

# The Construction of Low Carbon Construction Management Mode

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**Abstract—The carbon emission of buildings is a leading indicator of building low carbon goal. This paper is based on the full life cycle as a starting point, and low carbon of buildings is established in whole life cycle management model. With five subsystems is analyzed and discussed respectively, so this guarantees the construction of low carbon management mode.**

**Keywords- low carbon; the whole life cycle; management mode**

## I. INTRODUCTION

As the global climate warming is considered as a great threat to the sustainable development of human society, many countries in the world have launched a low- carbon development strategy and measures. As carbon emissions are main sources of energy consumption, countries will develop a more operational carbon reduction targets after the expiry of first commitment period under the Kyoto protocol at the end of 2012. With requirements of low-carbon development has become more and more strong, path of carbon emission reduction experiences a gradual transition from the macroscopic management to a macro and micro combination. Low-carbon economy at present is still in the stage of enterprise exploratory action under the push of government mandatory emission reduction. While there is no mature low- carbon management mode from which enterprises can draw lessons from, "greenwash" phenomenon appeared and enterprise low- carbon management practices fell in the puzzle and difficulties. As there is a paradox between the pursuits of benefit maximization and the social responsibility of energy conservation and environmental protection. Although some scholars have tried to use "economic externality theory" and "ecology theory" to explain that paradox, the micro aspects have not yet been touched upon and the management perspectives have still left alone.

As the core content of the new institutional economics and the most important action logics , organizational legitimacy emphasizes that the evolution of organization is not only derived from the pressure of production

technology and material resources, but also from the social regulation, cultural norms, the public belief. Only when the behavior of an enterprise in a certain social structure of standard system, value system and belief system is desirable, proper, appropriate, it appears to be right for existence. If the enterprise ignores the structural elements of the institutional environment (rules, norms, beliefs , and customs, etc.), it will pay a real price or event to die. No doubt it will remedy the defect exists in the current theory to explain enterprise low-carbon management and play an important theoretical and realistic role on the ecological management research. To this end, this paper carried out the following research work: (1) Defining the concept and dimension of organizational legitimacy to build theoretical basis for the low- carbon management legitimacy ; Carding the veins of the organizational legitimacy and in view of the research deficiencies to clear the orientation of this study. (2) Exploring the construction process of enterprise low-carbon management legitimacy from the aspects of enterprise external adaptation and internal integration, building the conception model and putting forward some relevant proposition through the theoretical deduction: In the field, responses to the government laws and regulations for energy conservation and emissions reduction, reactions ill to low- carbon consumption demands help an enterprise to gain regulative, normative and cognitive legitimacy. The elements in the fields interact with each other to form a stable and lasting external legitimacy. Within the enterprise, the low-carbon consciousness?the introduction of social legal low-carbon assessment tools, the products with low-carbon characteristics till to the formation of low-carbon management ritual can help companies achieve internal legitimacy. The four dimensions do not work separately, but cooperate with each other and develop in deepening way. (3) Keywords frequency statistics and longitudinal case study are adopted to validate the concept model and some relative propositions. By keywords frequency statistics, the external legitimacy model is validated. Interactions among different dimensions are revealed and support of related propositions is verified. By longitudinal

case study, the internal legitimacy mode is validated: using discourse analysis in linguistics to classify and code the enterprise interview data and literature data, using the context diagram, causal network diagram to present the enterprise low-carbon management legitimacy process respectively and through the case copy test to verify the initial low-carbon legitimacy mode and relative propositions and at last, the paper carried on one more deepening and expanding proposition that based on organizational legitimacy: the low-carbon enterprise management mode is a kind of new commercial operation mode, the enterprise can improve resource productivity and customer loyalty to reduce costs, improve market share and gain considerable profit. Through the case enterprise's financial data and low-carbon performance to prove, it has solved the paradox between the enterprise economic performance and low-carbon management. (4) According to the essence of legitimacy diffusion and imitation, it proposed that enterprises in China can imitate the benchmarking enterprise low-carbon management mode in the field level and formulate the realization path accordingly.

Construction industry consumes large amounts of natural resources and at the expense of heavy environmental negative influence. Our country building energy consumption accounted for 30.2% of the total energy consumption for the whole society. According to the statistics that building activity using the natural resources of human use 40% of the total, and 40% of the total energy, and the construction waste caused by accounting for 40% of the total waste generated in the human activity. In the process of building construction, using and destruction of energy consumption and the processing of solid wastes will bring enormous greenhouse gas emissions. Construction of greenhouse gas is expected to account for 25% of the emissions in the whole society in 2030. Therefore, intensify efforts to the construction of low carbon construction management is imminent.

## II. THE DEFINITION OF LOW CARBON CONSTRUCTION MANAGEMENT MODE

Low carbon construction management mode, then refers to low energy consumption, low pollution, low emission and the target on the basis of the management mode. Its essence is the efficient utilization of resources and the pursuit of low carbon GDP (gross domestic product (GDP)). The core is the resource and emission reduction technology innovation, organizational structure and institutional innovation and fundamental change of human survival and development concept. Essence is energy saving low carbon efficient management style. Low carbon management compared with other traditional management ideas have their own basic features: (1) Low carbon management is the process of project operation organization operation mode and the organic integration of low carbon technology system. (2) Low carbon management goal is to make low energy consumption low emissions of sustainable architecture. (3) Low carbon management is the basis of managers' consciousness and the staff of the low carbon culture atmosphere.

