

# The Governance Mechanism of the Transformation of Green Science and Technology Achievements: A Perspective of Architectural Project

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**Abstract.** Green scientific and technological achievements are an important pillar for economic and social development. However, when green scientific and technological achievements enter the downstream market, it is difficult to eliminate the intermediary obstacles caused by the interface innovation ability of the construction project. Based on this, this paper is based on the resource dependence theory, puts forward a governance mechanism to make up for the lack of innovative capacity of the engineering designer's interface, and puts forward the division of responsibilities and Countermeasures for the innovation responsibility of the building projects in different modes.

## 1. Introduction

Upstream green technology and new products in the construction industry are marked by “four sections and one environmental protection”. We must speed up the transformation of scientific and technological achievements and promote the transformation of the construction industry to intensive, green, smart, and low-carbon transformation. Therefore, relying solely on green technology transformation enterprises focused on the unilateral cooperation of industry-university-research institution, it is difficult to eliminate the intermediary obstacles to the entry of green technology achievements into the downstream market.

Therefore, based on the resource dependence theory, this paper proposes an intermediary governance mechanism that compensates for the inadequacy of the ability of engineering designers to interface with innovation. This mechanism has the characteristics of bilateral collaboration of industry-university-research institution and modularity, and proposes the innovation division of labor and countermeasures of the Collaborative Innovation Network under different modes of construction projects.

## 2. Literature Review

Throughout the research on “industry-university-research-user” presents three major features:

1. The purpose of the study is the majority of universities in terms of innovation interests. For example, Aokimasahi thinks that corporations and research institutions belong to two types of actors in different fields, and they create synergies through mutual influence, thereby enhancing the cooperation process of their respective development potentials [1]. Lu Redshank studied the initiative of the research and Research Institute, and gained most of the cooperative interests. [2]. Yang Xu believes that the purpose of University participation in collaborative innovation is to enhance capabilities through scientific research, personnel training and industrial innovation. [3].

2. The existing research content and methods of industry-university-research are still limited to framework and empirical research. For example, Hong Jinxing talked about the collaborative innovation of industry, University and research, which is the process of interaction between scientists and entrepreneurs. [4]. Chen Jin pointed out that the collaborative innovation of industry, University and research is a long-span integrated innovation organization mode based on knowledge increment. [5]. He Buying discussed the lack of initiative in utilizing scientific and technological achievements at present [6]. From the perspective of coalition capabilities, Wen Hai and others have found that the

transformation of China's scientific and technological achievements is still too fragmented and the technology integration is low [7].

3. on the core issue of “industry-university-research”: The research on the bilateral collaborative innovation of upstream and downstream companies has not yet been carried out in depth.

### **3. Intermediary Barriers to the Transformation of Green Scientific and Technological Achievements**

The literature review shows that the synergistic innovation of industry university research institute is characterized by unilateral collaborative innovation on the specific interface of the industrial chain. However, under the background of construction projects, the key to the transformation of green scientific and technological achievements lies in the secondary innovation and integrated innovation in the design phase. The design enterprises, as the technical agent of the construction project owner and the intermediary of the transformation of scientific and technological achievements, has shortcomings in the ability to innovate, which seriously affects the implementation of innovation and division of labor and the improvement of innovation performance.

Therefore, in order to promote the transformation of scientific and technological achievements in construction projects, this paper proposes to replace unilateralism with bilateral collaborative innovation in industry-university-research.

### **4. The Intermediary Governance Mechanism for the Transformation of Green Scientific and Technological Achievements**

#### **4.1 Collaborative Innovation Network Architecture with bilateral collaboration between Industry-University-Research.**

The construction enterprise is the decision-making body of green building integrated innovation. The designer is the implementation subject and knowledge subject of green building products and process integration innovation. In the process of transforming green technological achievements, the engineering designer undertakes the secondary development of green technology products and processes and system integration tasks. Therefore, taking the green building construction project as the carrier, this paper puts forward a bilateral collaborative innovation network, it is composed of the upstream industry –university -research institution, the downstream design downstream industry –university -research institution, and the construction enterprises (project owners).

#### **4.2 Modular Task Division of Collaborative Innovation Network.**

In the transformation of green scientific and technological achievements, the task division of the bilateral collaborative innovation network can be used as a modular approach to solve complex product customization efficiency problems [8]. The advantage of modularity is the simplification and standardization of the work interface, which helps to promote the maximization of innovation power within the task and the minimization of transaction costs between tasks [9], in order to overcome the constraints of innovation in the interface collaborative innovation activities.

