# Digital Transformation Of The Construction Supply Chain: Whole-process Green Supply Chain Management With China Construction E-Commerce Co., Ltd(Cloud Building Network)As The Industry Benchmark

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**Abstract.** Construction supply chain management mainly cooperates with the whole process of raw material procurement, component production, logistics transportation to the site for construction, operation and maintenance, and integrates information flow, logistics and capital flow,so as to achieve the best goal of project cost, duration and quality. In recent years, the research and practice in this field have changed from the previous linear integration to the common development of platform, intelligence, and Greening Based on digital technology. Taking China Construction E-Commerce Co. , Ltd (Cloud Building Network) as an example, this paper analyzes the digital transformation of the construction supply chain. It mainly studies the changes caused by the innovation and development of CSCEC e-commerce cloud building in this field, including the integrated service ecology of bidding, supplier quotation, online contract signing, delivery and receipt. Cloud Building Network can deeply assist in the construction supply chain, promote green supply chain management to achieve a full-process closed loop, and reach the goal of sustainable development. This article summarizes the hot research directions in the field and analyzes the impact of digital transformation on efficiency, effectiveness, and innovation ecosystem structure, in order to inspire future development directions.

**Keywords:** Building green supply chain; digital transformation; Cloud Building Network.

## 1. Introduction

Construction supply chain management mainly coordinates the entire process of raw material procurement, component production, logistics transportation, on-site construction, and operation and maintenance, and integrates information flow, logistics, and capital flow to achieve the optimal goals of project cost, schedule, and quality. However, the coordination between various links in the construction supply chain is difficult, and it is easy to encounter problems such as information asymmetry and resource waste [1]. The construction industry is facing the dual challenges of shrinking scale and declining profits and urgently needs to shift from quantity expansion to quality improvement in order to seek new growth drivers. Therefore, supply chain-based construction logistics management and digital transformation have become key factors in improving construction logistics efficiency, reducing costs, and enhancing competitiveness [2]. In recent years, research and practice in this field have changed from the simple linear integration direction in the past to the common development direction of platform, intelligence and green based on digital technology. Therefore, the supply chain-based construction project logistics management and digital transformation have become the key factors to improve the efficiency of construction project logistics, reduce costs and enhance competitiveness. For a long time, the construction industry has experienced extensive management, isolated information, and low profit levels. Moreover, the development speed of digital transformation of the industry is much slower than that of the retail and manufacturing industries. The report of the 20th CPC National Congress pointed out that "people should promote the development of high-end, intelligent and green manufacturing industry". The Third Plenary Session of the 20th CPC Central Committee further clearly emphasized the need to promote the high-end, intelligent and green development of the manufacturing industry. Due to the industrial characteristics of high resource consumption and environmental impact of manufacturing enterprises,

the "double carbon" goal proposed by China sets a stricter standard for the green development of the manufacturing industry. Therefore, it is urgent to promote manufacturing enterprises to reduce environmental pollution, improve resource utilization efficiency and achieve long-term sustainable development goals [3]. In recent years, China has had increasingly stringent environmental requirements for manufacturing enterprises and has guided and regulate the production and operation activities of enterprises. This development trend not only provides new development opportunities for the sustainable development of manufacturing enterprises but also brings many challenges [4]. Based on the above factors, green building has become the inevitable trend of the development of the construction industry with its characteristics of low energy consumption, low resource consumption, health and environmental protection, and harmonious coexistence with nature [5]. In addition, the mature and integrated applications of digital technologies such as cloud computing, big data, Internet of Things (IOT), BIM, etc. make it possible for the whole chain of intelligent collaboration. These factors jointly determine the green supply chain transformation of the construction supply chain. Then, the digital transformation of the green building supply chain must be the future development direction.

