

Research on Laws and Regulations of Sustainable Construction in China

Wei Zhang and Jing Dong

Abstract—This paper introduced the status quo of laws and regulations of sustainable construction in China and investigated the existing problems of current laws and regulations through person-interviews in Beijing, Shanghai, Chongqing and Shenzhen in China. The problems include incomplete legal system, lack of guidance of higher-level laws, backward in some laws and regulations, unclear legal liability and poor law enforcement. Aimed at these problems, this paper also put forward some improvement approaches, such as filling the legal gap, revising laws and regulations, establishing incentive system and keeping pace with level of development.

Keywords—Improvement, laws and regulations, status quo, sustainable construction

I. INTRODUCTION

COMPARED with developed countries, there are more barriers in developing countries when implementing the sustainable construction [1]. More seriously, 60%-70% of the population of developing countries will migrate to the cities in the future, thus the energy issue will be very prominent [2]. Therefore, Kats [3], W.K. Chow and C.L. Chow [4] believed that developing countries should be much more responsible for the development of sustainable construction.

The Chinese construction industry has developed into one of the largest markets in the world, completing a value added of construction at Renminbi (RMB) 1.87 trillion (about US\$285.3 billion) at 2009 and accounting for approximately 6.6% of the gross domestic product (GDP) [5]. Nevertheless, the performance of sustainable construction has not been good in the past ten years, and the unit energy consumption in China has reached 2-3 times higher than that in developed countries [6]. In recent years, Chinese government has attached importance to the development of sustainable construction and has formulated corresponding laws and regulations to promote its development. However, the sustainable construction is not well-implemented in China due to the imperfect legal system [7]. Therefore, the objective of this paper is to identify the existing problems that affect development of sustainable construction in China, from the perspective of professionals. These factors, if not handled properly, may be detrimental to the development of sustainable

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construction. The results will provide useful information for practitioners, researchers, and policy makers that are responsible for devising ways to promote the development of sustainable construction and improving the understanding of Chinese construction industry for foreign professional.

II. STATUS QUO

The Chinese construction legal system can be divided into five tiers, namely laws, administrative regulations, departmental rules, local regulations and local department rules, which are approved by the Standing Committee of the National People's Congress, State Council, Ministries, Standing Committee of People's Congress at local level and Departmental Commissions at local level respectively.

A. Laws of Sustainable Construction

The laws of sustainable construction are the social regulations which are implemented nationwide with the state power. The legal effect of laws is higher than administrative regulations, department rules, local regulations and local department rules, while lower than Constitution of People's Republic of China. Table I illustrates the laws of sustainable construction.

B. Administrative Regulations of Sustainable Construction

The legal effect of administrative regulations is lower than laws, while higher than department rules, local regulations and local department rules. Administrative regulations of sustainable construction are described in Table II.

C. Department Rules of Sustainable Construction

As can be seen in Table III, department rules of sustainable construction are regulatory documents, adjusting the management of implementing sustainable construction, which can be only applied to this field to provide basis for related department.

D. Local Regulations and Local Department Rules

Local regulation and local department rule are only applicable in the appointed region without violating the existing laws and regulations. There are considerable local regulations and local department rules in China, so they are not listed in this paper.

III. METHODOLOGY

To identify the problems of laws and regulations of sustainable construction, interviews were taken to investigate in this study. The respondents were asked about two questions:

TABLE I
 LAWS OF SUSTAINABLE CONSTRUCTION

Laws	Date of implementation	Remarks
<i>Environmental Protection Law of the People's Republic of China</i>	1989.12.26	Measures of supervision and management of the government, environment protection and improvement from a macro perspective, and legal liability are included.
<i>Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise</i>	1997.3.1	Prevention and control of environmental noise in construction is in Chapter IV.
<i>Laws of the People's Republic of China on the Prevention and Control of Atmospheric Pollution</i>	2000.9.1	Measures of supervision and management of atmospheric pollution and related legal liability are mentioned in some parts of the articles.
<i>Cleaner Production Promotion Law of the People's Republic of China</i>	2003.1.1	Implementation, inducement measures and legal liability of clear production in construction are mentioned in some parts of the articles.
<i>Law of the People's Republic of China on Evaluation of Environmental Effects</i>	2003.9.1	Evaluation of environmental effects in construction projects is clearly stipulated in Chapter III.
<i>Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste</i>	2005.4.1	Related measures of prevention of environmental pollution caused by solid waste in construction projects are stipulated in Chapter III.
<i>Law of the People's Republic of China on Energy Conservation</i>	2008.4.1	Related measures of rational energy utilization in construction are mentioned in sector 3, Chapter III.
<i>Law of the People's Republic of China on Prevention and Control of Water Pollution</i>	2008.6.1	Prevention measures and penalty of water pollution in new construction projects and expansion or reconstruction projects are mentioned in parts of the articles.
<i>The Circular Economy Promotion Law of the People's Republic of China</i>	2009.9.1	Measures and legal liability of decrement and recycling are mentioned in parts of the articles.

