

Construction and Application of Green Building Materials Evaluation System Based on Internet Technology

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Abstract—The rapid change and application of modern Internet technology has realized the "secondary development" of various industries and fields in the whole society. In the introduction of the Internet technology to the evaluation of green building materials and build up the evaluation system, to unify various elements of the evaluation criteria, evaluation of give attention to two or more things and features of Internet technology application platform, implement system of green building materials system efficient, convenient application, for the current social development of green building materials industry and green building construction to provide effective service support, promote green consumption upgrade, speed up the construction of ecological civilization. It is an important measure to effectively promote energy conservation and environmental protection, economic and social development in China.

Keywords-Internet technology; Green building materials; Evaluation system

1 Introduction

With the rapid development of China's social economy, great achievements have been made in infrastructure construction and urbanization. Behind the brilliant achievements, it is not difficult for us to find that the building materials industry has also gained great development space, and has become one of the pillars of the development of China's national economy. At the same time, the extensive development of building materials industry in the past has gradually shown disadvantages, especially the present demand for building energy conservation, green building and environmental protection building, prompting the building materials industry to carry out technical innovation and product upgrading. Green building materials have become the basic requirements of current engineering construction and people's life, and are the key to driving green consumption, guiding green development, promoting structural optimization and accelerating transformation and upgrading. [1] In the practical application process, due to the differences in the certification and evaluation standards and methods of green building materials, the evaluation system of green building materials is not perfect, and the information asymmetry directly affects the use and promotion of green building materials. Under the application of Internet technology, the construction of green building materials evaluation system is realized by building a green building materials information management platform. Therefore, on the one hand, unified evaluation and labeling, standardized certification process, on the other hand, reduce enterprise institutional transaction costs and improve the popularization of green building materials.

2 Green building materials

2.1 Summary

Green building materials refer to the building materials which can reduce the consumption of natural resources and reduce the impact on ecological environment in the whole life cycle, help to protect human health, meet the requirements of quality and performance, and have the characteristics of energy saving, emission reduction, safety, convenience and recycling. [2] Since the concept of green building materials was put forward, it has attracted wide attention. Its characteristics are as follows: ①Green building materials are made of industrial or other solid waste, which reduces the consumption of natural resources and energy. ②For green building materials, in its application process will not produce other radioactive, heavy metal, VOC (volatile organic compounds) and other pollution. ③The service life of green building materials is longer than other ordinary building materials, and there is no need for frequent maintenance and repair, and it can be dismantled and recycled after use.

Therefore, the promotion and application of green building materials meets the basic requirements of the current environmental protection, energy saving and emission reduction environment construction, and the use of green building materials directly affects the quality of the use of construction projects. The promotion and development of green building materials is the innovation and reform of the whole building materials industry. The introduction of green building materials technology will change and optimize the whole industrial chain from the upstream raw materials of the building materials industry to the middle production and processing, to the downstream sales and use. Therefore, green building materials is the development prospect of the building materials industry under the new situation, and also the green competitiveness of the building materials industry. It is the best choice for the majority of consumers to build a quiet, secure and livable living environment.

2.2 Evaluation and certification of green building materials

Professional techniques have been used for evaluation and certification of green building materials, currently has the following two kinds: first, the single factor evaluation method, and more commonly applied to health class evaluation, including radioactive material inspection and the content of heavy metal particles, namely to evaluation index of building materials has a unqualified cannot by evaluating and classifying, the building materials is determined not green building materials. Second, the composite evaluation method, that is, a variety of indicators to evaluate the characteristics of building materials, such as VOC (volatile organic compound) content, mechanical strength test, high temperature test. In the evaluation process, if one of the indicators is not qualified, it does not affect the result of the comprehensive evaluation of the overall indicators. This kind of building materials can still be evaluated and identified as green building materials.

