Does water accounting support sustainable water and business risks of clean water management?

A contabilidade da água apoia a sustentabilidade da água e os riscos comerciais da gestão da água limpa?

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ABSTRACT
Business risks associated with clean water companies include losses and downsizing loyalty of water users. This risk comes from responsibility, reliability and transparency of clean water sustainable management. This can be solved with water accounting. The explanatory overview explains the water management model using sustainable water accounting approach. The narrative review method consists of a compilation, tables, comparison and summary of research results. The articles are collected in a literature review study from accredited journal websites (Sinta, Emerald, Science Direct). After searching for a research paper keyword criteria the results show that water accounting, in addition to reducing the business risk of clean water service providers, it also supports sustainable water supply. Water calculation components such as gross income, net flow are available water, water emissions and emissions provide transparent and accountable information. The water accounting components can analyze water use, scarcity and productivity to make predictions the need for clean water, because the amount of water produced and used per day can be known for sure. Implementation requires leadership and community engagement sustainable protection of groundwater that the community can enjoy in the longterm supply of clean water.

Keywords: water accounting, water management.
RESUMO
Os riscos comerciais associados às empresas de água limpa incluem perdas e redução da fidelidade dos usuários de água. Esse risco vem da responsabilidade, confiabilidade e transparência da gestão sustentável da água limpa. Isso pode ser resolvido com a contabilidade da água. A visão geral explicativa explica o modelo de gestão da água usando a abordagem de contabilidade sustentável da água. O método de revisão narrativa consiste em uma compilação, tabelas, comparação e resumo dos resultados da pesquisa. Os artigos são coletados em um estudo de revisão da literatura de sites de periódicos credenciados (Sinta, Emerald, Science Direct). Após a busca por critérios de palavras-chave de artigos de pesquisa, os resultados mostram que a contabilidade da água, além de reduzir o risco comercial dos fornecedores de serviços de água limpa, também apoia o abastecimento sustentável da água. Os componentes de cálculo da água, como renda bruta, fluxo líquido, água disponível, emissões de água e emissões, fornecem informações transparentes e responsáveis. Os componentes de contabilidade da água podem analisar o uso, a escassez e a produtividade da água para fazer previsões sobre a necessidade de água limpa, porque a quantidade de água produzida e usada por dia pode ser conhecida com certeza. A implementação requer liderança e envolvimento da comunidade na proteção sustentável das águas subterrâneas, para que a comunidade possa desfrutar do fornecimento de água limpa em longo prazo.


1 INTRODUCTION
Water is an essential need and cannot be separated from the life of creatures living on the surface of the earth [Armadi D, Hidayat A, 2019]. 70% of the composition of the earth is water, which means that clean water should not depend on clean water supply companies [Hazar M, 2015]. The population and development of Indonesia is growing year by year, so the need for clean water has increased [Hendrik P, 2018]. Increasing the availability of clean water does not compensate for population growth and reproduction. The inter-ministerial cooperation forum was established by the Decree of the President of the Republic of Indonesia No. 185 of 2014 on Regulations for the Promotion of Clean Water Supply to ensure access to clean water for all. Provinces and districts therefore strengthen their commitment to achieve the goals by strengthening and enabling environmental policies through regional policy, budgeting and goal implementation [Escriva-Bou A, McCann H, Hanak E, Lund J and Gray B., 2016].

A poor clean water treatment model will damage the chain of water availability in the future [Kristo K, and Burritt R., 2017]. Then clean water management requires water accounting to reduce negative effects [Holyoak J., 2019]. Water accounting is the identification, storage and transmission of information related to water resources so that companies can manage water responsibly and transparently [Christ KL and Burritt RL,
The components of water calculation are gross revenue, net revenue, available water, water depletion and outflow. Control of water flow and community distribution are reflected in these components [Cummings E., 2015]. This means that it can integrate different inputs, outputs and environmental effects so that there is no shortage of clean water [Pawsey N, Ananda J. and Hoque Z., 2018]. Thus, clean water can be effective and efficient and create continuity of water supply [Gibassier D., 2018].

The research results also explained that water accounting provides managers with information to assess the commercial risks of clean water management [Holyoak J., 2019], which facilitates decision making [Escriva-Bou A., McCann H., Hanak E., Lund J., Gray B., Blanka E., Jezdimirovic J., Magnuson-Skeels B. and Tweet A., 2020]. Clean water suppliers can identify, reduce business risks and predict water availability [Gibassier D., 2018]. The water is processed in complex stages into pure water ready for daily use. The clean water supply should be completed first [Christ K., and Burritt R., 2017]. For further supporting data, based on the results of research conducted by the internal Danareksa Research Institute, the average water demand from 2015 amounted to 220.847 million m², then increased to 228.124 million m² in 2019. Moreover, the Danareksa Research Institute obtained the results of the projection of the average amount of water demand in 2030 increasing to 260.276 million m² and in 2045 further increasing to 289.788 million m². From the data obtained, it can be concluded that there is an increase in the average demand for clean water by 31% from the 2015 projection data to 2045. All data was obtained from a combination of irrigation, industry, livestock, fisheries, household and urban sectors. Therefore, this article explains in detail the support of water metering in creating a sustainable water supply around us.