## III. THE CONSTRUCTION OF LOW CARBON CONSTRUCTION MANAGEMENT MODE

Although, low carbon energy became a hot issue of research around the world, but the theory of low carbon building research is still in its infancy. It is relatively weak, and the theoretical basis of the low carbon buildings did not form a scientific and complete system. With traditional project management models of low carbon buildings a series of problems existing in the construction and management, such as lack of professionalism, increase project management span, management of pressure increases, the risk is too big, etc. In view of the low carbon building in construction management problems that exist in the process, should be in the life cycle as a starting point, the whole life cycle of low carbon construction management mode is established. This plans a whole the whole project at various stages of low carbon construction management, and clear tasks at various stages of construction. So it ensures consistency, and the goal of construction of the systematic construction process. At the same time introducing the professional third party to carry out collaborative management, to provide technical and management support, reducing the pressure of the management of the project owner. When necessary, the risk of low carbon can be special engineering transfer, and on the basis of "turnkey" passed on the risk of low carbon construction. After Construction parties select project owner investment intention, with appropriate qualifications entrusted by the consultants to carry on the feasibility. The argument should focus on the energy saving potential of the project. After argument feasible project, project owner should according to the requirements of the project positioning, energy conservation and emission reduction of the overall general goal of low carbon construction is put forward, and entrust the multiple consulting unit to do low carbon planning in detail, the overall goal decomposition. The low carbon management for a variety of decomposition scheme for energy-saving evaluation is selected the optimal solution, and the optimal scheme of the provider shall be rewarded.

After low carbon construction planning is passed, and the project can start. At the beginning of project low carbon construction management should provide more low carbon construction scheme to the project owner, and project owner can choose these solutions, and can choose the most suitable for the project plan. Scheme and construction drawing design shall be carried out under the supervision of the government. After the completion of the construction drawing design, should organize the parties and the blue prints. The design project is responsible for answering questions and difficult point should be specified by the designer. After reviewing, low carbon management should be evaluated for energy saving. On the use of low carbon technologies of construction scheme and construction drawing scores and the public, meet the requirements after commencement permission. After put into operation at the end of the acceptance of work, low carbon management should take energy conservation monitoring, building energy consumption of the actual data collection/analysis, and adjusting system operation

condition. The equipment of energy conservation and emissions reduction effect is adjust to the optimal, formulate long-term energy conservation and emissions reduction operation system, and prepare the operation adjustment strategy, energy conservation and management system. Carbon emissions monitoring data collected and sorted, and low carbon construction effect analysis. The cause of the actual effect occurs deviation is found out.

#### IV. LOW CARBON BUILDING MANAGEMENT MODEL OF CONTENT ANALYSIS

Look from content, low carbon building management mode can be regarded as a big system, including management by objectives, technical guarantee, organization guarantee and low carbon energy saving effect evaluation and low carbon culture construction four subsystems.

##### A. *Low carbon building target management subsystem*

Low carbon construction management by objectives is the low carbon construction as part of system engineering. In particular, the leadership develop low carbon construction total target of new project, according to the specific situation of the project, energy conservation and emissions reduction requirements. On the basis of the evaluation more adequately, then show me alone and decomposition, elaboration to each department and each member, make its related has clear, and the leadership formulate measures to guarantee organizations and individuals to complete the target. In order to form a scientific and reasonable process, and low carbon construction objectives of multi-level management system.

##### B. *Specification subsystem*

Supervision system of guarantee from the perspective of a third party, the project quality objective supervision, to strengthen the supervision of quality forming process and management. When the government shall exercise macro-regulations and control over the engineering field, we should speed up the implementation of supervision system, and to improve the construction project supervision. At the same time the supervision system of the supporting measures is perfected, and the supervision of legal system of the assessment of constraints is strengthened. Meanwhile supervision of personnel qualification examination is strengthened.

In order to ensure to achieve the goal of construction of low carbon, a perfect management system is needed to establish. The members of the group clear division of labor and purview division, and the corresponding standard subsystem to ensure that its effective operation. Restriction specification subsystem should include the following contents: (1) A low carbon management organizations is indispensable to the successful implementation, and efficient operation of management system has a distinct organizations. To ensure to achieve the goal of construction of low carbon, you first need a everyone individual low carbon management organizations, and then

the sufficient financial support to back it up. If low carbon management organization is not sound, there is not guarantee that involved in the participation of personnel responsibilities clear. Every other low-carbon work is impossible, and it cannot implement.(2) The construction of low carbon low carbon target responsibility system management organization is established and improved and implemented. Boundaries to participate in the management of personnel responsibilities and rights are particularly important. Each post operation personnel must have clear low carbon construction operation procedures and related responsibilities. Low carbon construction target responsibility system as the indispensable an integral part of the post responsibility system, the purpose is to ensure that rules and regulations implement construction of low carbon. A sound is established at low carbon construction as the center of the target responsibility system low carbon construction management system.