Based on the above two evaluation methods, it is obvious that there is a lack of perfect system and fine control in the evaluation process of building materials. In the current production and processing of building materials, the production process and production process of all kinds of building materials are not the same, the application of materials are also complex and diverse, and the green building materials that have been assessed and certified also exist one or two indicators of unqualified situation. Such evaluation of green building materials may be biased,

and it is also easy to mislead the choice and use of consumption.

2.3 Construction of life cycle evaluation system

The life cycle Assessment system of green building materials (LCA) is a relatively advanced evaluation system at present, which is aimed at the comprehensive analysis and assessment of the environmental impact of building materials. It involves the concept of "full life cycle" of building materials, and proposes corresponding improvement methods and measures in different stages according to this concept. The whole life cycle of building materials products includes four stages: raw material collection, production, use and recycling. In each stage, green building materials should minimize energy consumption and resource utilization, and minimize the impact on ecological environment and human health. But these two kinds of demand in the actual operation process is often a state of exchange, the two sides need to be in the whole life cycle of building materials in each stage of the overall consideration and correct treatment. In other words, the setting of evaluation indexes should not only meet the requirements of science, suitability and operability, but also be objective and comprehensive, grasp the principal contradiction, adapt measures to local conditions and keep pace with the times [3], which is also an important method to build the evaluation system of green building materials.

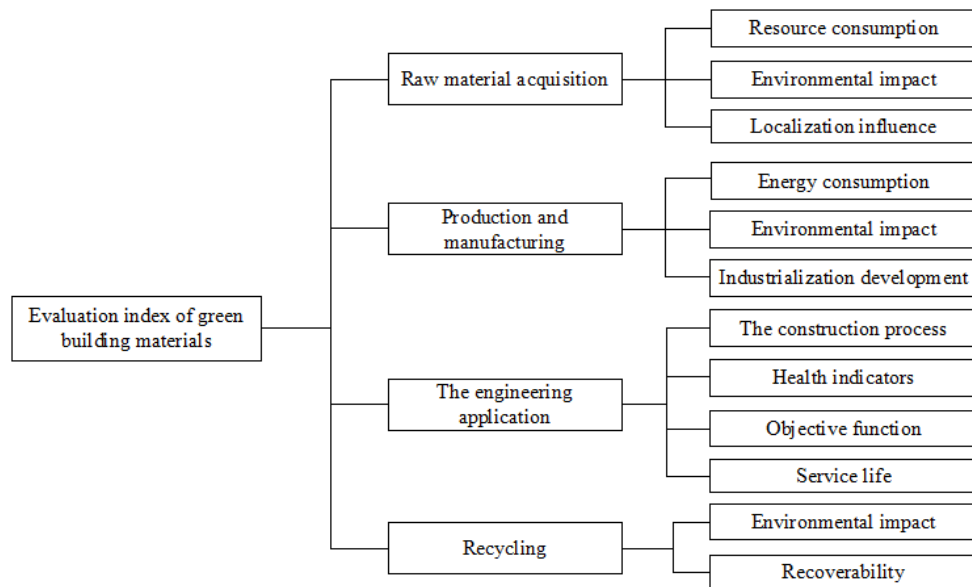


Figure 1 Structure diagram of green building materials life cycle assessment system

Life cycle evaluation system index according to the four different stages were divided into three levels of evaluation index, from raw materials acquisition, manufacturing phase, put into use and recycling of four phase of building materials product energy consumption, environmental impact, using performance, cycle renewable of comprehensively from the aspects such as comprehensive evaluation, and according to the corresponding grade weighted index, calculate the score rate, qualified building materials products can be identified as green building materials.

To sum up, the life cycle evaluation system can be applied to the evaluation and identification of all building materials products, and can solve the current standardization and standardization of green building materials evaluation. Combining with the current social needs, the Internet technology and the innovation of the life cycle assessment system integration greatly promote the information management system of green building materials, formed to promote green building materials enterprises, green building materials products list, green building materials to evaluate cognizance, green building materials comprehensive query issued comprehensive Internet green building materials information application platform. For the current manufacturers, sales enterprises, consumers can provide a variety of green building materials information sharing and technical services.

