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Study on Barriers and Countermeasures of Technological Innovation of Ecological Service Function Assessment of Urban Greenbelt

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Abstract

As the main body of the natural productivity, the urban greenbelt, an irreplaceable comprehensive ecological service system, plays a leading role in beautifying the urban appearance, improving the quality of the urban ecological environment, adjusting the urban ecological balance. The research of ecological service function assessment is a hot research of many domains in recent times, such as ecology, environmental science, sociology, science of culture, economics, etc. Technological innovation is not only the urgent need and significant support system of technological development, but also the urgent need of solving the existing problems of the ecological service function assessment of urban greenbelt. This paper analyzes the main barriers and corresponding countermeasures of the technological innovation, such as unsound innovation mechanism, dated technological means, fault information transform, unsound assessment system, etc., which provides enlightenment and reference for the assessment, planning, construction, management and sustainable development of the ecological service function of urban greenbelt.

Keywords: urban greenbelt; ecological service; assessment; technological innovation; strategy

1. Introduction

The urbanization is the inevitable trend of human social and economic development, which brings long-term progress for the city. However, all of the progress derives from natural resource plunder and destructive exploitation, such as environment deterioration, energy crisis, resource shortage, etc. As for

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these problems, the city stands in the breach. As the main body of natural productivity in the urban comprehensive structure, the urban greenbelt plays a leading part in beautifying the urban appearance, improving the quality of urban ecological environment and adjusting urban ecological balance. With the increasing of human beings' cognition towards the substitutability of service function of ecological system, the researches related to the assessment of the service function of ecological system are the hot topics of many domains in recent times, such as ecology, environics, sociology, science of culture, economics, etc. However, the relevant research of such hot domain is still not mature. It still remains existing many problems which needs to have further research, among which, there are ecological service function assessment of urban greenbelt and the countermeasure research of technological innovation.

2. Connotation and Significance of Technological Innovation of the Ecological Service Function Assessment of Urban Greenbelt

According to the national standards of PRC Design Specifications of Urban Greenbelt (GB50420-2007) released by Ministry of Construction of PRC, the urban greenbelt refers to "a kind of urban land which takes the vegetation as the main existence form, and which is used to improve the urban ecology, protect the environment, afforest and beautify the city, and which offers recreation place for the residents." With the development of urban planning and relevant subject theories, the connotation of urban greenbelt system expands continuously, as well as its concept. Although different domains have different definitions, their basic connotation and function have obtained affirmation. In general, the urban greenbelt system is a well-organized entirety which is formed under the effect of both biotic and abiotic factors, taking the vegetation as the main body, the soil as the matrix, the interference of natural and anthropic factors as the characteristics in urban green space. It has dynamic multifunction system, integrated and successive systematic structure, and connotation of open landscape system.

The service function of ecological system generally refers to that the human beings obtain benefit from the ecological system directly or indirectly, mainly including inputting useful material and energy to the social economic system, accepting and transforming the waste from the social economic system, and directly or indirectly offering service for the social members. It is the basis of human survival and modern civilization. The science and technology can influence the service function of ecological system, while it can not replace it. Maintaining and protecting the service function of ecological system is the basis of realizing the sustainable development of the whole society. Its research is the hot research domain of ecology and its relevant subjects which are development in recent several decades. In addition, it has multifunction. Different scholars and majors have different cognitions and emphasis, which have relatively great difference. It still does not have unified and recognized function classification and assessment indicator system.

As for the definition of technology innovation of ecological service function assessment of urban greenbelt, different scholars have different understanding. Totally, the technology innovation is a kind of new innovation technology system that the ecology, environics, sociology, and science of culture permeate towards traditional economic technological innovation. Besides, it is the technological innovation that is established in the new social, cultural, ecological and economic system, and also the compound innovation of economics, environics, and sociology, science of culture, ecology, management, and engineering. The technological innovation of ecological service function assessment of urban greenbelt has essential difference with the traditional technological innovation. The former one is new normal form of the latter one. Therefore, it is necessary to offer definition not only from the viewpoint of economics, management and engineering, but also from that of ecology, environics, humanity, etc. The technological innovation should be the floorboard of thought, behavior, skill and methods, which means that the main body of innovation takes the sustainable development of ecological service function of

urban greenbelt as the value orientation, adopts new technological means developed by systematic scientific methods, boosts the harmonious development between human beings and nature, and drives the continuous increasing of economy, science and technology, society and ecological results.

