comprehensive overview of the gathered data. The objective of collecting this information is to discern repeating themes, enabling qualitative data analysis to highlight the most significant aspects of their narrative and emphasise relevant findings from other segments of the study. Here are the primary tasks to undertake: Compiling a summary of the interview notes to enhance accessibility and facilitate collection, the interviews were archived in both audio and textual versions. The last phase involves meticulously analysing the interview data gathered from each interviewer to discern any biases present within the interviewees or within the interviewees' remarks themselves. Eliminating the relevant sections Segmentation is the process of categorising gathered data. Prior to elucidating the relationships among the gathered elements, it delineates their distinctions. This method facilitates the systematic arrangement of the collected data and delineates its exact nature. thirdly, formulating concept's various themes arose from the reorganised and classified information, which sought to elucidate the many facets of collaborative procurement referenced by respondents. Evaluation an exhaustive analysis of the collected data. Before proceeding, you must ascertain if the categories are hierarchical. Create a visual overview of the information or choose which aspect is crucial. Document the outcomes. Collect evidence and formulate a judgement.

### **3. Results and Findings**

#### *3.1 Collaborative Procurement Model is a Suitable Option for Green Buildings*

The majority of respondents feel that the collaborative procurement approach is acceptable for green buildings, with 80% of interviewees saying that it is.

“As a new form of procurement commissioning cooperation, collaborative procurement has shown vitality in recent years' procurement practices. In collaborative procurement, both parties negotiate on an equal footing with each other, actively communicate, make full use of market information and negotiation experience to improve the project, and organise and implement it flexibly and effectively to achieve better procurement results.” (Interviewee 1 and Interviewee 8).

The establishment of this cooperative organisation has transformed the procurement and mutual interaction, and collaborative procurement is a multi-participant procurement model that varies from conventional procurement in that it includes more than just the project or organisation and the contractor.

“This is a new model of cooperation between organisations and a mutually beneficial development model” (Interviewee 8).

The majority of respondents possessed a fundamental comprehension of collaborative procurement, nevertheless they were more inclined to recognise the supplementary advantages it provided to the project implementation process in comparison to alternative procurement approaches. Although some individuals have expressed apprehensions over the extensive implementation of collaborative procurement in China, others contend that the majority of projects continue to adhere to conventional procurement methods and emphasise cost efficiency. Green development in China is in its nascent phase. The state has enacted many laws mandating the construction sector to diminish carbon emissions and energy use; nevertheless, there are now no rules specifying the assessment criteria or implementation procedures for green building initiatives.

“Although we are advocating the importance of developing green projects, there are not many examples of how to develop green buildings and what we can refer to in China.” (Interviewee 1)

The respondents said that this research revealed the absence of green building construction standards throughout the project development phase in China. Consequently, the development and reform department lack a foundation for project approval, rendering the construction unit unable of providing precise cost estimates. The substandard construction quality and insufficient adherence to pertinent technical specifications have adversely impacted the quality of green building construction, attributable to the lack of enforceable standards regulating construction organisation, process oversight, and completion acceptance of green buildings. At the operational and administrative levels, the majority of green technology solutions are unsuccessful due to the absence of technical standards governing green building operational practices.

“The immaturity of these aspects makes us afraid to try this new cooperative procurement method to complete a project, as it requires more policies and knowledge to support.” (Interviewee 1)

“Ensuring the stability of the project is probably the choice of most of us in the construction industry, after all, the ultimate goal of a project is to create value. So, we will choose to complete a project in a way that we are more familiar with, so we will tend to choose a traditional procurement model with fixed costs to complete the project and reduce losses and uncertainty.” (Interviewee 2)

The answers present three factors for comprehending the collaborative procurement approach, with the first being to the efficiency of the project. The collaborative procurement approach is a means of enhancing the productivity of project completion.

“When I want to start a project, I always face problems such as the designer not fully understanding my project concept, resulting in a project design that does not meet my requirements,



which takes more time to change the design and therefore causes delays in the project. The use of a collaborative procurement model ensures that all parties are involved in the project and can communicate with each other if there are any issues, reducing the possibility of project delays.” (Interviewee 1)

Additionally, the collaborative procurement paradigm permits the interchange of information. The criteria for construction materials and methods are stricter in green building projects. Therefore, collaborative procurement is an excellent method for sharing expertise and exchanging data.”