By analyzing the successful case of cloud building, this paper summarizes its transformation mode and value creation principle. It plays an important theoretical and practical role in guiding the digital development of the entire construction industry and promoting high-quality construction. This paper regards CSCEC e-commerce Cloud Building as an industry benchmark and analyzes how to realize the whole process of green supply chain management in the digital transformation of its construction supply chain. What are the specific impacts of such a transformation on efficiency, efficiency and innovation ecological structure? What quantifiable results have the digital transformation of green supply chain brought?

## 2. Case Introduction

In 2015, China State Construction Engineering Corporation Limited established China Construction Electronic Commerce Co., Ltd (CSCEC), and launched the Cloud Building Network. CSCEC group has great procurement demand and good resources, which provide power and support to the Cloud Building Network. Cloud represents a strategic move carried out in the context of vigorous state support for the "Internet+" strategy. The advantages of CSCEC in offline procurement have been transferred and upgraded to online, standing in the tide of history. China Construction Group has a purchase demand of hundreds of billions of yuan every year, which is the gravitational field formed by Cloud Building Network. Cloud Building Network has a natural attraction effect on suppliers by launching a large number of confirmed orders. Cloud Building Network operates under the umbrella of a central SOE. This not only brings the brand but also allows financial institutions to recognize that with the strong background of central enterprise shareholders, Yunzhu not only strengthens the credibility of the brand, but also effectively enhances the recognition of its main credit in financial institutions. But its subject credit. The platform can penetrate the high-quality credit of CSCEC to the upstream multi-level small and medium-sized suppliers and solve the problem of credit transmission in the traditional supply chain. What Cloud Building Network has is not a simple order snapshot, but the real closed-loop data of the whole process, including bidding, contract, performance, signing in and settlement. Driven by technological innovation and business scenarios, technology is not utopian. SaaS tools such as procurement management, smart construction sites and electronic signatures have accumulated data in the service of the main business, forming standard digital products that can be exported to the outside world, and providing industry customers with procurement consulting reports such as price indexes and supplier portraits.

In this paper, the procurement management and tax coordination systems are exported to state-owned and private construction enterprises, and SAAS and other software licensing or annual service fees are charged. The dual-wheel-drive business model turns innovation into real value, achieves cost reduction and efficiency gains, and thereby attracts and serves a vast industry chain ecosystem. Relying on assisting the industry, formulating relevant standards and connecting the ecology, the

Cloud Building Network consolidated its position as the industry leader and expanded its influence and win-win cooperation network. In turn, these factors reinforce the platform, driving continuous scale expansion and a deepening moat effect. The Cloud Building Network uses centralized purchase potential energy and credit penetration to form a closed-loop transaction, creates value-added profits by relying on data assets and a digital intelligence base, and then defines industry rules by relying on ecological standards, to achieve the goal of upgrading from earning trade price differences to earning service, finance, data and ecological profits.

## 3. Analysis of Yunzhu's Full Process Green Supply Chain Management

### 3.1. Theoretical Deconstruction of the "Four Green Models"

In 1990, Schot analyzed the motivation for green procurement in chemical companies while studying their environmental performance [6]. In 1994, Webb conducted environmental impact studies on some products and recommended selecting raw materials according to environmental guidelines and strengthening resource recycling, emphasizing the importance of green procurement [7]. In 1996, the Michigan State University Manufacturing Research Association first proposed the concept of green supply chain when researching the "Environmentally Responsible Manufacturing" project [8]. Green supply chain management is an important manifestation of the extended producer responsibility system. Enterprises need to focus on social welfare and influence the behavior of supply chain-related enterprises through the "purchasing power" of core enterprises [9]. Green supply chain management is an effective environmental management method for enterprises, and procurement officers and supply chain managers play key roles in the green supply chain management of enterprises. Through the selection and evaluation of suppliers, the development of suppliers, and the improvement of purchasing procedures, they play a major role in establishing and maintaining competitive advantages for enterprises [10]. That is to say, green supply chain management has become the trend of future supply chain development. The Cloud Building Network's "Four-Green Model" of green supply chain management: Defining Green (green building material standard system), Evaluating Green (green supplier admission policy), Procuring Green, and Tracking Green (carbon footprint). It can be analyzed in three theoretical aspects: signal transmission, transaction cost governance, and full lifecycle performance closed-loop. This model regards the Internet platform of the construction industry as a hub, changes the original fuzzy green attribute into a digital rule model that can be coded, verified and traced, and re establishes the trust mode and value distribution logic between the upstream and downstream of the supply chain. "Defining green" as a cognitive starting point and legitimacy foundation, relying on the green building materials standard model, transforms "green standards" from empirical judgment to a structured and auditable technical indicator library. The main task of this stage is to form an industry green knowledge graph and develop relevant institutional norms, using standardized green code language to reduce cognitive differences between various entities and provide a unified value measurement standard for subsequent market transactions. "Evaluating Green" serves as a signaling and screening mechanism, turning the static standards produced by "Defining Green" into a dynamic market screening tool through green supplier access policies.