3. Main Barriers of Technological Innovation of Assessment of Ecological Service Function of Urban Greenbelt

3.1. Unsound innovation mechanism

At present, the relevant construction management units of urban greenbelt industry have fewer technology input of ecological service function assessment. However, even there is, the expenditure is really so little. Basically, they do not establish technological innovation system that is suitable for the feature of ecological service function assessment of urban greenbelt. Specialized research institutions and expenditure is in great shortage. The fund of public scientific research of the government is in unbalance development. They do not have made research towards the relation between the technological innovation and the green procurement of the government from the viewpoint of strategies. The negative effects brought by the imperfect investment mechanism and innovation chains and unsound support mechanism will inevitably hinder the development of the technological innovation of landscape assessment. Having technological innovation should get some corresponding support conditions. The most importance is capital, talent, information and corresponding systems. Currently, there is no system which is suitable for the requirements of market economy and in line with diversified ecological service function construction and assessment investment of urban greenbelt of ecological construction disciplinary. Its technological innovation has considerable difficulty in fund raising. In addition, there is no specialized legislation related to the technological innovation or related to facilitating the innovation, or new ecological legislation. Also, the corresponding environmental law is imperfect. The unsound leading mechanism mainly represents that the propaganda education system, which attaches great importance to the technological innovation, is not formed, and that the effective mechanism, which leads the industrial development of technological innovation taking the public institution as the main body, is not formed. The negative effects caused by the imperfect capital source mechanism and innovation chains, and unsound support mechanism will inevitably hinder the development of the technological innovation.

3.2. Backward technological means

The innovation of assessment technological means is an important link of the development of ecological service function assessment of urban greenbelt. At present, a great majority of the assessment of that kind is to directly adopt the assessment indicator and measuring technique means of service function of natural forest ecosystem. As for the data processing, it mostly utilizes the expert model according to the combination of math weighing and fuzzy math, and gets degree of membership and general score, and then grades the assessment targets. On the technology of assessment data processing, it lacks many kinds of innovation application of data processing ways. The means is relatively single, lacking man-machine interaction, information visualization, and comprehensive application of multi-source assessment technological means with digitalization, dynamism, rationalization and perception. Furthermore, it is in shortage of effective innovation fusion of multi-source information, which is unfavorable for the innovation research and sustainable development of ecological service function assessment of urban greenbelt.

3.3. Fault of information transformation

The ecological service function assessment of urban greenbelt has already shown its explicit demands for the technological innovation resource. However, as the high-efficiency assessment technological means of this link does not interfere deeply, most assessment still has not offer such research, and from the viewpoint of assessment research and development technology, it is a kind of symptom of "scarcity of innovation technological resource". In fact, a great majority of assessment innovation method theory and technology research has already pulled ahead of the practical application. Some scientific research institutions carrying out research hold many achievements of research and development, which will be put into the markets. Lots of achievements can not be transformed into practical productive force in time, which leads to severe problems of vacancy rate of scientific and technological achievements and waste of scientific resource. At present, the bottleneck problem is that these theories and technology can not offer good service for the specific research and development activities of ecological service function assessment of urban greenbelt. Besides, the innovation achievements and industrialization process come apart severely. Both the efficiency of technology innovation and the conversion rate of scientific and technological achievements are low. Both shows blind spots and fault. The research work of the link from the general innovation theories and technology to the transformation of industry design and technology assessment gives rise to fault.

3.4. Unsound assessment system

At present, the assessment related to ecological service function of urban greenbelt mainly derives from imperfect expert assessment indicator system, which lacks the research of public assessment indicator system and also the research of innovation assessment system based on the fusion of expert and public information. So far, there is no uniform assessment indicator system of ecosystem service function and its value all over the world. The assessment area does not have explicit definition. Besides, the system used by each country is not unified, which makes contribution to no comparability of its results. Most indicator screen is done by the assessors' own experience or several experts invited, and the source of the experts is limited in the local place, and the number is about 5 in general, which gives rise to imperfect and non-authoritative indicator system. The main beneficiary, user and appreciator of the urban greenbelt are the general public. The public is an indispensable part of the main body system of urban greenbelt assessment, which is determined by the value, property and characteristics of the urban greenbelt. The public participation is the powerful pushing hands of boosting the harmonious development of ecological environment construction. However, at present, the relevant assessment of ecological service function mainly stems from the expert assessment system, and thus it lacks the supplement and fusion of public assessment system, and also the comprehensive assessment system is unsound.

