

Research on the Collaborative Innovation Mechanism and Practical Path of Industry-University-Research Cooperation in Green Building across the Taiwan Straits

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ABSTRACT

Green building technology innovation is the inevitable trend of the building industry across the Taiwan Straits, which is directly related to the competitiveness, energy-saving and ecological capability of China's building industry in the future, as well as the ability to build a human settlement environment that adheres to the concept of sustainable development. This research sorts out the basic concept of green buildings, fully examines the current research and practice progress of collaborative innovation in industry-university-research cooperation of green buildings across the Taiwan Straits, and clarifies some elements that limit its development. In order to solve the dilemma, it directly puts forward countermeasures and suggestions for building a collaborative innovation mechanism and establishing an implementation path for industry-university-research cooperation of green buildings across the Taiwan Straits. These mainly include cross-border flows among the five major elements of collaborative innovation, the establishment of a multi-party industry-university-research cooperative innovation system, the common evaluation standard system for green buildings, and the continuous cultivation of talents and mutual recognition of qualifications. Through the establishment and improvement of the innovation mechanism and implementation path, it will provide long-term protection for the development of green building industry across the Taiwan Straits in the future, and promote the standardized, professionalized, and scientific operation of industry-university-research cooperation in green building innovation technology across the Taiwan Straits.

Keywords: *Across the Taiwan Straits, Green building, Industry-university-research cooperation, Collaborative innovation.*

1. INTRODUCTION

Following the report "Our Common Future" released by the United Nations World Commission on Environment and Development in 1987, more and more countries, regions, and organizations began to pursue the global concept of sustainable development. Under the advocacy of new concepts such as green, energy-saving, low-carbon, and carbon reduction, China's construction industry has reversed its traditional development model and organizational methods, and is now striving towards the goal of popularizing green buildings in urban areas. In recent years, although China's construction equipment and science and technology

have made significant progress, there is still a considerable gap between China's technological competition in green buildings and the world's leading level. Green building belongs to the field of science and technology, and the main driving force for national technological development is innovation, while industry-university-research collaboration is a crucial link in driving innovation.

To promote the process of peaceful reunification of the motherland, in September 2023, the CPC Central Committee and the State Council issued the "Opinions on Supporting Fujian in Exploring New Paths for the Integrated Development of the Taiwan Straits and Building a

Demonstration Area for the Integrated Development of the Two Sides of the Strait", indicating that Fujian Province should make full use of its unique advantages in dealing with Taiwan region, establish broader exchanges and cooperation and deeper expansion, improve the integrated development policy system, and foster a strong atmosphere of family ties between the two sides of the Strait and Fujian-Taiwan kinship. According to the guidance of the Ministry of Education's "Plan for Enhancing the Innovation Capacity of Colleges and Universities (also known as the 2011 Plan)", the demand for collaborative innovation is divided into four types: facing scientific frontiers, cultural inheritance and innovation, industry, and regional development [1]. Among the two sides of the Taiwan Straits, only Fujian Province has a unique position in the overall work with Taiwan region. With the profound "five affinities" as the background environment, under the condition of having the same historical and cultural origins and nearly identical local cultural backgrounds, the development of collaborative activities in industry-university-research cooperation in green building aspect fully aligns with the needs of the above four types of collaborative innovation. Fujian Province and Taiwan region need to carefully clarify the concept and development history of green building, and take advantage of the "favorable wind" of the large-scale growth and renovation of green building across the strait to steadily promote in-depth, long-term, and well-structured collaborative innovation cooperation in industry-university-research cooperation in green building, thus opening up a win-win situation.

2. GREEN BUILDING CONCEPT

In 1969, American architect Ian McHarg proposed in his book "Design with Nature" that a unified system should be formed among people, architecture, and the natural ecological environment to promote the emergence and virtuous cycle of Ecological Building, thus effectively ensuring the achievement of the goal of sustainable urban development [2]. Against the backdrop of the continuous iteration and upgrading of the concepts of Global Sustainable Development and Ecological building, the concept, connotation, and definition of Green Building have also been continuously deepened, updated, and evolved as the earth's environment deteriorates and people strive to improve their surrounding environment.

