Journal of Communication and Computer 14 (2017) 115-121
doi:10.17265/1548-7709/2017.03.002

Application Research of Water Resources Balance Sheet in Public Project Governance

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Abstract: Due to the fact that public project governance with water resources balance sheet has to be carried out under the influence of multiple uncertain factors, under present conditions of water resources shortage, extensive water utilization management mode could hardly be continued any longer. Combining the provisions of China's water conservation policy in the new era and the deployment of water conservation competent organizations relating to specific work in constructing water ecological civilization, and abiding by objective developing law to establish feasible objective and have a scientific un derstanding the factor of system are essential requirements of public project governance based on water resources balance sheet. For this purpose, this paper associates project governance with water resources balance sheet, which carries out research by focusing on water ecological environment protection in public project governance, and devotes itself to developing public project governance system module based on water resources balance sheet. In addition, the paper keeps in line with the principle of adjusting measures in view of water and basing the demand on water resources to study the application objective of water resources balance sheet in public project governance, so that to strive to make the progress of social economy to accommodate water environment and water resources carrying capacity. The paper may provide experiences and references for public project governance objective setting, governance system factors control and public project governance approach at the request of ecological civilization construction.

Key words: Water resources balance sheet, project governance, public management, ecological system.

1. Introduction

Natural resources balance sheet, especially water resources balance sheet is an entirely new concept in the worldwide [1]. However, as the problem of population, resources and environment becomes more acute, preparation of natural resources of water resources and land resources balance sheet has been highly attached importance, which has become one of important tasks in national comprehensively deepening reform and urgently needs to carry out theoretical and practical research. In 1960s, Goldsmith, a professor of Yale University has started to do research on national balance sheet. During 1970s~1980s, economists of Britain, Canada, Sweden, Australia, Czech Republic and other countries began to prepare their national balance sheet [2]. National balance sheet frame became a tool for studying macro economy, evaluating sovereign debt risk and analyzing business cycle problem. In 1990s, economists began to study balance sheet relating to government or public sectors. Among several countries who have released their government or public sectors balance sheet, assets relative to public sectors not only included financial assets (savings, stock held by the government and other securities, etc.), they also incorporated physical assets like buildings, forest, mineral products and land resources and so on [3]. Under the idea of sustainable development, international communities are exploring unceasingly, so as to enrich and improve national economic accounting system, or known as SNAs (system of national accounts) commonly used by most countries [4], attempting to incorporate resources and environment which can reflect sustainable

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development factors into economic statistical system [5].

Research and preparation of natural resources balance sheet starts relatively late in our country. Although National Bureau of Statistics has published Balance Sheet Compilation Method of China in 1997 and 2011[6, 7], but so far official balance sheet of China is still in a stage of tentative compilation. In recent years, as for debt problem of local government financing platform of China, from 2011, three research teams respectively led by Li Yang, vice president of Chinese Academy of Social Sciences, Dr. Cao Yuanzheng, chief economist of Bank of China and chief economist Dr. Ma Jun of Deutsche Bank for China in Hong Kong almost carried out the study on national assets and liabilities at the same time. There were some discrepancies among three research reports relating to value estimation of resources assets [8]. For example, total resources value including China's forest resources, non-forest resources, cultivated land, pasture and conservation area estimated by Li Yang et al. [9] based on the World Bank in 2011 was 2.16 trillion yuan; according to land use right value held by government land reserve centers at all levels, Ma Jun et al. estimated that total value of land resources in our country was 6 trillion yuan. Furthermore, under uniform deployment of deepening reform leading group office, National Bureau of Statistics called on to organize and carry out the compilation of national natural resources balance sheet [10]. Guidance on Deepening the Reform of Water Conservancy by Ministry of Water Resources points out that, establishing and improving water resources asset property rights, perfecting water pricing mechanism, cultivating and regulating water market, carrying out the work of confirming right registration of water resources utilization right and developing water resources property right with clear ownership, definite right and responsibility and efficient regulations, etc. [11], which provide institutional guarantee for promoting the compilation work of water resources balance sheet. Recently, water resources management is given high attention from both governments at all levels and society. Constantly strengthening of awareness of overall society water saving and cherishing provides a favorable social environment for the research of this project. In addition, extensive use of modern information technology, remote sensing technology and application mathematical technology, etc. in terms of water resources management also provides technical support for the project research.