3 Internet technology application platform and green building materials information management system

3.1 Internet technology application platform

The Internet application platform has an open architecture. In the actual application process, no matter enterprises, schools, units, institutions and other organizations can use the Internet application platform to establish a relationship between themselves and the outside world. Countless small associations will form social networks across societies or regions, helping to build a broader and more powerful ecosystem. Internet application platform supports multi-role, multi-user login, that is, different individuals can be connected through the Internet, in the virtual network environment to form communication and collaboration groups. Therefore, the emergence of Internet application platform has greatly optimized the business model and work process of traditional industries, accelerated the circulation and transmission of information, and more efficient handling of various problems and contradictions.

3.2 Green building materials information management system

Green building materials information management system is the practical result of Internet technology application platform in green building materials industry. It is a complete solution built around the information management of green building materials. Green building materials information management system, from the platform framework construction, functional module implementation, evaluation and identification process control, unified management of information data and other aspects of comprehensive consideration, based on the life cycle assessment method to establish and improve the green building materials evaluation system. In addition, based on the information management system of green building materials, the practical application of the evaluation system of green building materials will be expanded to solve the problems in the evaluation and identification process of green building materials in the current building materials industry, and the unification, standardization and standardization of the evaluation and identification of green building materials will be realized. The construction of green building materials information management system has actively promoted the evaluation and identification of green building materials, and played a positive publicity role for consumers, manufacturers and distribution channels of building materials products. To help building materials manufacturers quickly deal with the evaluation and identification of green building materials, but also for consumers to choose qualified, assured green building materials to

provide an efficient and convenient information channel. It is also a useful exploration and extension to the construction of the scientific and practical evaluation and identification system of China's green building materials industry.

4 Design and implementation of green building materials information management system

4.1 Overall framework design

The core function of green building materials information management system lies in the evaluation and identification of green building materials. The life cycle evaluation system method is adopted in the evaluation methods and indicators, and the whole process of evaluation and identification of green building materials is realized by networking, digitalization and informatization.

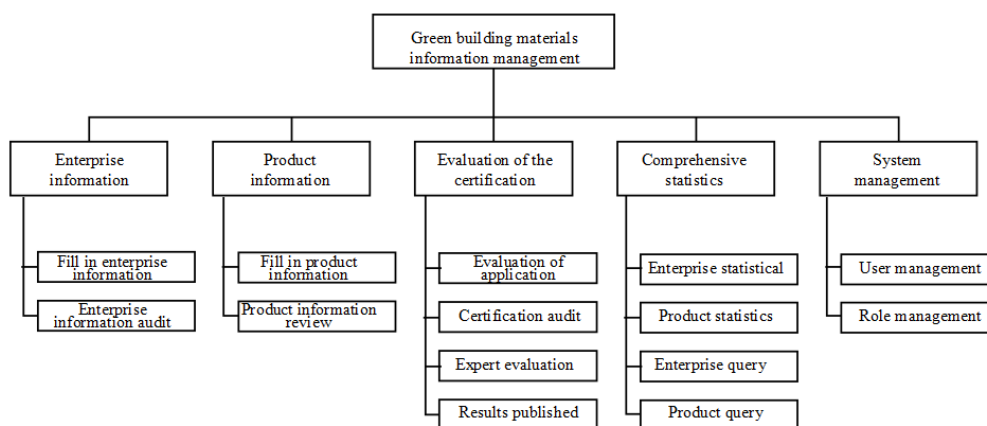


Figure 2 Function module diagram of green building materials information management platform