The concept and connotation of Green Building vary among different countries and regions. In Japan, it was first called Environmentally Symbiotic Housing, with the core content focusing on three main themes: preservation of the Earth's environment, affinity with the surrounding environment, and a healthy and comfortable living environment. European countries refer to green building as Ecological Building or Sustainable Building, emphasizing ecological balance, conservation, biodiversity, resource recycling and reuse, renewable energy, and energy conservation. North American countries adopt the term Green Building, focusing primarily on improving building energy efficiency, rationally recycling resources and materials, and paying attention to indoor environmental quality.

In the Assessment Standard for Green Building (GB/T 50378-2019) jointly issued by the Ministry of Housing and Urban-Rural Development and the State Administration for Market Regulation in March 2019, the concept of Green Building is clearly defined as a high-quality building that saves resources, protects the environment, and reduces pollution throughout its entire life cycle, providing people with healthy, suitable, and efficient use space, and maximizing the harmonious coexistence between humans and nature.

3. RESEARCH AND PRACTICE OF INDUSTRY-UNIVERSITY-RESEARCH COOPERATION IN GREEN BUILDING ACROSS THE TAIWAN STRAITS

3.1 *Related Research Progress*

Foreign scholars have conducted numerous studies on the essence and characteristics of collaborative innovation from the perspective of the collaboration of participating entities. At the end of the 20th century, American sociologists Henry Etzkowitz and Leydesdorff closely linked university-industry-government and proposed the famous Triple Helix Theory, expounding on a new type of interactive relationship in innovative technology. There is a contractual spirit among the three parties, which can be exchanged in diverse ways, cross-subsidized, and evolved in turn, showing a high degree of synchronization [3-4]. The multilateral parties have produced dynamic and flexible communication, resulting in a continuous flow of innovation. Peter Gloor, a researcher from the MIT Sloan School of Management, introduced

the idea of collaboration into the innovation process based on the triple helix theory and put forward the earliest concept of Collaborative Innovation. It is the inevitable outcome of the shift of innovative behavior from a closed model to an open model, and also the application and manifestation of the idea of synergetics in the field of innovative technology research [5].

Chinese scholars have introduced a large number of foreign collaborative innovation theories and ideas. Although they started later than foreign countries, the achievements of their research are still quite substantial. Scholars such as Zheng and Zhang have explored the comprehensive collaborative process of technological innovation among regions, which should go through five stages, contact-communication, competition-conflict, cooperation, integration, and collaboration, based on the development law of innovative cooperation. Only by doing so can stable connections be established among collaborative elements and achieve the best synergistic effect [5-6]. Xia analyzed the generation process of internal and external drivers for industry-university-research collaborative innovation and the interaction between them in his research, proposing the construction of an incentive mechanism and implementation path for multi-party element collaboration [7]. Sun dissected the constituent content and constraints of the industry-university-research collaborative innovation mechanism across the Taiwan Straits in detail, and proposed specific suggestions for optimizing the collaborative mechanism, guided by four mechanisms: motivation, benefit distribution, guarantee, and evaluation. This provides some reference for improving the level of collaborative innovation in economic industries across the Taiwan Straits [8]. Huang analyzed the three stages of the development of the industry-university-research collaborative innovation model in Taiwan region: the initial stage, the development stage, and the mature stage. Huang explored the roles played by schools, governments, and markets at each stage, as well as the respective functions of different collaborative innovation entities in facilitating, deepening, and integrating the innovation process [9].

