

Assessing the effectiveness of waste minimization methods in solid waste reduction at the source by manufacturing firms in Malaysia

ABSTRACT

Manufacturing industries in Malaysia play a fundamental role in economic growth and enhancing the population's standard of living. However, a huge quantity of industrial wastes is generated daily, exacerbating landfill disposal issues. Waste minimization as the most sustainable approach of waste handling contributes to a significant reduction of waste. In Malaysia, practicing waste minimization by manufacturing firms is not very common. Thus, this study attempted to determine the most commonly practiced methods of minimization by manufacturing firms in Malaysia. Also, the effectiveness of each method in waste reduction was explored. Data were collected through survey and analyzed through the quantitative and qualitative approaches from 214 manufacturing firms that cover small, medium, and large sizes with a 67.5% response rate. The questionnaire was developed based on the review of literature and is validated by a panel of experts. Paired sample T-test was used to compare the solid waste generation one year before and one year after practicing methods. Spearman Rho Correlation and multiple linear regression analysis were used to explore the relationships of methods and their significant contribution in waste reduction. Findings revealed that waste generation was significantly different after practicing waste minimization methods ($p < 0.05$). With respect to the methods correlation and effectiveness in waste reduction, all waste minimization methods have a significant and positive correlation with waste reduction ($p < 0.05$). Methods include segregation of wastes, on-site reuse and recycle, improved housekeeping, and equipment modification – all of which were found to be effective in waste reduction for Malaysian manufacturing firms ($p < 0.05$).

Keyword: Solid waste generation; Waste minimization; Manufacturing firms; Minimization methods effectiveness