2 METHODOLOGY

The narrative review method consists of compilation, tabulation, comparison of research findings and summary. In the literature review study, articles were collected from accredited journal websites (Sinta, Emerald, Science Direct). As journal articles, an open full-text journal related to the research topic with a publication date of the last ten years from May 2012 to May 2022 is used and an indexed journal. From August 2021 to June 2022, the authors searched for peer-reviewed international journal articles with the keywords 'water accounting' and obtained up to 17 titles (17 titles), 'water management' obtained two titles (2 titles), and 'sustainable environment' obtained one title (1 title). Meanwhile, articles in national journals using the keyword “water management” obtained...
six titles (6 titles) "sustainable environment" three titles (3 titles). In addition to articles related to the topic, the search examines literature and books related to the topic. This study examines water management and a sustainable environment. However, as far as the researcher knows, the water accounting approach has not been widely used in the management of sustainable water resources. In general, they did not use the water calculation method; on the other hand, in water accounting studies, they refer to financial reporting and monitoring, or control [Charles Batchelor (FAO consultant) 2017, Sadalia et al., 2017].

3 RESULT AND DISCUSSION

3.1 BUSINESS RISKS OF CLEAN WATER MANAGEMENT

Risk is defined as the possibility of loss, and risk is the possibility of loss, uncertainty, the difference between actual and expected, and risk is the probability that some result differs from what was expected [Gibassier D., 2018]. The study [Pawsey N., Ananda J., and Hoque Z., 2018] explained that risk is classified as speculative and pure risk that can come from inside or outside the company. Strong population growth, either naturally or indirectly in the form of migration, increases the acceleration of the water crisis and the inefficient management of clean water [Elmahdi A., 2019]. In an Australian study [Escriva-Bou A., McCann H., Hanak E., Lund J., Gray B., Blanco E., Jezdimirovic J., Magnuson-Skeels B., and Tweet A., 2020] about clean water management was not effectively implemented. Notes that there is no clear calculation of water availability now and in the future. Sustainable clean water management using water accounting predicts water shortages in the dry season [Elmahdi A., 2019]. In the future, the water crisis will end the distribution of clean water in clean water management and will become a major challenge in dry areas [Gibassier D., 2018]. Water accounting in clean water management minimizes business risks [Gibassier D., 2018]. For example in Indonesia, The Ministry of Public Works and Housing in 2023 designed a budget for natural resource management from upstream to downstream to achieve national targets. The budget amounted to IDR 41.948 trillion for Water Resources management and IDR 23 trillion in the settlement sector. Upstream Water Resources Management is through the completion of the dam construction program with a target of 13 dams completed by 2023, including Keureuto and Rukoh Dams in Aceh, Lau Simeme in North Sumatra, Karian in Banten and Cipanas and Leuwikeris in West Java. Then, rehabilitation and improvement of irrigation covering 98,700 hectares including in DI Komering (South Sumatra), DI Rentang, DI South
Lakbok (West Java), DI Cihaur, DI Logung (Central Java), DI Mrican (East Java), DI Pakacangan (South Kalimantan) and DI Saddang (South Sulawesi). For downstream natural resource management, the construction of irrigation networks covering an area of 6,900 hectares such as the Lematang Irrigation Area in South Sumatra and DI Baliase in South Sulawesi, and other irrigation areas whose water is served from dams. Next, the construction and improvement of Drinking Water Supply Systems (SPAM) with a capacity of 2,206 liters/second. Third, optimization of SPAM with 680 house connections (SR) and community-based SPAM with 276,000 SR. Finally, the Domestic Wastewater Management System with a service of 16,600 Family Cards (KK). The above was made to achieve various targets and strategies to improve water security in Indonesia upstream and downstream.

3.2 COMPONENTS OF WATER ACCOUNTING

Water accounting can be used to analyze clean water management [Elmahdi A., 2019]. Water accounting is the identification, storage and transmission of information related to water resources, enabling companies to manage water more responsibly [Tortajada C., 2020]. This detection enables analysis of water use, scarcity and productivity [Charles Batchelor (FAO consultant), 2017]. These are the water calculation components usually used in research [Escriva-Bou A., McCann H., Hanak E., Lund J. and Gray B., 2016].

