Research on Construction of Standard System for Development of Green Economy in Hainan Province

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Abstract. The research on green system in Hainan Province aims to analyze the development trends, standardization status and problems in related fields at home and abroad by investigating the policy mechanism and pilot operation of ecological civilization construction and sustainable development and the standardization in green development fields in China and abroad. This paper further integrates the local practice of green development standardization with the international development trends, puts forward the strategic positioning and layout of standardization in support of ecological civilization construction and green development in Hainan. This paper studies and builds a green standard system that is compatible with the national ecological civilization pilot zone by focusing on key industries in Hainan, clarifies the connotation, boundary and main contents of the standard system for development of green economy in Hainan by study, and also prepares green standard system tables for Hainan, proposes a list of standards adopted and a list of missing standards to form a catalogue of key standards, thus accelerating the establishment and improvement of the standard system for development of green economy in Hainan.

1. Introduction

Ecological environment is the biggest advantage and lifeline in Hainan. Hainan is committed to building green and low-carbon characteristic industrial systems such as modern service industry. Green development is an important choice for the reform and development of Hainan and is of great significance to the construction of a free trade zone and a free trade port in Hainan. This paper studies the construction of a green standard system that is compatible with the national ecological civilization pilot zone, promotes Hainan to implement a standardization strategy by focusing on green development, implements the requirements in core documents of ministries and provincial governments for ecological civilization construction and quality improvement, builds a sound green standard system, strengthens the formulation and implementation of standards in key areas of green development, gives full play to the basic, strategic and leading role of standardization to provide a full range of standard support for the formation of a new pattern of harmonious development between man and nature and to take important steps to promote ecological civilization in Hainan [1-3].

2. Process Research Method for Standard System

The standard system for development of green economy is a multi-field, multi-industry, and multi-link comprehensive system involved in the green development of national economy. The ecological civilization construction and green development in Hainan should involve the twelve priority...
industries such as agriculture, industry and service industry. The standard system should be refined for different objects in terms of pollution and prevention and response to climate change. The development of green economy is a process involving planning, technology, management and evaluation. The green standard system should be refined according to technology, management and other links [4-6].

The above analysis indicates that the standard system for development of green economy can be divided into such sub-systems as green efficient tropical agriculture, ecological forestry, emerging green industry, green energy, green service industry, ecotourism and characteristic marine economy. These standard sub-systems are further classified by industry and link according to the main objectives of the Guiding Opinions on Supporting Hainan's Comprehensive Deepening of Reform and Opening-up.

3. Composition of Standard System Framework for Development of Green Economy in Hainan Province

3.1. Sub-system of standards for efficient tropical agriculture
This standard sub-system is further classified into ecological crop cultivation, healthy livestock breeding, agricultural facilities and mechanization, agrotechny, animal and plant disease and pest control, ecological circular agriculture and others relying on Hainan's agricultural advantages and characteristic industries with the goals of ecological civilization construction and objective agricultural development to highlight Hainan's agricultural characteristics. See figure 1.

3.2. Sub-system of standards for ecological forest
Standards are developed in terms of forest seedling cultivation, forestry engineering and production, forest products, forestry equipment, and integrated forestry management in the context. Standards for forestry seedling cultivation involve seedling cultivation technology and seedling quality. Standards for forestry engineering and production involve afforestation and management technologies. Standards for forest products involve wood and wood products, including wood, artificial boards, and wood products. Standards for forestry bioindustry involve biomass materials and energy. Standards for forestry equipment involve forestry harvesting machinery and wood processing machinery; standards for integrated forestry management involve certification and law enforcement and supervision. See figure 2.
3.3. Sub-system of standards for emerging green industry
This sub-system of standards for emerging industry mainly includes the standards for industrial energy and water conservation, industrial resource recycling, and green evaluation based on the development of green industry in Hainan to highlight the green transformation of traditional industry and the cultivation of emerging high-end manufacturing. Standards for industrial energy conservation involve total energy consumption control and energy consumption intensity control; standards for industrial water conservation involve total water consumption control and water resource consumption intensity control; standards for industrial resource recycling involve waste recycling, reuse, remanufacturing, and resource utilization; standards for green evaluation involve industrial green products, enterprises, parks, and supply chain. See figure 3.