Suppliers, after undergoing certification and auditing, transform their green investments into credible commitment signals. The Cloud Building Network platform, as a trusted intermediary, conducts initial filtering and endorsement of these signals during the access phase, significantly reducing the search costs and adverse selection risks for buyers under information asymmetry. This scenario represents a typical process of establishing a signaling equilibrium in economic terms. "Green procurement" has become a key link in realizing the value of green signals and embedding them into the market. Cloud Building Network does not simply list green products but has established a dedicated library of green building materials, classified according to environmental protection, energy conservation, and low-carbon standards, and prioritized the promotion of certified materials. At the same time, the green weight is also included in the bidding template to guide the selection

behavior of procurement enterprises in transaction rules. This indicates that the green attribute has changed from a bonus item for suppliers to a threshold or weight item for winning the bid competition, enabling the credit assets accumulated in the early evaluation of green to achieve value conversion at the important node of order acquisition, achieving market-oriented expression and fair distribution of green preferences. “Tracking Green” takes carbon footprints as the connecting thread to build a data authenticity and closed-loop verification network that spans the entire chain. The Cloud Building Network has developed LCA carbon footprint calculation methods for bulk materials such as steel bars, concrete, and cables, and provided an industry average emission factor library. At the same time, suppliers are required to report actual emission data and then form immutable dynamic carbon labels through IoT collection and blockchain certification. This technology model solves the main problem of unverifiable commitments in green supply chains and achieves a change in carbon data from self-reporting to self-certification. It is worth noting that the scope of tracking has extended to the linkage accounting of recycling and carbon performance: the idle material trading sub platform promotes resource circulation through intelligent matching and calculates the carbon emissions avoided from new material production, extending the "reduction of carbon footprint" from the procurement end to the consumption end.

These four steps together form a reinforcing loop of “Rule Definition – Credit Evaluation – Market Redemption – Data Verification,” which continuously feeds back on transaction and emission data, allowing the evaluation criteria to be dynamically optimized. Green supply chain finance relies on real data and a green evaluation index as a credit basis, which encourages low-carbon behavior and strengthens the binding relationship between financial incentives and emission reduction performance through carbon intensity commitment clauses. The interconnectivity of carbon emission data across the entire chain and the use of visualization tools have formed a green trust model centered on a platform for multi-party governance, which can self reinforce and continuously evolve.