4. Countermeasures of Technological Innovation of the Assessment of Ecological Service Function of Urban Greenbelt

4.1. Improving innovation mechanism

By improving policy guide, fund support and incentive mechanism, the government will greatly reduce the risk of technological innovation and instead enormously increase the enthusiasm and feasibility, which is to the benefit of strengthening the dynamic, expansion and spread of the technological innovation. During the process of technological innovation, there are so many uncertain factors which may be suspended at any time. If the government and some relevant organizations can offer risk prevention for the technological innovation and share some risk, the fear of attacks from behind possibly

will be reduced. The main approaches include establishing human capital incentive mechanism and property right incentive mechanism of the technological innovation of ecological service function assessment of urban greenbelt, and strengthening the public service responsibilities of the government. The authority of government management has confirms its leading role in national economy and social development. As a result, at present, among many factors of influencing the technological innovation, the government's role is guiding, mainly including strengthening infrastructure construction, enhancing the rewarding for technological innovation, and unveiling fresh policy that is favorable for the technological innovation and makes mechanism guiding.

4.2. Improving technological means

As for the innovation of technological innovation research means of the ecological service function assessment of urban greenbelt, it is necessary to attach great importance to make use of modern information processing components and realize the fusion processing of information composition, integration, fusion and association related to multi-source assessment data, reduce information redundancy, utilize information evolutionary algorithm to solve recessive or fuzzy indicator optimization problems (especially the assessment and decision problems with the perceptual elements, e.g. emotion, intuition, preference, etc.) and the optimization assessment problems and fatigue assessment problems of multi goals and mixed goals. Though solving generic technology and assessment system problems, it is necessary to have deep research towards the assessment and implementation technique of ecological service function of typical urban greenbelt, make the assessment research from spot to face. Finally, it forms indicator system connotation, technological means, and multiple innovation assessment system and methods, which boosts the sustainable development of the technological innovation.

4.3. Boosting information transformation

The basic effect of informatization on the technological innovation represents on the needs of technological innovation of each phase for the informatization of ecological service function assessment of urban greenbelt. Aiming at the problems of low-efficiency innovation and low conversion rate of scientific and technological achievements, it is feasible to adopt the policy of government procurement, give full play to the effect of social technological service agents, strengthen the cooperation between official scientific research institutions and enterprises, and improve the innovation efficiency and the conversion rate of scientific and technological achievements. The government should play an active role in encouraging the establishment of scientific service agents of undertaking scientific consulting, technology transfer and other service activities, which can offer superior service for the scientific and technological exploitation of the ecological service function, and the transformation of the achievements. Besides, it should integrate the scientific and technological resource of different domains, improve the effective use ratio of the limited resource, and accelerate the realization of the conversion from the general innovation theory and technology to the industry design and assessment technology, which is to the benefit of making the technological innovation realize industrialization and universalization. Furthermore, it should realize the feedback and interaction with the user need, which can enable the technological innovation of landscape assessment to enter into virtuous circle.

4.4. Improving assessment system

It is conducted by aiming at the technological source links of ecological service function assessment innovation of urban greenbelt and the connotation source link of system, namely, the innovation links of

technology and assessment indicator system. In terms of the innovation of assessment indicator system, construct advanced, reasonable, innovative urban landscape public assessment indicator system and expert assessment indicator system by aiming at the imperfect expert assessment indicator system, the shortage of public assessment indicator system researches and the innovation assessment system based on information fusion of expert and public, and participating in the innovation of urban landscape assessment and urban greenbelt ecological service function assessment system. On one hand, it facilitates the development of the connotation and system of the ecological service function assessment of urban greenbelt. On the other hand, it boosts the depth and breadth of the technology needs of ecological service function assessment. Finally, it becomes the demand dynamic of the technological innovation.

5. Conclusion

The status of urban greenbelt has become the important symbol for measuring urban civilization and modernization, and also the significant content of urban sustainable development strategy. The development of the 21st-century urbanization will present many characteristics, such as urban size expansion, continuous increasing of population, increasing of ecological environment stress. The urban environment problems will be more outstanding. The assessment of material amount and value magnitude of the ecological service function will enable us to realize the urban greenbelt and the relation between it and human being on a new level and further establish its ecological status. During the times of pursuing informatization, intensification, and circulation development, the technological innovation is not only a great theme of economic development, but also the development research theme of sociology, science of culture, environics, ecology, etc. The technological innovation of the ecological service function assessment will offer enlightenment and reference for the environment assessment, planning, construction, and management of urban greenbelt, which plays a significant part in development the urban greenbelt construction, boosting the development of harmonious society with the thought of people first, facilitation the accounting of green GDP and realizing the sustainable development of urban ecology.

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