ABSTRACT

Dinas Kebersihan dan Pertamanan (DKP) Surabaya has responsibility to keep Surabaya clean in order to support the vision of Surabaya toward eco-city. Currently DKP has a road sweeping system which involves sweeping workers managed by independent companies or directly managed by DKP. In the implementation of that system, there are many problems related to the abuse of the monthly salary of the sweeping workers, the unfair workload of the sweeping workers, different difficulty level of the road, the management and the control of the sweeping processes, and the likelihood of accidents that involve sweeping workers. As the length of the road and the volume of vehicles in Surabaya are going to increase significantly in the near future, DKP is keen to investigate the possibility of using road sweeper machines to replace some sweeping workers. The use of road sweeping machines may reduce the cost and the risk but has to comply with the difficulty level of each road in Surabaya city.

This research began with the observation and the benchmark of road sweeper machine alternatives that have potential to be used in Surabaya city. The next step is the identification of factors that influence the suitability of the road towards the road sweeper machines usage. This identification classified Surabaya city’s roads into high potential roads, medium potential roads, and not potential roads. The high potential and medium potential roads will be hint for the next step, which is the calculation of the number of road sweeper machines needed and the number of sweeping workers needed when road sweeper machines are used. Those numbers will be used to calculate the financial feasibility of the road sweeper machines compared to the current situation. The financial calculation used Benefit Cost Ratio (BCR) and Net Present Value (NPV). The use of road sweeper machines will be analysed in two schemes, which are buying or leasing. To provide more comprehensive analysis, this research assessed the risks of road sweeper machines’ usage, for example the CO$_2$ emission and the accident likelihood.

The results of this research demonstrated that the use of Nilfisk and GM 414 at high potential and medium potential roads is feasible, with the BCR values more than 1. Based on NPV analysis, the best alternative for 1.5 working hours is to lease road sweeper machines, while for 7 working hours is to buy road sweeper machines.

Keywords: Benefit Cost Ratio (BCR), Net Present Value (NPV), Risk, Road Sweeper, Road Sweeping System