##### C. *Technical support subsystem*

In order to ensure to achieve the goal of construction of low carbon, it is necessary to establish the corresponding technology principle and application procedures, namely technical support subsystem. The main content is to low carbon construction plan formulation and implementation management. A project to achieve the goal of construction of low carbon depends largely on the early stage of the plan and the formulation, and a good plan will make the whole project basis and guidance for the construction of low carbon. Of course, the implementation of good management is also in the process of low carbon construction scheme to implement low carbon construction target and guarantee. Technical protection measures, therefore, is one of the most important in the process of low carbon construction parts.

##### D. *Effect evaluation subsystem*

Effect evaluation about low carbon building on the one hand is to complete the part of low carbon construction effect assessment. It ensures its maintain small deviation with the goal of low carbon, and reach the standard of low carbon energy saving of the our country related. On the other hand carbon emissions monitoring system measure the actual carbon emissions in different stages of the project, comparing with planning objectives, and it is concluded that the actual effect of low carbon construction. In addition, through the simulation and evaluation of energy saving effect operating period, and optimize the structure of equipment use and energy use, realizing the maximization of operating costs and energy loss and minimize carbon emissions.

Research on low carbon construction project management pattern in the development of our country is still in its infancy, and abroad relatively perfect low carbon management system and screening criteria and tools are still a certain gap. With the development of energy saving low carbon buildings, our country also have noticed that the construction project investment and financing. That is very necessary, the importance of energy saving and

emission reduction of housing and urban-rural development has explicitly put forward that the introduction of carbon emissions trading is a means of promoting building energy efficiency. The next step should be to continue construction of carbon trading policy and method of research, and realize the construction of low carbon and efficiency.

## V. CONCLUSION

Through the above research work, the main research conclusions of this study include: (1) The formation of low carbon enterprise management mode is the enterprise from the perspective of legitimacy is a process of internal integration and external adaptation. (2) About the field level, the legitimacy of the enterprise low carbon management is formed in an order of regulative legitimacy — normative legitimacy — cognitive legitimacy. (3) As for the construction of internal enterprise low-carbon management builds in an order of low-carbon consciousness — rating system service-oriented production — low carbon management ritual. (4) As cognitive legitimacy is deepest level in the organizational field, there leaves spaces for further verification about whether enterprise low carbon management is really reached the affinity of beliefs and values with the outside world. (5) Low-carbon management ritual is a continued activation process, the formulation of which should experience a long term with the cognitive schemata, low-carbon action framework, low-carbon production process and low-carbon product design. (6) Based on organizational legitimacy, low-carbon enterprise management is a kind of new commercial operation mode, which can effectively solve the paradox between the enterprise economic performance and the low carbon management. (7) Benchmarking imitation is an effective form for the legitimacy diffusion

and realization of low-carbon management legitimacy in China.

## REFERENCES

- [1] Maxwell J. A., & Miller, B. A. *Categorization and Contextualization as components of qualitative data analysis* [M]. Cambridge, MA: Harvard University, Graduate School of Education.
- [2] Marguerat, D. and G. Cestre. *Determining Ecology-related Purchase and Post-purchase Behaviors Using Structural Equations* [J]. Institut Universitaire de Management International (IUMI), Working paper, 2014.
- [3] Khanna, Tarun and Krishna Palepu. *The Future of Business Groups in Emerging Markets: Long-run evidence from Chile* [J]. *Academy of Management Journal*, 2010(43): 268-285..
- [4] Konar, S., & Cohen, M. A. *Information as regulation: The effect of community right to know laws on toxic emissions*. *Journal of Environmental Economics and Management*, 2010(32):109-124.
- [5] Knut F. Kroepelien. *Extended Producer Responsibility — New Legal Structures for Improved Ecological Self-Organization in Europe* [J]. *Review of European Community & International Environmental Law*, 2011 (02):165-177
- [6] Marilyn T. Lucas. *Understanding Environmental Management Practices: Integrating Views from Strategic Management and Ecological Economics* [J]. *Business Strategy and the Environment*. *Bus. Strat. Env.* 2009(19):543-556.
- [7] Meyer, J. W. & Rowan, B. *Institutionalized organizations: Formal structure as myth and ceremony* [J]. In W. W. Powell & P. J. DiMaggio (Eds.), *The new institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991. 41-62.
- [8] Mizuchi, Mark S. and Lisa C. Fein. *The Social Construction of Organization Knowledge—A Study of the Use of Coercive, Mimetic, and Normative Isomorphism* [J]. *Administrative Science Quarterly*, 2010(44):653-683.
- [9] Nickson, Jack A. and Brian S. Silverman. *Why Firms Want to Organize Efficiently and What Keeps Them from Doing So: Inappropriate Governance, Performance, and Adaptation in a Deregulated Industry* [J]. *Administrative Science Quarterly*, 2011 (48): 433-465
- [10] Pfeffer, J. *Management as symbolic action: The creation and maintenance of organizational paradigms* [J]. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior*. Greenwich, CT: JAI Press, 1981/2011(13): 1-52.