Based on the research question and the literature review, this paper tries to analyze application of water resources balance sheet in public project governance, which can be divided into seven parts. Specifically, we need to effectively allocate water resources, improve water-use efficiency, understand the effect of management on all the users, enable infrastructure investment to obtain value-base effect, associate water supply with water consumption, provide standard information system, and allow the water interested party, particularly the interested party of public project to get involved in scientific decision making. Then, we proceed to construct public project governance system model based on water resources balance sheet, which may provide experiences and references for public project governance objective setting, governance system factors control and public project governance approach at the request of ecological civilization construction. At the end of the paper, we provide research conclusions and future research direction.

2. Application Analysis of Water Resources Balance Sheet in Public Project Governance

Centering on strategic deployment under the new situation and aiming at the status of relative deficiency of related work, it is of great significance to promote water resources study as well as its application in public project. Therefore, this paper explores the compilation of water resources balance sheet, which is in favour of regulating statistical behaviours of water resources, urging water resources statistical system to

effectively integrate into national statistical system and improving water resources management level and efficiency. Moreover, it also evaluates water utilization conditions in representative regions and public regions, which replenishes economic accounting system of water resources environment, so as to further support the strictest water resources management system and cadres auditing and assessment work. Specifically, it can provide the following supports for formulating development strategy of making actions according to water resources.

2.1 Effectively Allocate Water Resources

Water resources balance sheet can list water volume used for several purposes (including industry, agriculture, life and ecology), as well as quantity of wastewater and emission generated in the course of production, which will contribute to calculating water saving and water productivity indicator. With multiple purposes, it also can provide convenience for water resources development, allocation and management planning in public project, and help water management personnel to adopt a more comprehensive method to reflect actual water consumption accurately.

2.2 Improve Water-Use Efficiency

Water-use efficiency can be improved from two aspects of demand and supply. In terms of demand side, policy maker needs to determine to employ what kind of economic means to change user's behaviour. While in view of the supplier, policy maker can encourage the supplier to improve water supply or irrigation system efficiency, so that to encourage reutilization of water resources. Balance sheet of water resources can provide a basic database for public project, which can be used for analyzing the effect of different water use strategies on water resources.

2.3 Understand the Effect of Management on All the Users

Scope of influence of decisions made by policy maker may be relatively extensive, which is not merely confined to water conservancy department or public project itself. Water resources development, utilization, saving, protection, allocation and governance involve in multiple sectors and users. When evaluating different results resulting from different policies on all the users, water resources balance sheet can be the basic information tool.

2.4 Enable Infrastructure Investment to Obtain Value-Base Effect

Infrastructure investment needs to evaluate long-term cost and benefit. Policy maker needs corresponding information to understand the influence of infrastructure maintenance, water service and cost recovery potentiality on the economy. Water resources balance sheet can provide relevant information, which also can provide support for evaluating potential cost and benefit of newly built infrastructure.

2.5 Associate Water Supply with Water Consumption

Under the situation of water resources shortage, improving water-use efficiency becomes particularly important. As for public project governance, it's important to associate water use with water supply. Information provided by water resources balance sheet includes water resources reserve and changes to the reserve caused by natural reasons and human activities.

2.6 Provide Standard Information System

This kind of information system can coordinate and unify information from different sources, which is acceptable to the interested party of public project, and can be used for the calculation of several public projects, especially for water conservancy project indicator as well. Different government sectors that exercise their different functions in specific water use sectors, for example, irrigation, water supply and sanitation, etc., are responsible for information generation, collection, analysis and release. Purpose of each data set collection varies, and commonly

inconformity definition and classification employed would result in overlapping of dataset collection. Likewise, data collection activity may leave out important aspect of water resources. Whereas water resources balance sheet uses common concept, definition and classification to incorporate information from different sources into one comprehensive system, which will be conductive to discovering data gap and the problem of inconformity. Its purpose is to ensure the conformity at different time. This is of vital importance for obtaining those which can be used for the estimated value in comparable time series in the course of decision making. Furthermore, it also helps to introduce balance mechanism in the data, so as to generate the data of higher quality.

2.7 Allow the Water Interested Party, Particularly the Interested Party of Public Project to Get Involved in Scientific Decision Making

Water resources balance sheet is a transparent information system. The government can make use of complete information provided by this system to make reasonable decision, and each interested party can use its extensive information to maintain its legitimate rights and interests.