3.4. Sub-system of standards for green energy
Green energy standardization is a very complex and huge system engineering, covering all aspects of society such as energy development, production, circulation, use, and consumption. The construction of green energy standardization system is to plan the green energy standardization comprehensively, systematically and effectively for the realization of scientific, orderly and efficient development, thus guiding the construction of green energy standardization at a macro level. The sub-system of standards for green energy is further classified into nuclear power generation, natural gas power generation,
regional energy, solar energy, biomass energy, hydrogen energy, ocean energy and geothermal energy based on Hainan's energy status and development trends and according to its geographical location and spatial distribution characteristics. See figure 4.

3.5. **Sub-system of standards for green transport**

The sub-system of standards for green transport in Hainan covers infrastructure, transportation construction and operation, green logistics, marine transportation, and clean energy vehicle application. Infrastructure standards mainly involve urban slow traffic, urban electric vehicle charging and replacement piles, urban electric vehicle charging piles, and urban hydrogen refueling stations; standards for transportation construction and operation mainly involve green highways, public transportation, airports and railways; standards for green logistics mainly involve green cargo and transportation enterprises; standards for marine transportation mainly involve green ports and waterways. Standards for clean energy vehicle application involve new energy, natural gas and hydrogen fuel vehicles. See figure 5.

3.6. **Sub-system of standards for green finance**

The sub-system of standards for green finance in Hainan covers basic general standards and those standards for green investment, financing and third-party assessment and verification. Basic general standards mainly involve terms and definitions, environmental performance assessment and calculation, green financial information exchange, and environmental risk management; standards for green investment mainly involve green financial institutions, green financial products, monitoring statistics, process management, and personnel team; standards for green financing mainly involve green financing enterprises, green financing projects and assets, assessment and verification, and
process management; standards for third-party assessment and verification involve personnel, institutions and implementation processes. See figure 6.

Figure 6. Sub-system of Standards for Green Finance

3.7. Sub-system of standards for ecotourism
As a new type of sustainable tourism with multiple good functions, ecotourism is an inevitable choice to realize the sustainable development of Hainan tourism. This standard sub-system is further classified into ecotourism resources, facilities and services as well as supporting systems. Standards for ecotourism resources mainly involve ecotourism resource planning, development and protection. Standards for ecotourism facilities focus on meals, accommodation, travel and entertainment, mainly involving port ecotourism catering, accommodation, ecotourism area traffic, ecotourism spots, entertainment and products. Standards for ecotourism services mainly involve tourism service quality control, tourism service performance evaluation, scenic spot rating, catering and accommodation quality evaluation. Standards for supporting system mainly involve tourism public facilities construction, tourism safety and ecotourism information services. See figure 7.

Figure 7. Sub-system of Standards for Ecotourism

3.8. Sub-system of standards for marine economy
The marine economy in Hainan is mainly supported by three traditional industries of marine fishery, transportation and tourism. This standard sub-system mainly covers modern fishery, marine transportation, marine tourism and other aspects of marine economy.
Modern fishery mainly involves aquaculture, fishing, processing, proliferation and recreational fishery. Standards for marine transportation mainly involve port construction and management, ocean transportation services and management. Standards for marine tourism mainly involve coastal vacation projects, offshore water sports and cruise tourism. The other aspects of marine economy mainly cover marine oil and gas development and utilization, marine engineering equipment manufacturing, seawater comprehensive utilization, marine minerals, and tropical marine ranching according to relevant requirements for the development status and trend of emerging industries in Hainan. See figure 8.

Figure 8. Sub-system of Standards for Marine Economy

4. Conclusion
The standards for green economy in Hainan have not yet formed an organic whole as they are scattered among different standard systems by industry and specialty. The inadequate research on some standards in the early stage results in unscientific or repetitive contents, which is not conducive to the implementation. This paper focuses on the construction of a free trade zone and a free trade port with Chinese characteristics, gives play to the ‘three advantages’ of ecological environment, special economic zone and international tourism island, implements standardization strategy aiming at green development, builds a sound green standard system that is compatible with the national ecological civilization pilot zone.

This paper systematically analyzes the foundation, principles, environment and elements of the standard system for development of green economy in Hainan, establishes a standard system that is beneficial to the green economy and forms a list of standards by means of ‘keyword search’ and list analysis, and constructs a basic standard system formwork that is beneficial to the green economy in terms of efficient tropical agriculture, ecological forestry, emerging green industry, green energy, green service industry, ecotourism and characteristic marine economy. The above 8 sub-systems are further classified into 41 aspects focusing on the key objects covered, thereby constructing a three-level standard system framework with a view to providing technical support for green development and ecological civilization construction in Hainan.

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