In the research on green building industry-university-research, many scholars have extended their keen tentacles to different multiple composition mechanisms, and the pertinence, depth and breadth of the research are also different. He and Chen take the production-learning-research-

collaborative innovation of green buildings as the main medium, carry out qualitative and quantitative research on the main elements and influence relationship of intermediary governance between green technology production enterprises and project owners, and successfully build a collaborative innovation network with engineering design innovation functions [10]. Ouyang from Wuhan University emphasized in the research the collaborative innovation activities of the cross-strait construction industry under the guidance of the government as the main force [11]. Sun and Zhang analyzed the dilemma faced by China in the practice of collaborative innovation cooperation, and were more inclined to the market-oriented mechanism construction in industry-university-research-application collaborative innovation, and put forward the path method to guarantee the market mechanism [12]. Su and other scholars focus on universities, one of the main elements of industry-university-research collaborative innovation, and discuss the connotation and characteristics of various collaborative innovation modes, such as government-industry-study-research-application, which take universities to spread knowledge, train talents and serve local areas, pointing out a new path for the construction of collaborative innovation mode dominated by universities in the future [13].

3.2 Related Practice Progress

The cooperative areas of industry-university-research in Fujian Province and Taiwan region can be traced back to 1985. Fujian Province is the first province in China to enroll students from Taiwan region. By 2009, Fujian Province began to organize students to study in colleges and universities in Taiwan region on a large scale. Fujian Province has also issued a series of preferential policies to encourage graduates in Taiwan region to work in Fujian Province.

In 2009, in order to build a cooperation platform for green building technologies across the Taiwan Straits, enhance exchanges and cooperation, and diversify models in the construction industry. The Fujian Strait Green Building Development Center and the consortium legal entity Taiwan Region Construction Center signed a green building cooperation agreement for the first time in Fuzhou. In April of the same year, the center was established, which has been committed to the research, development, promotion, and application of green and low-carbon technologies for a long

time. It has extensively conducted academic exchanges, technical evaluations, and consulting services. The Development Center has set up the Fujian Green Building Innovation Alliance, which has gathered more than 70 units related to green building design, consulting, construction, building materials, universities, and scientific research in the province, jointly promoting and guiding the high-quality development of green buildings in our province.

In Taiwan region, Professor Lin Xiande of National Cheng Kung University is the main editor of EEWB green building evaluation standard system in Taiwan region. In January 2011, hosted by his design of Sun Yunxuan green building research building, known as Green Magic School [14], advocate and fully implement the energy saving, waste, environmental protection green concept, represents the success of the first green building in Taiwan region, prove in Taiwan region has quite mature green building technology innovation technology.

In addition to Professor Lin Xiande's green building design and construction, there are also leaders in industry, universities and research institutes to lead employees into rural development. Mr. Cai Xingjue is an architect who has been engaged in the construction industry for more than 25 years and is also the vice president of the Taiwan Region B&B Inn Association. In 2019, he led a team of teachers and students from architectural colleges and universities in Taiwan region to closely cooperate with more than 10 teams of teachers and students from Fujian architectural colleges and universities. Through internships, teachers and students from both sides of the Taiwan Straits were introduced to participate in the green construction and renovation of traditional buildings in Xiaojiao Village, a millennium-old ancient town in Liexi Street, Sanyuan District, Sanming City, Fujian Province. Riding on the momentum of comprehensively promoting rural revitalization and a series of Taiwan-benefiting policies, Mr. Cai's team of teachers and students, relying on universities, the government, and villagers, successfully created a rural green building with an innovative development model of "planning and design + accompanying operation" in Xiaojiao Village. This is a successful case of collaborative innovation in green building industry-university-research cooperation across the Taiwan Straits in recent years.

4. THE CONSTRAINTS OF GREEN BUILDING INDUSTRY-UNIVERSITY-RESEARCH COLLABORATION ACROSS THE TAIWAN STRAITS

4.1 Lack of Industry-University-Research Collaborative Innovation Mechanism

Although the above Fujian Province and Taiwan Region have made some progress in the industry-university-research collaboration in the construction industry, there are still defects in the integration of industry-university-research collaborative innovation in green building. At the present stage, the degree of cooperation in science and technology innovation across the Taiwan Straits is still in a very shallow stage, and the exchanges and cooperation between the two sides have shown a low willingness attitude in many fields. Long-term and stable development plans for the cross-strait work, and green building innovation resources have not been effectively integrated and lack of being systematically allocated, resulting in problems such as duplication of layout and waste of resources. The lack of industry-university-research collaborative innovation mechanism is mainly presented in the following points.