To sum up, in view of severe situation that Shandong Water Resources faces and in order to realize rational exploration, scientific utilization, abundant saving, efficient protection, optimal allocation and system governance, as well as promote sustainable development of economic, social and ecological environment, it is urgent and necessary to carry out water resources balance sheet compilation and its application research in public project.

3. Public Project Governance System Model Building Based on Water Resources Balance Sheet

For a satisfactory public project governance system model based on water resources balance sheet, the role it plays lies in guaranteeing a higher repeating utilization factor of regional water resources, so as to form the procedure based on health water resources system, focusing on the management of important issues and obscure phenomenon appeared in water resources balance sheet as well as covering environment friendly water conservancy project planning, appraisal and review, etc. In accordance with public project governance characteristics based on water resources balance sheet, the following aspects should be covered in management system.

One is interested party involvement. Through the definition of scope and environment of water resources balance sheet, interested party can directly influence decision-making result and have a chance to learn from experiences. Influenced by water conservancy project and complexity, breath and scope of interested party involvement may vary a lot from different projects. Second is to examine the goal of management system from multiple dimension and multi-stage. In the course of implementing public project governance, commonly there’s not only one goal. For example, some interested parties desire to maintain the diversity of species within drainage basin of certain area, maximize economic growth rate and also hope to conduct large-scale wastewater treatment within affordable cost range at the same time. Resources can be used for carrying out such kind of activity are limited. Under such circumstances, it is important to weigh the importance of different goals. Compare and optimize management plan for many times to look at contributions of different plans towards multiple goals. Third is the analysis of system factors. System factors analysis is aimed at revealing characteristic variables of city water ecological civilization. Research and observation for these variables can assess water ecological civilization of public project, so as to guide governance strategy of future public project. Forth is monitoring plan. It needs to meticulously design monitoring procedure, through tracking the full life-cycle feedback of water conservancy project to facilitate evaluation and study,

so as to determine proper project governance behaviour.

Based on the above-mentioned theories, research group has investigated 76 sectors and 492 water conservancy workers in Shandong Water Conservancy Competent Departments and related water resources management organizations along Huai River basin. On the basis of explaining and stating idea and connotation of water resources balance sheet and combining the concept of public project governance, they were asked to put forward water resources balance sheet system factors and their mutual relations it deems appropriate for them. After information collation, key factors are extracted and public project governance system model based on water resources balance sheet that includes problem recognition, objective discovery, factors analysis, decision support and monitoring feedback, etc., is preliminarily established, As shown in Fig. 1.

Under this preliminary system framework, it is important to focus on analyzing and exploring objective recognition of public project governance based on water resources balance sheet, and conduct key research on it.

The system model's specialty is to consider water resources balance sheet impact of stakeholders in decision-making on public projects. Decision-makers can construct the social network structure of Wade's main body through Ucinet simulation platform and introduce water resources balance sheet and public projects indicators into wade water stakeholders public project governance decision-making process to review its influence on the final decision to gain the measures of promoting public projects for scientific rational water using. In particular, it takes water resource debt constraint coordination of decision-making of public projects and social network structure optimization into consideration. In water ecological civilization construction's complex adaptive system, it needs multiple aspects interaction to encourage Wade subject to implement water resources protection adaptability and learning behavior and deferred genetic initiative. Also, it needs to try hard to explore a new approach to performance

