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Abstract

DYNAMIC SIMULATION OF CONSTRUCTION WASTE IN MACAO

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This paper is the analysis for the behavorial tendency of the construction waste (CW) volume in Macao from 2006 to 2025. The analysis aims at discovering the changing behavior of construction wastes volumes in Macao by means of system dynamic models. The quantity of construction waste is determined by many factors in various aspects. Four sources of construction waste are selected to be the objects of study, which are assumed to constitute most of the construction waste in Macao. They are the waste generated by construction of casinos and hotels, the waste generated by interior renovation of residence in Macao, the waste generated by civil infrastructures and private construction project in Macao, and the waste generated by reconstruction of old zones in Macao. Some secondary factors, such as area of Macao, the average stay time of tourists, population density are also taken into consideration.

A system dynamics simulation tool – STELLA will be used to perform the analysis, and correlation analysis of parameters in the dynamic models will be carried out by a statistic analysis software – SPSS(SPSS Inc., Chicago, Ill.). Most of the information

about Macao construction waste, especially parameter values, is obtained from The Statistics and Census Service(2006).

From the results of the correlations analysis among the cited data, we obtain parameter values of the curve estimation analysis in SPSS for different functions. Then we select the most suitable curves by comparison of the R square values. Finally, by linking up the relevant equations, the model for simulating the entire volume of Macao construction waste is formed, and a graph for the generation of Macao construction waste from 2006 to 2025 is derived by running the model.

Sensitivity tests are conducted to ensure the dynamic model to be stable and reliable, so that the simulation results will not change considerably upon high uncertainty of parameter values. Important parameters including tourist normal growth rate, area of Macao in 2025, maximum value for population density and the cost to generate $1m^3$ construction waste, are chosen to perform sensitivity tests. Finally, the sensitivity tests results do not show any substantial change of the basic patterns.

The simulation result shows that the total construction waste will reach 530127.91 cubic metres in 2025. The sum of total construction waste from 2006 to 2025 will have a volume of 13,818,250.33 cubic metres.

The results of the analysis indicate that the volume of construction waste in Macao will remain at high level from 2006 to 2010. It shows that the increasing volume of construction wastes requires a large dumping area to deposit such a large volume of non-incinerated waste.