First of all, the inconsistent driving core, interest objectives and actual demands have caused the lack of internal motivation of collaborative innovation. In the external incentive environment of university teachers and researchers of scientific research institutions, the professional title evaluation and promotion mechanism still takes papers, topics and awards as narrow evaluation criteria and incentive guidance, which can only push the scientific research achievements into the embarrassing situation. Secondly, due to the negative shielding effect of political elements on both sides of the Strait, the cultural identity has cracks, and the trust between industry-university-research subjects declines. Construction enterprises on both sides of the Taiwan Straits generally lack in-depth green building technology and strategy guidance from intellectual units. In the need for deep integration and coordination of high-end core technologies, they do not firmly establish honest sharing of knowledge information and technology application, leading to the lack of information sharing mechanism. Third, although there has been a certain basis for cooperation since the opening of exchanges across the Taiwan Straits, the relevant competent authorities between the two sides have

been unable to effectively predict and monitor the risks of the two sides for many years, and the dialogue and negotiation mechanism has almost been shut down, and the profit distribution has not been effectively adjusted. Intellectual property disputes are also one of the problems that are easy to appear in the industry-university-research collaboration. The lack of synergy between the achievement transformation chain and various innovation entities also hinders the deep collaboration between industry, university and research. Fourth, the construction on both sides of the Taiwan Straits about a series of policies, systems, regulations, the evaluation of the project supervision system in the situation of their camp, the internal structure and composition between loose, insufficient cohesion, unable to supervise and coordination, not the essence of the elements responsibility, also cannot guarantee the overall operation mechanism of the project.

4.2 Significant Variances in Assessment Standard for Green Building

The green building evaluation standard system in mainland China was completed late. Drawing on the mature experience of the world, the essence of the system has absorbed the earliest system of Britain, the United States, Canada and Japan. At present, China currently uses the Assessment Standard for Green Building (GB/T 50378-2019), which has been gradually optimized over the years. Fujian Province with the advanced practice of green building and research results as the foundation, the national standards for the underlying logic, based on its historical and cultural characteristics, geographical and climatic conditions, economic development level, social cognition, etc., formulated the targeted Assessment Standard for Green Building in Fujian Province (DBJ/T 13-118-2021)(hereinafter referred to as "Standard"). The evaluation system is divided into five categories:

safety and durability, health and comfort, convenient life, resource saving and livable environment. Each type of index includes control items, scoring items and bonus points. The expert evaluation passing system is more inclined to qualitative evaluation.

On the other hand, the green building assessment standard in Taiwan region uses a full set of EEWH green building evaluation manual developed from the Taiwan Energy Saving Design Regulations in 1995, also known as EEWH Family, which are derived from the initials of ecology, energy saving, waste reduction and health words. Among them, EEWH-BC (Basic Version) Green Building Evaluation Manual 2019 edition(hereinafter referred to as EEWH-BC (Basic Version)) is the most widely used, and the evaluation spindle module is respectively located in the daily energy saving index and indoor environment index [15]. In the EEWH system, nine indicators comprehensive score and weight are set up systematically and scientifically. The Green Building Grading Method and the Green Building Innovation Technology Preferential Evaluation Method are established. The scoring evaluation system using formula calculation is more quantitative evaluation method, which is in line with the international evaluation method.

After carefully combing the Standards of Fujian Province and EEWH-BC(Basic Version) of Taiwan region, it is found that there are great differences in the evaluation indicators of the two provinces. In "Table 1" below, the contents of the first and second level indicators in their respective systems are extracted to form an intuitive comparison. It is found that the most prominent ecological characteristics in the EEWH system are not found in the Standard of Fujian Province, and it is these contents that set up a clear ecological goal for the future development of green buildings in the mainland region.