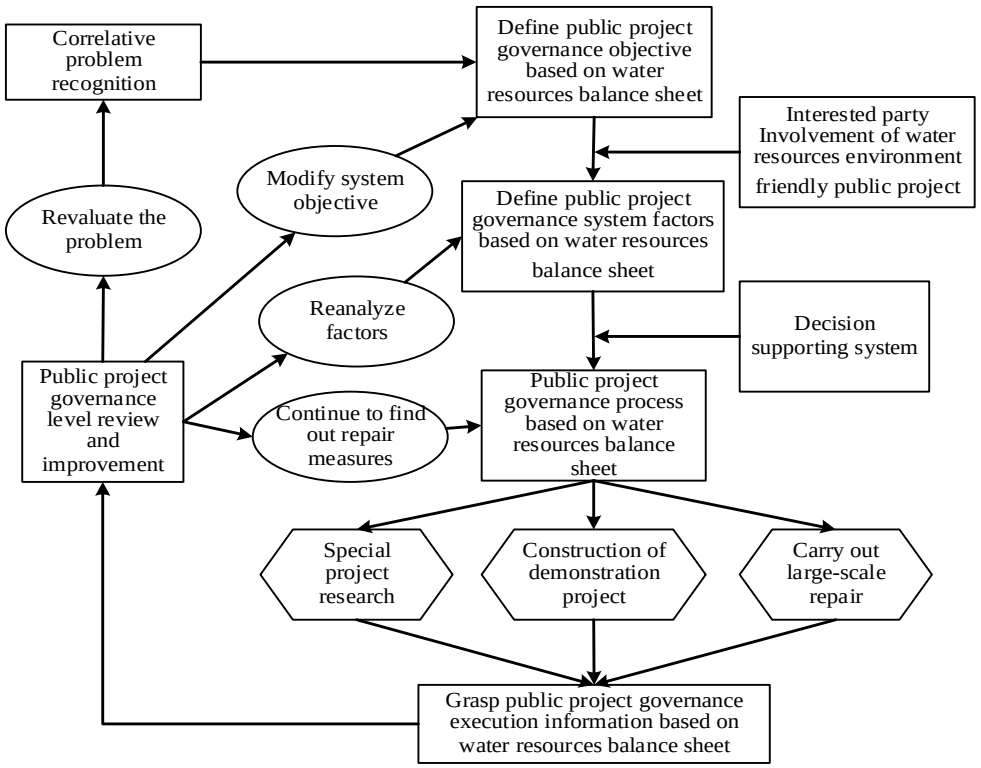

Fig. 1 Public project governance system model based on water resources balance sheet.

appraisal, putting water resource assets net worth and changes in the evaluation of public fiduciary responsibility to fulfill an important part of the project, thus protecting natural resources performance and Wade has a positive correlation between the survival and development of public projects, forming not incompatible external stimuli on Wade public pursuit of social performance and assume conservation responsibilities.

Based on analyzing public projects relating areas' water resources balance sheet situation and project water resources demand, putting asset-liability index and the actual needs, water resources carry capacity of the environment into the common project stakeholders the governance parameters of decision rules system, which will be transformed into integrated social property and nature of project governance analysis. Taking into account of the public funding sources and flows of social relations exist in the project at the same time, resources routes for bi-directional, and the project based on multiple attribute flow (natural quality and social quality) describes the dynamics of governance derived network to make decisions again. Based on, practical analysis over the entire network of nodes and arcs on scientific measures for rational allocation of water resources, the objectives to ensure the projects certain governance benefits (public goods, capability of supplying services, economic and capacity harvest of stakeholders) conditions, it must enhance the level of water resources management of the entire project.

This system model above also includes building public project governance multi-objective decision making platform based on water resources balance sheet to strengthen research results support of the practice. On the basis of analysis public project governance pattern under water resources constraints, we use SNA (social network analysis) and balance sheet preparation technology, build decision support platform for cooperating and sharing including investors, construction, traditional security institutions, credit-rating agencies, government regulators, e-commerce and traditional financial institutions.

4. Research Conclusions

Due to the fact that public project governance of water resources balance sheet has to be carried out under the influence of multiple uncertain factors, therefore, under present conditions of water resources shortage, extensive water utilization management mode could hardly be continued any longer. Combining the provisions of China's water conservation policy in the new era and the deployment of water conservation competent organizations relating to specific work in constructing water ecological civilization, based on practical situation and abiding by objective developing law to establish feasible target and have a scientific understanding the factor of system are essential requirements of public project governance based on water resources balance sheet. Strategy of making actions according to water resources and basing the demand on water resources should be carried out, so as to make the progress of social economy to accommodate water environment and water resources carrying capacity. For this purpose, this paper associates project governance with water resources balance sheet, which carries out research by focusing on water ecological environment protection in public project governance and on the basis of water resources balance sheet, and establishes public project governance system module based on water resources balance sheet, which may provide experiences and references for public project governance objective setting, governance system factors control and public project governance approach at the request of ecological civilization construction.

Acknowledgments

This paper is the research result of Shandong Provincial Level Water Conservation Scientific Research and technology promotion project "Water Resources Balances Sheet and Its Application

Research in Public Project Governance" (SDSLKY201604), and Humanities and Social Research Program of Universities of Shandong province "Research on Multi-dimensional Decision Making Innovation of Poverty Alleviation Project Governance under the Perspective of Dynamic Social Network" (J16YF13).

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