TABLE II
 ADMINISTRATIVE REGULATIONS OF SUSTAINABLE CONSTRUCTION

Administrative Regulations	Date of implementation	Remarks
<i>Regulations of the People's Republic of China on Prevention and Cure of Ambient Noise Pollution</i>	1989.12.1	Prevention methods of noise in construction are stipulated in Chapter IV.
<i>Regulations on the Administration of Construction Project Environmental Protection</i>	1998.11.29	Environment impact evaluation, methods of environment protection in construction and legal liability are mentioned.
<i>Regulations on the Administration of Construction Project Production Safety</i>	2004.2.1	Safe liabilities and legal liabilities of client, designer, supervisor and contractor are included respectively.
<i>Regulations on Energy Conservation of Civil Building</i>	2008.10.1	Methods of energy conservation in civil buildings and legal liability are stipulated.
<i>Regulations on Evaluation of Environmental Effects</i>	2009.10.1	Measures of environment evaluation and supervision are mentioned in parts of the articles.

TABLE III
 DEPARTMENT RULES OF SUSTAINABLE CONSTRUCTION

Departmental Rules	Enacted Department	Date of implementation	Remarks
<i>Stipulation for Environment Protection Design of Construction Project</i>	National Development and Reform Commission; Environmental Protection Committee of the State Council	1987.3.20	Measures of environment protection in design phase of construction projects.
<i>Stipulation for Management of Urban Construction Garbage</i>	Ministry of Housing and Urban-Rural Development of the People's Republic of China(MOHURD)	2005.6.1	Disposal activities of construction garbage such as discharge, transport, backfill and utilization are mentioned in the provisions.
<i>Technical Guidelines for Green Building</i>	MOHURD and Ministry of Science and Technology of PRC	2005.10.27	Indicator system and techniques in design, construction and operation of green building are included.
<i>Stipulation for Energy Conservation Management of Civil Building</i>	MOHURD	2006.1.1	Related measures of energy conversation in planning, design, construction and operation are mainly focused.
<i>Measures on Supervision and Management of Conservation Quality in Civil Building</i>	MOHURD	2006.7.31	Liabilities and obligations on energy conservation of client, designer, supervisor and contractor are mentioned respectively in construction.
<i>Green Construction Guidelines</i>	MOHURD	2007.9.10	The principles and application of green construction are included.

“What are main problems of current laws and regulations of sustainable construction in China? Why?” and “How to improve these laws and regulations?”

The interviewees were professionals and officials in the

construction industry drawn from four typical cities in China: Beijing, Shanghai, Chongqing and Shenzhen. A total of 40 interviewees (10 interviewees from each of the four cities) selected from government officials of construction department,

the First Class client, design firm and contractor who would be able to form opinions from a more profound viewpoint. In term of qualification class, Chinese client, design firms and contractor are ranked, according to their (1) registered capital, (2) throughput, (3) previous performance, (4) technological staff, (5) technological facilities, and (6) fixed assets. The ranking system has four classes: First Class, Second Class, Third Class, and Fourth Class. The Chinese construction industry has been using a qualification management approach pursuant to which only qualified contractors can enter a certain segment of the construction market. First Class client, design firm and contractor which are leading in the Chinese construction market, are stronger in capacity compared with Second Class, Third Class, and Fourth Class. Given the geographic position, economic status, and overall demographics of the four cities identified previously, the results are generally viewed as representative of the whole country. Table 4 indicates the demographic information of response, and Fig. 1 shows the professions of the interviewees.

TABLE IV
 DEMOGRAPHIC INFORMATION OF RESPONSE

	Beijing	Shanghai	Chongqing	Shenzhen
Client	3	3	3	3
Design firm	2	2	2	2
Contractor	3	3	3	3
Construction department	3	3	3	3
Total	10	10	10	10

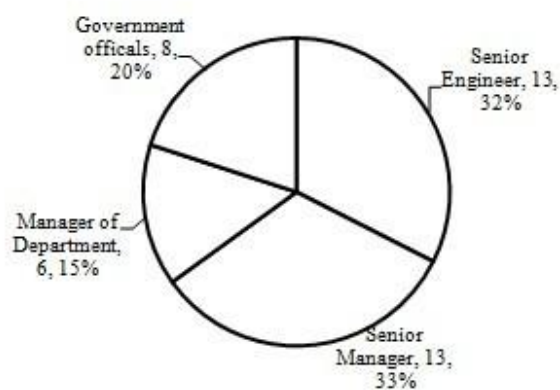


Fig.1 Professions of interviewees

IV. PROBLEMS OF CURRENT LAWS AND REGULATIONS

The existing problems of laws and regulations of sustainable construction in China are presented through the interviews as follows.