Table 1. Comparison of the First Level and Second Level Indicators

Assessment Standard for Green Building in Fujian Province (DBJ/T 13-118-2021)		EEWH-BC (Basic Version)	
First Level	Second Level	First Level	Second Level
Safety and durability	Safety	Ecology	Biodiversity indicator
	Durability		Green quantity indicator
Health and comfort	Indoor air quality		Energy saving
	Water quality	Daily energy saving indicator	
	Acoustic and light environments	Waste reduction	CO ₂ Reduction indicator
	Indoor hot and wet environment		Waste reduction index

Assessment Standard for Green Building in Fujian Province (DBJ/T 13-118-2021)		EEWH-BC (Basic Version)	
First Level	Second Level	First Level	Second Level
Convenient life	Travel and Accessibility	Health	Indoor environment indicator
	Service facilities		Water resources indicator
	Smart operation		Sewage and garbage improvement indicator
	Estate management	Innovative design	Adopt the identification system of preferential upgrade
Resource saving	Land conservation and land use	/	/
	Energy conservation and utilization		
	Water conservation and utilization of water resources		
	Material conservation and green building materials		
Livable environment	Site ecology and landscape	/	/
	Outdoor physical environment		
Improvement and innovation	Bonus points		

4.3 Incomplete Structure and Asymmetric Personnel Communication

According to the list of 30 green and low-carbon building experts published by Fujian Construction Industry Association in May 2023, the actual technical experience of the construction industry, especially the green construction industry, the large gap of scientific research and teaching personnel and the imperfect echelon structure are one of the shortcomings in the coordination process of industry-university-research institute of green building.

In terms of the level, scale, influence and penetration of the construction industry exchange personnel returning from the mainland and Taiwan region, the number of Taiwan region people coming to the mainland is large, the number of mainland people going to Taiwan region is small, and the field of communication is also limited to different degrees. Most of the industry elites who come to the mainland are from northern Taiwan region, there are few grassroots people in the central and southern regions, and the communication of young people is less. The new generation of cultural exchange activities are lack of creativity, few projects, insufficient depth, weak sense of participation and insufficient interactivity, and their influence on the young people in Taiwan region with innovative and creative ability is very limited.

5. BUILDING THE COLLABORATIVE INNOVATION MECHANISM AND PRACTICAL PATH OF INDUSTRY-UNIVERSITY-RESEARCH GREEN BUILDING ACROSS THE TAIWAN STRAITS

5.1 Cross-border Flow of the Main Elements of Collaborative Innovation

There should be appropriate main elements for the construction of industry-university-research collaborative innovation of green building across the Taiwan Straits. According to this research, the focus should be on the five elements of government, construction enterprises, construction universities, scientific research institutions and construction market.

Government elements play a guiding and promoting role, and the innovative policy tools mastered by governments on both sides of the Taiwan Straits, such as urban renewal plans, education resource allocation, technological means cultivation, fiscal and tax systems, legal regulations and policies, have a significant impact on the degree, level, and connotation of collaborative innovation between industry, academia, and research [16]. With the auxiliary guiding role, strengthening the convenience of promoting the participation of innovative entities in the

construction industry in the deep integration of industry, academia, and research can greatly affect the quality and success rate of collaborative innovation among multiple parties.

In order to obtain a higher level of strategic and market-oriented green building scientific and technological innovation achievements, China will inevitably promote enterprises to follow the trend and change their dominant position of industry-university-research as the dominant position. Construction enterprises in order to improve their core competitiveness in the market environment, usually take with architecture universities and research institutions to cultivate, incubation, development, build research institutions to achieve their research and development purposes, through the transformation of research results, at the same time more economical in cost accounting.

The main function of construction universities is to promote the construction of a team of teachers in the field of architecture, cultivate and supply innovative technical professionals in green building to the society, improve the level of scientific research and complete the practical transformation of scientific research results. Construction universities can use the scientific research platform provided by the government, and construction

enterprises and markets to deliver the required talents, and adjust the talent cultivation strategy in a timely manner according to the construction market. It is one of the key areas of layout on both sides of the Taiwan Straits.