### 3.2. Circular Economy

The Cloud Building Network's practice in managing idle waste materials has changed the traditional incremental procurement model, expanding its business into the field of stock circulation, while also achieving benefits in both environmental and commercial aspects. After forming a recycling sub-platform, The Cloud Building Network will handle the idle waste of equipment and materials in the construction industry. Enterprises can release idle materials such as tower cranes and templates in dedicated trading areas, and intelligent matching engines can efficiently connect supply and demand, thereby improving the reuse rate of materials. This model generates quantifiable green recycling benefits: the platform calculates the carbon emissions of new material production reduced by the recycling of idle materials, giving environmental benefits a monetary value. After realizing idle assets, they become cash inflows, and buyers can obtain materials at prices lower than new products, which reduces procurement costs. The platform also relies on various value-added services to generate income. Finally, compliant recycling records will be integrated into the company's green evaluation index. Companies that actively participate in recycling resources can obtain better financing conditions in the Cloud Building Green Loan, promoting the transformation of green behavior into financial advantages. The Cloud Building Network has changed the management of construction waste from end-of-pipe disposal to front-end recycling and achieved dual benefits of economy and environment through digital means, to achieve the goal of sustainable development.

### 3.3. The Support of Digital Tools for Green Management

The digital tool combination formed by the Cloud Building Network plays a major role in green management, covering the complete process of definition, evaluation, procurement, and tracking. People hope to use data algorithms to promote the realization of green value. At the “Defining Green” stage, AI tools translate environmental standards into dynamic system rules, enabling intelligent compliance review systems to quickly screen the green clauses in bid documents and contracts and guarantee that each transaction complies with green criteria. In terms of "Evaluating Green", the

supplier risk profiling tool integrates business, judicial, performance records, and multi-source environmental data, and combines the energy consumption and carbon emission information that suppliers need to submit to achieve cross-validation and dynamic evaluation. In the process of "Procuring Green", digital tools turn green preferences into transaction weights. The intelligent sourcing system uses natural language processing to analyze procurement needs, and the matching logic includes a green building materials library and a supplier green evaluation index. It will prioritize recommending materials that have passed green certification and high-scoring enterprises. The algorithm integrates green weights into the bidding template, prompting procurement companies to prioritize green products and generate market preference for green suppliers. In terms of "tracking green", the carbon footprint intelligent accounting system automatically matches emission factors during tracking and generates dynamic carbon labels for each batch of materials through logistics trajectories. This method combines IoT data collection with blockchain certification, transforming LCA carbon footprint calculation from manual reporting to trajectory-driven real-time generation, giving carbon data the characteristic of self-certification and trustworthiness. The Cloud Building Network combines IoT and blockchain technology to upgrade carbon footprint calculation, transforming it from manual reporting to real-time generation. Intelligent matching of carbon emissions from resource circulation has extended the boundaries of tracking. The digital tools of The Cloud Building Network utilize data governance and artificial intelligence technology to transform the green supply chain from a traditional experience-based model to an intelligent ecological model. It achieves the implementation of green standards, the realization of credit, and the measurement of carbon emissions. Ultimately, a decision loop and financial incentive system supported by real-time data were formed, resulting in a comprehensive improvement of green management.

### 3.4. Green Closed-loop Logic Throughout the Entire Process

Cloud building uses data flow to integrate the four links of definition, evaluation, procurement and tracking to establish a self-driven closed loop, so as to realize the effective management of the green supply chain. In the “Defining Green” phase, the Cloud Building translates national and industry standards into concrete rule codes, thereby ensuring the consistency of quantitative indicators in the green procurement list. This process serves as the starting point of the closed loop. In the "Evaluating Green" link, the platform allows suppliers to submit energy consumption and carbon emission data and form a dynamic green evaluation index. The index will directly affect the search ranking and financing support. Suppliers with good performance can get the endorsement of the Cloud Building green standard. Suppliers who fail to meet the standard need to accept improvement guidance, which turns green investment into a credible signal. During the "procurement" period, The Cloud Building established a green building materials library, giving priority to the promotion of materials that have been certified, and also incorporating the green weight into the bidding template, making the green attribute an important factor in obtaining orders. During the "tracking" period, The Cloud Building uses the Internet of Things and blockchain technology to dynamically monitor and verify the carbon footprint, so as to ensure the authenticity of the green commitment. The Cloud Building uses unchangeable data to ensure the openness and reliability of each stage. Finally, the feedback generated by each step promotes the continuous updating of rules and standards. Green supply chain finance uses real transaction data to provide support for financing, so as to enhance the incentive effect on green behavior. In general, Yunzhu uses digital governance to transform the green supply chain from initiative-driven to mechanism-driven, to achieve a virtuous cycle of green procurement and sustainable development.

