

Differences in Training Between Operators in Managing Industrial Wastewater Treatment Plants

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Abstract

This Study aims is to review the literature concerning differences in training between operators in managing wastewater at Jakarta Industrial Estate, Pulo Gadung by using the descriptive qualitative method. Many industries at Jakarta Industrial Estate Pulo Gadung do not have any wastewater treatment plant and although they have one, they are not willing to operate the treatment plant. The different operator training in managing industrial wastewater through comparative study between waste water treatment plant (WWTP) direct and simulator in WWTP with supervisory control and data aquisition (SCADA) system. The result show that (1) Operation of the simulator with human resources for the operational processes is much more efficient, requiring supervision by one instructor from 4 to 10 operators at the same time for several scenarios, (2) Simulator operating costs are lower than real training which is made directly in the wastewater treatment plant (WWTP) and the results are much better for training on the simulator than in WWTP with SCADA system.

Keywords: Training, Operator, Management, Wastewater, Industry

Introduction

Sustainable business operations management will be realized if the directors of manufacturing corporations in the estates of Jakarta Pulo Gadung industry pay attention to ecological, social and economic aspects in managing industrial wastewater (Ismail, 2016). Nearly 87 % on the total industries in Indonesia are located in urban area. Those industries discharges wastewater into the river without any proper primary treatment. As illustration, more than 720 industries are registered in the Brantas River East Java, situation 2003 and 459 are asses as potential polluter for the rivers. They produced in terms of BOD is 82.7 ton / day and the most important part comes from from paper and pulp industries (42 %).

In Jakarta region (JABOTABEK) more than 1740 medium and lard industries contributed 13 % pollutant in Jakarta – Ciliwung River with level of degradation (recorded in 2002) by decreases of PH of surface water by 0.13 / year increase in BOD by 3.24 ppm /year and also increase in COD and other contaminant like Fe, Cd, Zn, and others. The establishment of clean river Program (PROKASIH) , in short term, subjected to control puntual pollution source (Mitchell, 2013). Since than the Government policy has not yet been effective to improve the water quality in a substantial way, although water quality standard have been formulated for surface water and industrial effluents by the Decrease to State Minister of Population and Environment No. 12/MENKLH/I/1988 and No. 03 / MENKLH/ II /1991.

The industrial wastewater management in the corporations becomes significant issues, because it affects the cost in overall business. The life cycle of any given product observes the following pattern : could include an increase in state funds allocated for these purposes waste water fees or wastewater facility permit fees. (Panaitescu, at. al., 2013). Also as a significant part related with this subject is the operator training in managing the industrial wastewater at Jakarta Industrial estates Pulo Gadung.

Some Industries has been built years ago when the river water pollution had not yet become serious problem, so they did not realize the necessity of installing a wastewater treatment plant. Some of the small scale industries are not capable enough to finance the construction of treatment plant as well as the operation and maintenance (Freeman, 1988). Many people, including some industrialist, do not aware their contribution in the water quality deterioration. Many industries do not have any wastewater treatment plant and although they have one, they are not willing to operate the treatment plant continuously. It is also caused by lack in wastewater treatment and process expert particularly in planning (designing), operation and maintenance of wastewater treatment plants.

The human resource operators functions is to improve the efficiency of employee data management and employee activities and also eliminate human error in the computational process. Problem statement for a training in a process from a waste water treatment station can act in two ways: (1) emergency data system operating in a virtual simulator operational process, (2) Controlling failure data with Supervisory Control and Data Acquisition (SCADA), software installed in a wastewater treatment station. With the simulator computer the operators can follow training or learn courses attendants in choosing the best strategies in a given crisis situation and offers the realistic modeling of a crisis situations over money and quick response time beacon additional costs of operating mistakes (Panaitescu, 2013). (Rony, at al., 2021). The role of the Human Resources Division needs to be optimized to develop and prepare future operators and business partners who can initiate and carry out this change process.

Method

This research method uses descriptive qualitative method. (Sugiyono., 2017). How to minimize the Industrial wastewater through the operator training in the Jakarta Industrial Estate, Pulo Gadung ?

An general, the first step in minimizing the effects of Industrial waste on receiving streams and treatment plants is to reduce the volume of such wastes. This may be accomplished by (1) classification of wastes; (2) conservation of wastewater (3) changing production to decrease wastes ; (4) reusing both industrial and domestic effluents as raw water supplies.

