

# **A STUDY AND REVIEW OF THE OPERATIONAL METHODOLOGIES FOR WASTE MANAGEMENT IN INDUSTRIAL SETTINGS**

## **Executive Summary**

With the emergence of sophisticated technology especially since the industrial revolution in the late 1700s, every facet of manufacturing has evolved into what is observed in the modern industry and has paved the way forward for additional phases of technological milestones. The first industrial revolution was the introduction of steam and water power to mechanize production, the second was the start of mass production with the assistance of electric power, the third marked the start of the digital age with the emergence of electronics and computers to automate production, and finally we are currently in the age of cyber physical systems and artificial intelligence that endeavours to connect the currently existing computational entities to the surrounding physical world. With each industrial revolution, demand for energy has increased to a level that waste management strategies have struggled to keep up with due to the rigorously evolving industry.

Detailed process mechanisms and technicalities are not within the scope of this project as this project aims to study the evolution of waste management and their operational strategies and philosophies, and to develop a simple waste management pipeline to provide guidelines and direct operations managers to useful waste management tools when working in different industries. Quantitative life cycle assessments and economical/environmental impacts are not discussed in this report.

Often, due to the unknown nature of some classification of hazardous waste, organizations do not practice the correct method of handling and segregating waste which has caused growing concerns in the general public and the governments of many countries. A fragment of this report is dedicated to the application of certain methods to create tools for operations managers to utilize. Using a list of datasets from sources online related to solid waste, some concerning dumping sites and other centred on waste recycling optimization, we were able to apply these learned concepts to a select case studies and arrive at useful tools that can be replicated by other operations managers. These case studies seek to look into the modelling and optimization of waste streams and recycling outputs using tools for data analysis, optimization and geospatial analysis.