## 4. CSCEC E-Commerce Yunzhu’s Concrete and Quantifiable Results

The scale effect of CSCEC e-commerce cloud building is very obvious, which can be seen from the transaction volume, growth rate and review participation. In 2024, the annual trading volume of Yunzhu reached 1. 6 trillion yuan, and the cumulative trading volume of the platform exceeded

10trillion yuan [11]. At present, the cumulative number of searches and demand fulfillment on the platform reaches 5million times a year, the demand for demand fulfillment is 60000 times a year, and the annual number of business opportunities on the platform exceeds 100000[12]. The platform has passed the highest level of CMMI 5v3. 0 certification in the global software field [13]. By using intelligent models and more than a dozen tools, the cloud building platform has reduced the procurement cycle by about 40% and the comprehensive cost by about 20%, becoming a new benchmark for intelligent procurement. In addition, the number of suppliers involved has reached more than 1million [14]. In November 2025, at the cop30 meeting of the 30th United Nations Climate Change Conference, The Cloud Building took the construction of green supply chain as an important means to promote the green development of upstream and downstream enterprises by assisting CSCEC to promote the development of green supply chain,and it was selected as one of the top ten cases in the development report of green and low carbon supply chain of central enterprises, which shows that The Cloud Building's green and low carbon supply chain solution has been widely recognized internationally[15].

## 5. Conclusion

The construction industry is changing from scale expansion to quality improvement. This paper selects CSCEC e-commerce Cloud Building as a case to summarize the achievements of digital transformation of the construction supply chain and green supply chain management. Relying on CSCEC's annual procurement momentum of hundreds of billions of yuan, the Yunzhu platform has turned its offline advantages into an industrial internet platform, forming a self-driven closed loop of rule definition, credit evaluation, market fulfillment, and data verification. In this way, it has achieved a higher-level revenue model — shifting from earning trade margins to generating profits from services, finance, data, and the ecosystem. The platform has formed "four green modes" in green supply chain management. "Defining Green" transforms environmental protection standards into quantifiable technical indicators and a green building materials library. Evaluating Green" forms a dynamic green evaluation index that will affect search ranking and financial credit based on the energy consumption and carbon emission data of suppliers. In the "Procuring Green" link, green weight is added to the bidding template, making the green attribute the threshold for winning the bid, to realize the value of green credit. " Tracking green" uses the Internet of Things and blockchain technology to generate tamper-proof dynamic carbon labels for bulk materials and uses the idle material recycling sub-platform to calculate the carbon reduction of resource reuse, to achieve quantifiable green recycling benefits. This model has achieved remarkable results. The annual trading volume of the platform reached 1. 6 trillion yuan, and the cumulative contract value exceeded 10trillion yuan, serving more than one million suppliers. The procurement cycle is shortened by about 40%, and the comprehensive cost is reduced by about 20%. It has obtained CMMI5 certification, and its green supply chain solution has been selected as one of the top ten cases of central enterprises on COP30 and has been internationally recognized. The research shows that digital transformation provides a quantifiable and traceable technical basis for the green supply chain, while the green idea injects a clear value of carbon reduction and resource recycling into digital. The deep integration of the two is becoming the key driving force for the construction industry to achieve the goals of "good house" and intelligent construction.

Obviously, the deep application of digital technology in the green building supply chain can have a significant impact on the green supply chain. However, the perspective of this article is relatively single, and it only describes the successful case of cloud building. Other successful and failed cases are not mentioned, and the challenges, implementation resistance or failure lessons faced by enterprises are not discussed. In the future, should continue to conduct more in-depth research on the in-depth application of digital technology in the construction supply chain in combination with more practical cases.

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