The step of research methodology for an operational processes as follows:

1. Choosing a schematic diagram of a higher fidelity type of a wastewater treatment facility
2. Construction and configuration modules based processes and the connectics
3. Specification in addition to the standar configuration of the analysis and they allow the possibility of automatic calibration facility chosen, with process and set process basic, and other intermediate processes occuring plant technology.
4. Work on multiple workstations, for example 6 users, and then we deal network
5. Presenting a case of working with key variables related scheme.
6. Conducting operation and display the relevant results screen can change corresponding results of other. (Moleong, L. J., 2016).

Discussion

Over the past ten years wastewater management has been engaged in industrial communities as a key for environmental management. Nearly 87 % of the total industries in Indonesia are located in Urban areas and discharge their wastewater into the river without any proper treatment. They contributed in increasing pollutants such as BOD, COD, and other contaminants like heavy metals for surface water. Many industries at Jakarta Industrial Estate Pulo Gadung do not have any wastewater treatment plant and although they have one, they are not willing to operate the treatment plant. It is caused by lack in technological and process expertise of wastewater. (R. A. Harianto, 2017). A technological approach like wastewater minimization and practical solution for various characteristics of industrial wastewater are conducted with the different operator training in managing industrial wastewater through comparative study between wastewater treatment plant (WWTP) direct and simulator in WWTP with supervisory control and data acquisition (SCADA) system. The required operations and processes necessary to achieve that required degree of treatment can that be grouped together on the basis of fundamental considerations

Using the simulator the results are presented in Table 1 that The Operators are trained and the professional development of human resources on computer operation for a wastewater treatment plant with supervisory control and data acquisition (SCADA) control system is real, and any cost for company.

Subsection 1

The result show that Operation of the simulator with human resources for the operational processes is much more efficient, requiring supervision by one instructor from 4 to 10 operators at the same time for several scenarios,

Subsection 2

Simulator operating costs are lower than real training which is made directly in the wastewater treatment plant (WWTP) and the results are much better for training on the simulator than in WWTP with SCADA system.

Table 1The Result of Training on the Simulator

Form Training	Operator	Number of Operators	of Working Result	Case
Training on Operational Processes Simulator		4 – 10	With key variables related scheme and possible mistake Unit control elements display permanently computer controlled	
Training in WWTP SCADA System	in with	1 – 4		

Data Source : Jakarta Industrial Estate, Pulo Gadung (JIEP)

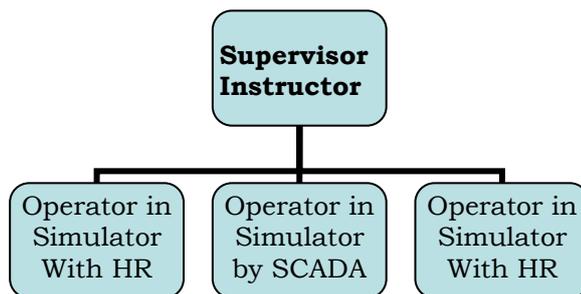


Figure 1. Training Between Operators

The Working Case Result show that (1) Simulator training is more effective for any beginner operator in Wastewater Treatment Plants, (2) Operation of the simulator with human resources for the operational processes is much more efficient, requiring supervision by one instructor from 4 to 10 operators at the same time for several scenarios, (3) Simulator operating costs are lower than real training which is made directly in the wastewater treatment plants (WWTP) and the results are much better for training on the simulator than in WWTP with SCADA system, (4) Training with simulator leads to a modern, efficient training and contributes to the development of specialized human resources using the criterion of quality in computer training.

Conclusion

The operators can be trained on knowledge retention process is better with 56 % for operational training. Training on simulator are lower than the real costs. WWTP is equip system the efficiency of the processes is 87 % - 100 % for the operators trained. Besides the operating costs of the simulator are lower than real training which is made directly in the wastewater treatment plant (WWTP) and the results are much better for training on the simulator than in WWTP with

supervisory control and data acquisition (SCADA) system, and training simulator leads to a modern, efficient training and contributes to the development of specialized human resources using the criterion of quality in computer training.

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