- Total flow is the total amount of water entering the system, consisting of rain, surface water and groundwater.
- Net income is gross income plus changes in inventory. If storage is reduced, net imports are greater than gross income. When inventory increases, net income is less than gross income. If no inventory is taken, then net income = gross income.
- Available water is the available water that can be used, it is the difference between the net income and the required water
- Water depletion is the use of water that ultimately reduces the availability (available) of water for other uses. Drainage can be classified into process drainage and non-process drainage. Water is used to make some products to break down the process, such as water evaporation, drinking water needs and industry. Non-process consumption refers to the use of water in ways other than process
consumption, such as evaporation from open water surfaces and/or uncultivated land and deep filtration.

- Effluent is a certain amount of water that leaves the system. Wastewater can be grouped into bound and unbound water. Bound water is the part of wastewater that is collected for use or given to users after the system. It is intended for use in downstream irrigation areas used for ecosystem purposes, such as minimal flow left for river tracking and/or downstream fishing, or as part of a seawater intrusion. Unbound water is a million of water that leaves the system as an additional user.

This all point above are needed for do water accounting and make it applicable to corporation of water supply.

3.3 APPLICATION OF WATER ACCOUNTING

Water accounting is a systematic quantitative assessment of the status and trends of water supply, demand, distribution, availability and use in specific areas. It informs water science, economics and management to support social and water sustainability outcomes. environment [Hazelton J., 2015], [Momblanch A., Pedro-Monzonís M., Solera A. and Andreu J., 2018]. The benefits of water accounting itself (Armadi D., Hidayat A. and Simanjuntak SM., 2019) can improve the understanding of water costs for sustainable development, (Hazar M., 2015) can help identify water problems in different sectors and (Hendrik P., 2018) increase transparency in water distribution. Water accounting is a system used by companies to manage water use to measure and calculate and monitor the impact of water quantity and storage, water quality and use [Escriva-Bou A., McCann H., Hanak E., Lund J. and Gray B., 2016].

Although water accounting has many advantages in implementation, there are several barriers to implementation as most developing countries still struggle to manage water resources for clean water management [Holyoak J., 2019]. For water sources, the quantity and quality of water metering is sometimes undetermined. In addition, the lack of hydrometric infrastructure (eg. meters) in clean water management results in water sources not being accounted for now or in the future [Elmahdi A., Hafeez M., Smith A., Frost A., Vaze J. and Dutta D., 2015]. This is very important for the clean water supply of the company.
3.4 SUSTAINABLE WATER MANAGEMENT MODEL

Water management models can positively influence clean water management now and in the future, especially at water sources [Sallata MK., 2015]. The following is a model of how water supply got managed from top to bottom.

Figure 1: The Water Supply Model


The model explains that groundwater use in Indonesia can be realized through the implementation of surface water protection programs, groundwater protection, and groundwater use protection. Its implementation is influenced by ecological, economic, socio-cultural, technical and institutional factors. When analyzing water use and groundwater damage, these five factors largely determine the maintenance of sustainable groundwater use. The concept of water resource management provides feedback from the user community. Therefore, it requires the commitment of leaders and communities to strengthen institutions and appropriate incentives [Rahmi YK., Paulus W., Haryoto K., Setyo SM., 2017].

- Aspects of community involvement include the need to increase the supply of clean water, perceptions of the ratio of benefits and increased supply of clean water, feelings about responsibility and ownership, culture, practices and beliefs related to clean water.
- Technical aspects include current and future water needs, clean water treatment, technical standards, organizational procedures and water quality management.
- Environmental aspects include the quality and quantity of water sources and the protection of water sources.
• Financial aspects include cost-benefit analysis, ability and willingness to pay, and rate structure.

• Institutional aspects, namely national level strategies and policy/legal framework.

All these measures ensure the sustainable use of groundwater in such a way that it can exceed water availability in the future [Putra D., 2017].

4 CONCLUSION

Every year, population growth and development has increased, which affects the demand for clean water. During the dry season, many areas in Indonesia suffer from a lack of clean water management. Clean water providers play a key role in maintaining the availability of clean water that society needs. Applying water accounting to clean water facilities can solve this problem. Water accounting can be used to identify business risks and calculate future water use and availability. Companies can manage water transparently and responsibly. Commonly observed business risks are losses and loss of customer trust. The introduction of water metering can minimize these risks. In water accounting, the amount of water produced and used in one day can be reliably known, so it brings many advantages. Therefore, community participation in clean water management is essential.

To maintain natural sustainability, it is necessary to increase community participation in the maintenance of water sources. Community participation begins with the implementation of surface water protection programs, groundwater protection programs, and groundwater use programs. Water resource management focuses on ecological, economic, socio-cultural, technological and institutional factors. When all these factors are taken into account, the management of water resources and the environment is sustainable. Finally, the community can enjoy the water supply in the long run.
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