“In comparison to other procurement models, collaborative procurement is actually a process of knowledge exchange. Under the traditional design and build model, as a contractor, I simply use the designer's design to carry out a specific project, but under the collaborative procurement model, I am responsible for the project with the designer and the client, so I not only have to understand the needs of the designer and the owner, but also have to demonstrate my own construction ideas and techniques to ensure that my construction meets the interests of all parties.” (Interviewee 9)

Moreover, collaborative procurement methods include factors other than price.

“The collaborative procurement model is not used much in current projects, but from some practices that has been used this model, I aware that it focuses more on the importance of collaboration than other models and can provide a comprehensive consideration of the interests of multiple parties, rather than focusing solely on costs and economic benefits.” (Interviewee 2)

### *3.2 The Role of Collaborative Procurement Models in the Front-end Stages of a Project*

Collaboration among the client, designer, and contractor may expedite the handover process in the first phases of a project, which is essential for its development and implementation. Interviewees argue that effective project commencement and logical planning need collaborative communication with contractors and designers from the project's outset. The customer must also assume responsibility and engage with the team. Green construction projects impose stringent limitations on the artistic representation of designs during the planning phase, hence necessitating enhanced preparatory planning to align with the objectives of reducing carbon emissions and conserving the environment. This necessitates comprehensive early planning, including not just the expenses associated with the design and construction stages but also any potential unanticipated expenditures that may arise post-project handover. The absence of proper technical standards and management frameworks for green building design and construction may result in design alterations and rework, stemming from subpar workmanship and insufficient handover management during the first phases of the project. The project's progress and quality may suffer if the collaborative procurement method is not used. Respondent 6 from the design team articulated:

“It is necessary to consult in advance about whether my design meets the client's needs or the contractor's construction requirements, and what concepts and techniques I need to introduce in my design. Compared to other procurement models, collaborative procurement provides an opportunity for multiple parties to work together, with a high level of involvement from all parties, and through collaborative communication in the front-end of the project, all parties can have a macro understanding of the project and ensure that the project moves smoothly into the implementation phase.” (Interview 6)

Collaborative procurement is a multi-participant procurement approach that demands the participation of many parties and is a mutually beneficial model of development. The success of a project is dependent on its front-end planning; thus, all stakeholders must collaborate to determine a path of development that is mutually acceptable. Although green building projects represent a very tiny fraction of China's construction market, they represent the industry's future growth trend,

making technical innovation and the exchange of knowledge resources imperative. As a contractor, Respondent No. 7 stated:

“Collaborative procurement is the inevitable trend in the development of the modern procurement management function, which is a better way to meet the common interests of clients, designers and contractors, and to establish a new collaborative decision-making system that takes into account the interests of the collaborating companies while making decisions.” (Interview 7)

The client, designer, and contractor are advised to cultivate a strategic alliance aligned with modern procurement management practices that encourage collaborative procurement. The collaborative procurement technique enhances the efficacy of collaboration among clients, designers, and contractors.

“The cooperative procurement model requires consideration and coordination of the economic interests of the three parties, as well as the establishment of cooperation channels between the owner and the designer and constructor, and the implementation of the project through a well-established operational mechanism, all of which determine that we should carry out the clarification of mutual responsibilities before the formal start of the project and actively adjust the relationship between the parties in order to avoid adverse effects and make it difficult to carry out the cooperation”. (Interviewee 2)

### *3.3 Collaborative Procurement Models Promote Collaboration between Contractors, Clients and Designers*

The utilisation of the current collaborative procurement model has established a reference for cooperation between the client, the contractor, and the designer, enabling the three parties to communicate more effectively and providing a solid basis for future collaboration. Communication and cooperation develop the relationship between the three parties, build trust, and eliminate misunderstanding-based disputes, hence enhancing the value of project delivery. First and foremost, trust is the overriding factor that enables effective cooperation among clients, designers, and contractors.

