

Developing Sustainability-based Indicators for Communal Wastewater Treatment Plant Evaluation

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ABSTRACT

The lack of stakeholder concern for sanitation issues, especially domestic wastewater issues, is reflected in the small budget allocation for the construction of basic sanitation facilities. In fact, the danger of environmental damage and decreased water quality due to poor sanitation causes repair efforts to be 10 times more expensive than the cost of prevention. Diseases related to water quality often appear in areas with poor environmental sanitation. Limited attention to wastewater management is also characterized by limited alternative technology options so that the application of wastewater treatment can be said to be far from optimal. Therefore, since a few decades ago the use of communal wastewater treatment plants (communal WWTP) began to be developed in Indonesia to improve environmental sanitation conditions in the community. Although the number of communal WWTP in Indonesia has reached thousands of pieces, many of them are not functioning optimally. The causes of the malfunctioning of the communal WWTP include: limited operational and maintenance budgets for the WWTP, incompatibility of design and technology choices, lack of user attention to maintenance, lack of technical knowledge, and the absence of monitoring and evaluation of the performance of communal WWTP.

The malfunctioning of communal WWTP can cause many losses, including: financial losses, decreased levels of public health, and environmental pollution because the processing results are below quality standards. This underlies the thinking of the proposer of this research proposal that it is very important for sanitation projects (in this case the communal WWTP system) to consider all aspects in an integrated manner so that the *sustainability* of the sanitation project can be relied upon. This study aims to develop an instrument to evaluate the performance and sustainability of communal WWTP with a multi-criteria analysis approach (socio-economic, technical, institutional and environmental). This instrument is expected to provide a complete picture of the current and future condition of the communal WWTP. With this evaluation instrument, problems that can hinder the sustainability of WWTP are immediately identified and can be used by decision makers (especially the government) to determine the type of intervention that must be carried out. This instrument is designed to be very easy to operate, especially for WWTP managers and governments in developing countries, especially Indonesia.

The assessment of the sustainability of the sewage system should include environmental, social, economic and technical aspects of the option. Sustainability modules were developed to evaluate different options for technology selection and evaluation of existing wastewater treatment plants. Modules can be applied by selecting and adjusting the weight of the assessment criteria with the assessment mechanism to suit specific local conditions. Best practices can be an important step in identifying and selecting these indicators. The sustainability of different wastewater treatment options can be compared to identifying and balancing criteria and selecting performance measures according to specific conditions. As new and improved wastewater treatment technologies are developed, more wastewater treatment options are available to offer greater sustainability, reliability and flexibility. Therefore, wastewater treatment systems can provide greater sustainability to users, communities, and the environment. The developed model can be used to assess the sustainability of existing cultures as well as to evaluate various design and technology options in detail. The results also help decision makers with overall project planning, process improvements or improvements and future priorities. By developing sector-specific indicators, the module can be applied to other sectors, for example, oil and gas wastewater, mining, industry, municipalities and manufacturing (sustainable cities). Sustainability challenges many of these approaches, attitudes, and practices. Sustainable practices can be included at any stage. Many sewage treatment plants have been operating for years, even decades. The plant is a prime candidate for process optimization, re-evaluation and improvement, not only in terms of performance but also in terms of sustainability.

Kata Kunci: *Communal WWTP, evaluation instrument, multi-criteria perspective, sustainability principles, sustainability predicate*