A. Incomplete Legal System

In the interview, 95% of the interviewees mentioned the current legal system of sustainable construction is incomplete.

On one hand, there is no specific law on sustainable construction. The current laws and regulations used in implementing sustainable construction are related laws on the fields of environment protection, energy conservation and

resource etc. As shown in Table 1, the articles of sustainable construction are scattered in those laws, which is inconvenient for both law executors and construction companies.

One the other hand, the current legal system mainly focused on the control of the production process and the disposal of pollutants. There are almost no laws and regulations of sustainable planning and design. As a result, the thinking of “control from the source” can not be reflected from the current laws and regulations, which are short of legal guidance during the whole construction lifecycle.

B. Lack of Guidance of higher-level laws

90% of the interviewees considered that it is not easy to implement the higher-level laws in practice due to the theoretical provisions. The specific provisions and measures used in implementing of sustainable construction are quite short. Although some rules or measures formulated by construction department are operational, they could not constrain construction companies effectively by reason of lower legal status and less legal effect.

What’s more, the lower-level laws such as administrative regulations and department rules are lack of the supports from higher-level laws. That is to say, some provisions in administrative regulations or department rules are not mentioned in relevant laws. Take two high-level laws for examples, articles on sustainable construction has not been involved in *Construction Law of the People’s Republic of China*, the basic law of construction activities and its supervision, because the law is legislated earlier. Similarly, *Environment Protection Law of the People’s Republic of China* emphasizes environment protection in the field of industry and there are no direct and specific points on construction.

C. Backward in Some Laws and Regulations

75% of the interviewees referred to the backwardness of some laws and regulations. Some of laws and regulations related to sustainable construction were made under the ground of planned economy in the past, which are not correspond to the development of sustainable construction in socialist market economy. For example, new environment pollution such as light pollution of building has not been mentioned in *Environment Protection Law of the People’s Republic of China* which is promulgated in 1987. The thinking of “sustainability” has not been involved in *Construction Law of the People’s Republic of China* while its legislative intent is to strength supervision and regulation of construction activities and to ensure the quality and safety of construction projects.

D. Unclear Legal Liability

75% of the interviewees indicated that some of the articles in laws and regulations only focused on measures of sustainable construction without related legal liability, leading to hard to achieve the purpose of the laws and regulations. Moreover, pollution and deconstruction of the natural environment by illegal activities are special kinds of infringement, but there are no provisions in connection with the penalties of these activities

in Criminal Law, Administrative Procedure Law etc. Besides, the legal liability in current laws and regulations is quite ambiguous. It is unclear on what the legal liability is and how to hold responsible parties accountable.

E. Poor Law Enforcement

65% of the interviewees deemed the law enforcement is too poor to arouse the enthusiasm of construction enterprises. The reason is mainly manifested in two aspects below. Firstly, current laws and regulations are often stipulated from the lowest requirement of sustainable construction without quantitative standards. Secondly, the absence of severe penalties to illegal activities leads to the fact that the penalties caused by illegal activities are less than the cost of low-abiding activities. Many respondents in construction companies pointed out frankly that the cost of facilities and personnel will be increased when implementing sustainable construction and the added cost is even higher than the penalty.

V. IMPROVEMENT OF LAWS AND REGULATIONS

To solve the problems of laws and regulations of sustainable construction presented above, this paper tries to establish a legislative framework of sustainable construction in China based on the interview, as shown in Fig. 2.