#### **4.3 Modular Division and Countermeasures in Different Modes**

##### **4.3.1 Modular Work Division and Countermeasures under the Project General Contracting Mode.**

###### **(1) Modular work division**

Under the project general contracting situation, the project contractor commissions the upstream green building technical element module supplier's industry-university-research institution to sign the construction subcontract, and in order to simplify the drafting, hereinafter referred to as the “green technology cooperation enterprise” to complete the development of a single green technology module. The performance requirements and commissioned development prices for the module development are specified. After the development is completed, the general contractor will perform integration and adjustment, as shown in Figure 1.

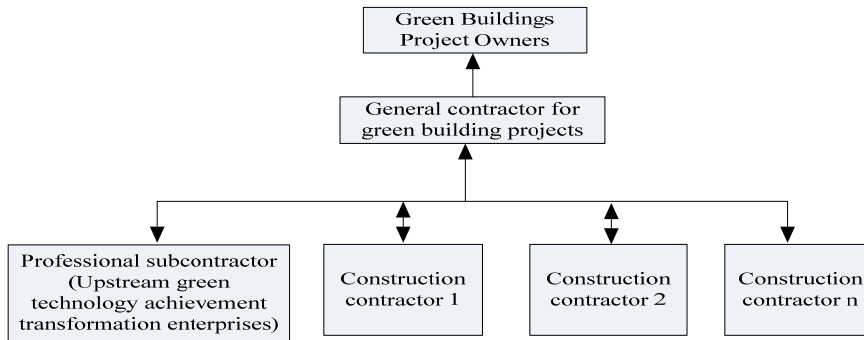


Fig 1. The contractual relationship of the network under the project general contracting model  
(2) Countermeasures and Suggestions

According to the innovation compensation principle of the supply chain collaborative innovation leader to the collaborators, the upstream green technology cooperation enterprise can promise to participate in the integrated innovation of the system interface in the subcontract of the green building technology factor module, Or accept reasonable requirements from the general contractor on the risk sharing and liability sharing of the integrated innovation environment. For green scientific and technological achievements, cooperative enterprises can cooperate with the general contractor. By disclosing the advantages of green technology in reducing the operating cost to the owners, they can get the premium of the total contract and improve the total profit of the cooperative innovation.

**4.3.2 Modular Division and Countermeasures in Parallel Contracting Mode.**

(1) Modularization work division

Under the model of parallel contract, the subcontractors of the green building technology factor module product and the design integration innovation subject. The contractual relationship of innovation cooperation occurs between the owner and the green technology industry-university-research institution, and also occurs between the owner and the engineering design industry-university-research institution, and overlaps with the professional subcontracting or project outsourcing contracting relationship of the construction enterprise (owner),as shown in Figure 2.

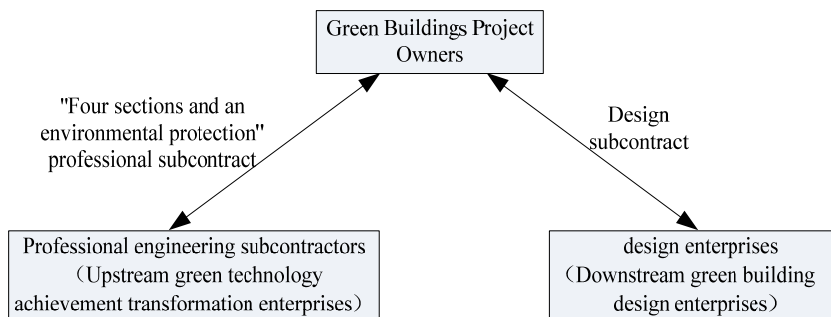


Fig 2. The contract relationship of the complex under the parallel contracting mode  
(2) Countermeasures and Suggestions

In order to encourage green building owners to accept the green science and technology elements, according to the innovation compensation principle of supply chain innovation leaders to collaborators, the upstream green science and technology cooperation enterprise can give scientific and technological achievements in the sub contract the promise of price advantage liability risk sharing.

**5. Conclusion**

It can be seen from the above that in order to promote the transformation of green technology achievements in construction projects and solve the current problem of lack of innovation as an independent intermediary for designers of green technology products in the transformation of green building projects, we must focus on resolving the issue of acceptance of green technology

achievements by downstream users that drive upstream industrialization, and explore the elimination of mediation barriers in the path of green technology transformation.

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