As the front end and back end adhesive of innovative technology, scientific research institutions are an important source of intellectual resource pool in the process of promoting industry-university-research collaboration. Scientific research institutions can cooperate with knowledge and intelligence of colleges and universities, and construction universities training scientific research talents, using the government on both sides of the service platform, provide information, capital and policy support, for construction enterprises to provide green building science and technology innovation research results, and according to the market choice constantly adjust research direction. All focus of collaborative innovation, is about the construction market inspection, market to promote the government according to the market demand for the identity of the change, guide the construction enterprises to change their production mode and elements, at the same time decide the construction of green building scientific research, talent training direction, and scientific research innovation direction of scientific research institutions.

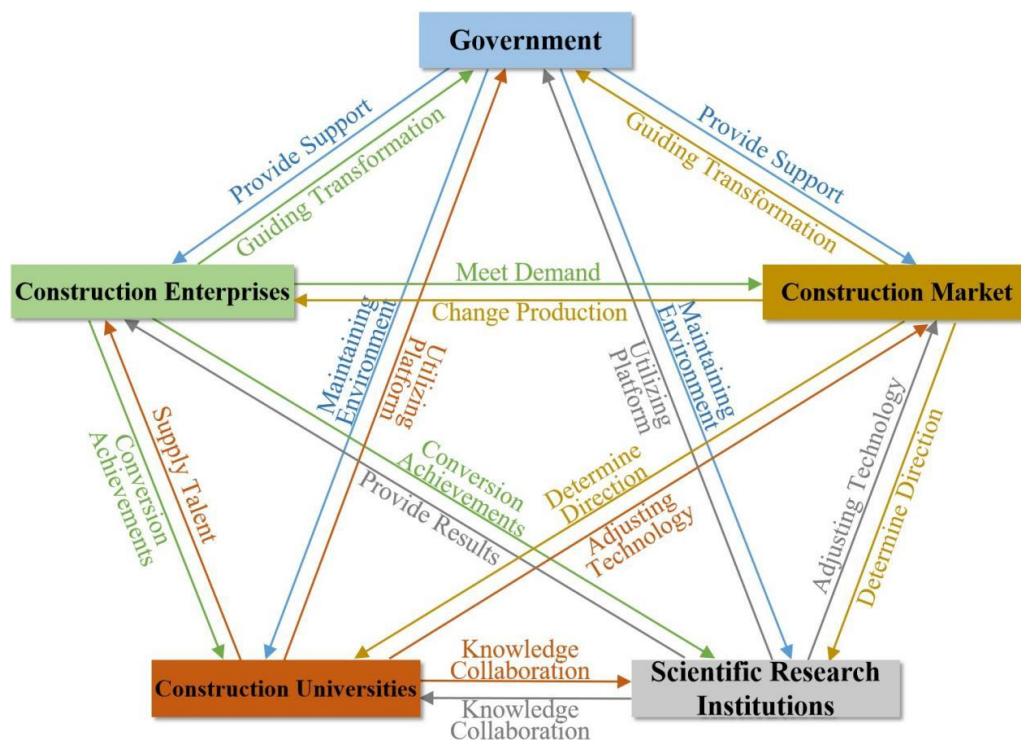


Figure 1 Cross-border flow relationship diagram of subject elements.

To sum up, in order to more clearly show the cross-border flow oriented form between the five main elements of green building industry-university-research collaborative innovation across the Taiwan Straits, the special flow relationship chart can be shown in “Figure 1” on the previous page.