“By observing other related project collaborations, it is understood that in a project, the client needs to have a good understanding of the designer's level of knowledge, time in the field and experience to ensure that the designer can design a project that meets their needs.” (Interviewee 4)

“For the contractor, knowing the contractor's contracting experience, skill level and industry reputation can better ensure that the contractor is able to build a project that meets the designer's and the client's vision.” (Interviewee 8)

Experience has shown that information on project requirements, stock status, production schedules, production plans, job schedules, market forecasts, and freight schedules should be compiled and shared between the client, designer, and contractor in order to clarify the value-added scope of the project, increase trust among the three parties, and facilitate working towards common goals.

“The sharing of information and proofreading with designers and contractors can identify the scope for adding value throughout the project, increase trust between the three parties and facilitate working towards common needs (Interviewee 2).

Secondly, good information transmission is a crucial means of facilitating cooperation between clients, contractors, and designers. The first interviewee said that a collaborative procurement approach was used for the building of an ecological project, in which the customer recognised and agreed upon certain changes that might be implemented via particular contact with the designer and contractor. After identifying the areas for improvement, the three parties were able to take different initiatives to enhance the overall performance of the project with fewer disagreements by

collaborating. Therefore, information integration is the foundation of collaborative work, and only on the basis of accurate, timely, and sufficient information can decisions and improvements be made in real time. Thirdly, collaborative procurement clarifies the separation of roles between the customer, designer, and contractor and prevents the shifting of responsibilities.

“The collaboration between client, designer and contractor is a way of working together with clear common interests, and it can be seen from the relevant collaborative procurement events that under this model all three are more involved in the project and all focus on risk management. The advantage of this approach is that the specific parts of the project that each party is responsible for are clarified at the outset, avoiding delays caused by unclear boundaries or poor involvement of some of the subjects”. (Interviewee 3)

In order to increase project performance, there is a need for a defined division of labour between the three parties at the outset of future project implementations.

#### **4. Conclusions**

Considering the current trend towards sustainable practices in the construction industry and how to effectively facilitate the successful execution of green building projects. This investigation examines the green building sector in China and the persons overseeing green construction projects using a collaborative procurement technique. This study uses qualitative research methodologies and interviews to derive three primary findings on the model's advantages and disadvantages, its facilitation of collaboration among construction project stakeholders, and the implementation of collaborative procurement practices.

Initially, green construction projects are executed more effectively when stakeholders collaborate. The procurement model, an integral component of the project, influences the management and operation of a construction project. To optimise resource conservation, environmental protection, energy efficiency, emission reduction, and profit enhancement in green building construction, it is essential to use an appropriate procurement model and integrate advanced knowledge and technology to improve the project. The collaborative procurement approach promotes the exchange of information and knowledge throughout the project's development, encouraging all participants to consider the broader context rather than only their own interests. This thereby reduces the probability of dispute and guarantees that all parties are aligned towards the successful completion of the project. The collaborative procurement approach facilitates project initiation by promoting consistent and timely communication among the customer, designer, and contractor. This ensures that all individuals' requirements are acknowledged and that the project is methodically organised. In conclusion, the collaborative procurement approach enhances the engagement of customers, designers, and contractors, facilitating a clearer understanding of their respective roles and responsibilities within the project. This will mitigate managerial uncertainty and the absence of accountability associated with either. Furthermore, collaborative efforts may foster mutual trust, facilitate dispute resolution and maintain project momentum. This study identifies a knowledge gap and establishes a foundation for future research by examining the reasons the collaborative procurement model is more advantageous for green building projects, along with its significant impact on the initial design phase and teamwork among project teams. This study also offers a path for future collaborative procurement strategies in green building project implementation. The construction sector might benefit from a collaborative procurement strategy for green building initiatives to more clearly delineate tasks, enhance confidence, promote transparent communication among all stakeholders, and ultimately achieve successful project completion. This dissertation has many issues. This research examines just a limited segment of individuals engaged in green building initiatives within China's construction sector. Secondly, while

the research yields insights on the collaborative procurement model, the study's scope requires expansion to enhance its generalisability.

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### Conflicts of Interest

The authors declare no conflicts of interest.

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