4.2 System function design

4.2.1 Enterprise information management module and product directory management module

The enterprise information management module is mainly aimed at the standardized and unified sorting and registration of the data information of green building materials production enterprises. For the production enterprises of green building materials, enterprise information is also an essential content in the evaluation and identification process of green building materials. Enterprise information management module supports users to fill in and upload all kinds of enterprise data, such as name, unified social code, registration information and so on. Through the preliminary examination of enterprise information, it can be determined whether the enterprise has the qualification to apply for green building materials. After passing the examination, the enterprise information enters the green building materials enterprise information database. And green building materials products list according to the resource saving, energy saving and environmental friendly classified three categories, at the same time

will also be in accordance with the purposes into masonry materials, insulation materials, ready-mixed concrete, glass, ceramic tile, sanitary ceramics, building energy saving, ready-mixed mortar and so on seven kind of [4] to develop green building materials evaluation index and technical requirements. Building materials products should add corresponding green building materials information sheets according to different categories and different uses, and submit them to the system for review. After the approval, it will be added to the green building materials product directory, and the relevant information will be stored in the green building materials product directory database.

4.2.2 Evaluation and certification of green building materials

Under this functional module, users can clarify the whole process of evaluation and identification of green building materials. First, building materials production enterprises select the building materials products that have passed the preliminary examination and choose the declaration grade and evaluation type according to different types and uses, and initiate the evaluation and identification application of green building materials through the system. Second, the system will transfer the evaluation application to the evaluation and identification agency, and according to the enterprise information, product directory information, application evaluation and identification information submitted by the enterprise to review, determine whether to accept the case. Third, the green building materials evaluation and accreditation institution shall, after accepting the application, transfer it to relevant evaluation experts for detailed evaluation and accreditation of the building materials products. According to the evaluation criteria in the life cycle evaluation system, the evaluation and weighted score shall be scored, and the score statistics shall be completed. And according to the score results to judge whether the building materials product through the review. Finally, after the evaluation and identification institutions of building materials products audit and public no objection, then through the evaluation of building materials products, green building materials evaluation and identification report and green building materials to the enterprise. If there is any objection, the corresponding evaluation results will be fed back to the enterprise. When evaluating and scoring according to various indicators in the life cycle evaluation system, the scoring rate of building materials under the green technology index is calculated according to the following weighted calculation formula. If the scoring rate exceeds 95%, it can be assessed as green building materials. Where M is the score rate, X is the evaluation score of green building materials index, and Y is the evaluation score of additional technical index. [5]

$$M = \frac{X + Y}{100} \times 100\%$$

4.2.3 Comprehensive statistics and information release of green building materials

Under this function module, users can query and release the approved green building materials production enterprise information and green building materials product directory. Different users can set different search content, by category, by purpose, by time, by enterprise and other ways to search the relevant information. In addition, direct jump and associated query between different data information are supported. For example, in the actual results of query by category, you can directly click on the name of the enterprise, you can jump to the detailed display page of the green building materials production enterprise information, which is convenient for users

to complete the query and call. At the same time, this function module also supports to show the statistical and summary results of various attributes of green building materials in the form of various data charts.

4.3 Technical support

The green building materials information management system adopts B/S architecture, namely three layers of application architecture, which are front-end application layer, logical business layer and data support layer respectively. The whole system adopts MVC (Model-View-Controller model-View-controller) mode, which can well support the front-end application layer to realize a large number of man-machine interaction operations, and also facilitate the system to carry out unified function regulation and data statistics for each functional node in the whole operation process. In the data support layer, that is, the database system uses MySQL database, which is a relational database, emphasizing the association between each data set, but also to ensure that the system can realize data jump and chain level operation when calling data. In the middle service of the logical business layer, Workflow engine is adopted to provide data flow engine support for the evaluation and identification of green building materials. According to different process links, different roles are required to complete the corresponding process processing rules, and complete the supervision and control of the entire process operation.

5 Conclusion

Based on the life cycle evaluation system, the green building materials information management system refined the different stages and technical indicators of the evaluation of green building materials, and judged whether the building materials products meet the standards of green building materials by means of scoring and weighted scoring. At the same time, through the construction of green building materials information management system, the innovative and integrated application of Internet application technology is realized, which not only realizes the summary, management and display of green building materials enterprise information and green building materials product directory, but also completes the networking, informatization, standardization and standardization of green building materials evaluation and identification. The green building materials information management system can provide effective service support for the development of green building materials industry and green building construction in the current society.

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