5.2 Establishment of the Industry-University-Research Collaborative Innovation System

5.2.1 Dynamic Incentive Mechanism

According to the difference of sources, the power of industry-university-research collaborative innovation can be divided into internal power and external power. The combination of the two jointly promotes the operation of the industry-university-research collaborative innovation mechanism system [8]. From the perspective of internal motivation, the power mechanism with unified community goal should be established to ensure the consistency of the cooperative growth and growth direction among the subjects, maintain the harmonious coexistence of the subjects of industry, university and research, and stimulate the internal drive, initiative and innovation of the main elements in the innovative science and technology production. From the perspective of external power, the reform of collaborative innovation should improve the construction market regulation technology resources for starting point, such as green building technology forum, organize green building skills competition selection construction talents, build green building science and technology innovation incubation project platform, etc.

5.2.2 Information Sharing Mechanism

Construction industry is the pillar industry of urban economy, and green building is an important driver to cater to the national double carbon strategy in recent years, but due to the industry characteristics, green building data often scattered in various administrative units, enterprises, universities, scientific research institutions, etc., no unified processing platform to overall management data, caused a great waste of resources. The information sharing between the innovation subjects of green building, industry, university and research on both sides of the Taiwan Straits needs to span the complex factors such as geography, politics, industrial population quality, economic environment, social and cultural level.

with the help of modern network and digital technology, on both sides of the Fujian Province and Taiwan region as pilot, try to establish Green Building Data Information Sharing Platform, characterized by rapid implementation knowledge transfer, reduce the communication costs across regions, across system, jointly optimize green building scheme, establish a complete on both sides of the construction personnel information system, monitoring personnel quality. Enterprises on both sides of the platform make information circulation more transparent, increase trust between construction industry, further improve the digital information coordination mechanism between various elements, gradually formed Internet Big Data + Green Building Science and Technology + Scientific Research Achievements Transformation information integration strategy, promote the green building production synergy of high quality, high precision maintenance and development.

5.2.3 Interest Protection and Distribution Mechanism

The collaborative innovation activities between industry-university-research subjects are not only about making cheese, but also about how to divide cheese. The fair protection and reasonable distribution of the benefits between the main elements after the transformation of the results are the important reasons for the stable and sustainable cooperation between the two sides. Clear green building project on both sides of the collaborative parties subject in investment proportion, with innovative technology distribution and degree, intellectual property rights, input elements and knowledge contribution in the distribution of income proportion, and innovation of scientific and technological achievements, disposal and benefits, in the project starting before as far as possible to avoid conflicts of interest. Through regular consultation meetings, the main elements can timely understand, communicate and correct the problems in the process of industry-university-research collaborative innovation, run-in consensus in the talks and consultation, and find the common fulcrum in line with the interests of various parties. Through the government the auxiliary factors, overall adjustment between the tax system, independent perfect tax regulations for green building system, guidelines, regulations and laws and regulations, in the level of property distribution intervention in the form of policy, system, can ensure that maintain on both sides of the green

building industry collaborative innovation of long-term and stability.

5.2.4 Evaluation and Supervision Mechanism

With Fujian Province and Taiwan Region as the main venue, the Cross-Strait Collaborative Innovation Committee and other special agencies have been established to manage the deep integration of industry-university-research collaborative innovation in green building across the Taiwan Straits. Construction enterprises, universities and scientific research institutions as the main core, and relevant government departments, intermediaries and financial institutions as auxiliary third-party evaluation and supervision institutions will be established. Its responsibilities are to track and evaluate the implementation process of green building projects in the field of green building technology, irregularly check the progress of industry, university and research projects, and listen to the reports of universities, scientific research institutions and enterprises. And together with production subject management, supervision, rectifying technology in the field of resource utilization, knowledge input, joint training, achievements transformation, benefit distribution, responsibilities, common research and develop green building technology innovation route, solve the problem of key technology, constantly resolve the risks and hidden dangers in the depth fusion, ensure both subject legal compliance activities in Fujian Province and Taiwan region, and most importantly, to ensure that the shared between green building production, collaborative innovation.