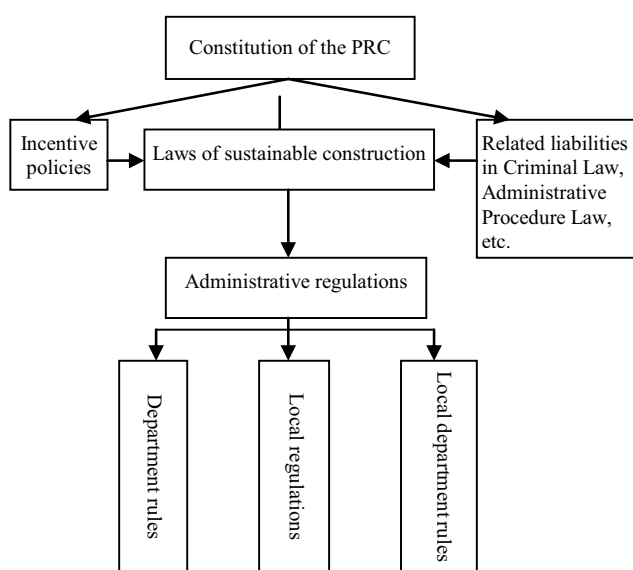


Fig. 2 Legislative framework of sustainable construction in China

A. Filling the Legal Gap

Sustainable construction system of projects includes planning, design, procurement, construction, operation and disposal [8], whereas the main target of each phase is different. To solve the problem of absence of laws and regulations of sustainable planning and design, the legislature needs to fill the legal gap in these areas. Making related laws and regulations in every phase of construction is required to formulate a law chain of sustainable construction during the whole process of construction.

B. Revising Laws and Regulations

In order to promote the provisions of sustainable construction, some of the laws, regulations and department rules should be revised.

The revision of laws and regulations of sustainable construction should begin with the higher-level law. First, the articles of sustainable construction should be added in *Construction Law of the People's Republic of China*, including making clear the obligations and legal liabilities of supervisor of sustainable construction and all parties in construction projects and so on. Second, expand the adjustment scope of *Environment Protection Law of the People's Republic of China* and take measures of sustainable construction in as one of the key objects adjusted. Third, related liabilities and penalties are suggested to be added in *Criminal Law of PRC*, *Administrative Procedure Law of PRC*, and *Law of PRC on Penalties for Administration of Public security* etc.

The specific administrative regulations on sustainable construction are required to be made as soon as possible, as they can be implemented nationwide and the difficulty of legislation is relatively less. Additionally, administrative regulations could avoid the disadvantage that the authorities only promulgated policies according to the need of one department.

The department rules revised should be more clear, scientific and operational based on sustainable construction characteristics. The provisions on legal liability of sustainable construction need to be strengthened as to the problems of unclear legal liability. Enhance the penalty in time according to the development of economy.

C. Establishing Incentive System

Legal system as the compulsory means of sustainable construction needs to be coordinated with incentive policies to promote the implementation of sustainable construction. The governments of developed countries such as United States, Japan and Germany have promulgated related laws, regulations or policies to reward the company which implemented sustainable construction [9]. Chinese government could learn from the experience of developed countries and offer some economic benefits such as low-interest financing and tax relief to those construction companies.

D. Keeping Pace with the Level of Development

The content of laws and regulations is required to reflect the level of development of sustainable construction. Renew and take feasible measures in laws and regulations to avoid the backwardness. At the same time, provisions which are difficulty to be implemented in sustainable construction through current technologies should not be included in the laws and regulations either.

VI. CONCLUSIONS

Laws and regulations play an important role in promoting the development of sustainable construction in China. This paper proposed some improvement measures to solve the problems of current laws and regulations of sustainable construction, which

can be a reference when legislating or revising laws and regulations of sustainable construction. Moreover, relevant departments in government should ensure the legal effect through effective supervision and management.

REFERENCES

- [1] C. du Plessis, "Agenda 21 for sustainable construction in developing countries," in *Report for CIB and UNEP-IETC*, Pretoria, 2005, pp. 1-4.
- [2] N. W. Alnaser and R. Flanagan, "The need of sustainable buildings construction in the Kingdom of Bahrain," *Building and Environment*, vol. 42, pp. 495-506, Aug. 2007.
- [3] G. H. Kat, *Green building costs and benefits*, United States: Massachusetts Technology Collaborative, 2003.
- [4] W. K. Chow and C. L. Chow, "Evacuation with smoke control for atria in green and sustainable buildings," *Building and Environment*, vol. 40, pp. 195-200, July 2005.
- [5] National Bureau of Statistics of China, *China Statistical Yearbook 2010*. Beijing: China Statistics Press, 2010.
- [6] B. X. Qiu, "Developing energy-saving and green buildings: an urgent task in China," *Architecture Technology*, vol. 36, no. 3, pp. 168, Mar. 2005.
- [7] K. X. Sha, X. H. Deng and C. B. Cui, "Sustainable construction in China: status quo and trends," *Building Research and Information*, vol. 28, no. 1, pp. 59-66, Jan. 2000.
- [8] Q. Shi, *Sustainable Construction and Management*, Shanghai: Tongji University Press, 2007, pp. 8-10.
- [9] X. C. Yao, *Construction and Environment Protection*, Beijing: China Architecture and Building Press, 2005, pp. 39-42.