5.3 The Common Assessment Standard System for Green Building

In the speech at the 40th anniversary of A Message to Our Compatriots in Taiwan region, Xi Jinping pointed out that China mainland should actively promote the institutionalization of relevant cooperation, and the two sides should "fully connect". The connectivity here includes major aspects such as unimpeded economic and trade cooperation, infrastructure connectivity, energy and resource connectivity, and common industry standards. The Fujian Provincial Department of Housing and Urban-Rural Development issued the document Implementation Plan for the Creation of Green Buildings in Fujian Province in October 2020, which also mentioned the promotion of the

common construction, construction, and evaluation standards for green buildings across the Taiwan Straits. At present, the two sides of the Taiwan Straits are working together to compile five construction industry standards, including the Assessment Standard for Green Building across Taiwan Straits (DBJ/T 13-324-2019) and the accessibility facilities project, which can be implemented by both sides. This common measure will further level the development of the construction industry on both sides on the same track. A series of interworking standards have been pilot applied in the Pingtan County Taiwan Region Compatriots Community Project. On this basis, the cooperation and demonstration of green building, green building materials, resilience city and other projects across the Taiwan Straits will be strengthened.

5.4 Talent Coherence Training and Mutual Recognition of Qualifications

The lack of innovative technical talents is the key factor restricting the development of construction enterprises, while universities shoulder the important responsibilities of training innovative technical talents, conveying to enterprises and the market, and feedback social services. Colleges and universities should build graduate flow stations, cooperative laboratories and internship centers of green building related disciplines, build a coherent collaborative innovation talent training system, and form an educational situation of both production and study between classroom theory and extracurricular practice [17]. Universities can obtain more resources and growth space conducive to cultivating innovative and technical talents in the cycle and upgrading of the industry-university-research cooperation ecosystem. They can also get financial assistance from the government, other intermediary agencies and enterprises, and can also reasonably incubate and develop scientific research bases or platforms with enterprises in the technology industrial park. Should also promote the coherence of Taiwan region construction talents training, guide has been in Fujian Province for many years, have good successful experience of construction team, enterprises into Taiwan region universities exchanges in the field of construction, share in mainland entrepreneurship, word of mouth true tells the story of Taiwan region compatriots in the mainland.

On the other hand, continue to expand the scope of recognition of professional qualifications in the

construction field across the Taiwan Straits, including qualifications for enterprises and individual practitioners in the construction field in Taiwan region, to resolve unnecessary bottlenecks in talent constraints. In Fujian Province on both sides of the development of construction industry standards, in the greater efforts to break the institutional barriers, on the basis of supporting Taiwan region construction team to Fujian Province, apply for green building design qualification, with corporate operation mode as a whole green building project to undertake, coordination and communication related social services, to create benefits, motivate Taiwan region team play. Support Taiwan region compatriots to participate in the joint construction of ecological environmental protection, rural revitalization and other construction fields in Fujian Province. Fujian Province strives to retain advanced construction talents from Taiwan region as a master, and strives to make Taiwan region compatriots stay, have work, benefit well, and be praised. Fujian Province and Taiwan region work together to build the first home for Taiwan region compatriots to land.

6. CONCLUSION

In order to meet the strategic goal of sustainable development in China, based on the development of green building concepts, this article reviews the relevant research and practical progress of cross-Strait green building industry-university-research collaboration innovation, and carefully examines the constraints that hinder cross-Strait green building industry-university-research collaboration, including the lack of mechanisms, differences in standards, and unequal structures. To solve the discordance in the collaboration of green building industry-university-research across the Taiwan Straits, and break through the bottleneck, this article focuses on four aspects: the cross-border flow of collaborative innovation main elements, the establishment of collaborative innovation mechanism system, the interoperability of green building evaluation standards across the Taiwan Straits, and the construction of talent cultivation of construction qualifications. It constructs a complementary coupling mechanism system and implementation path, which is conducive to long-term protection of the future development of green building. In addition to being used as an important reference for the scientific and precise policies of relevant government departments, this paper can also be promoted and applied in construction

enterprises, construction universities, scientific research institutions and construction industry in Fujian Province and Taiwan region, so as to promote the standardized, professional and scientific operation of green building innovation technology on both sides of the Taiwan Straits.

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